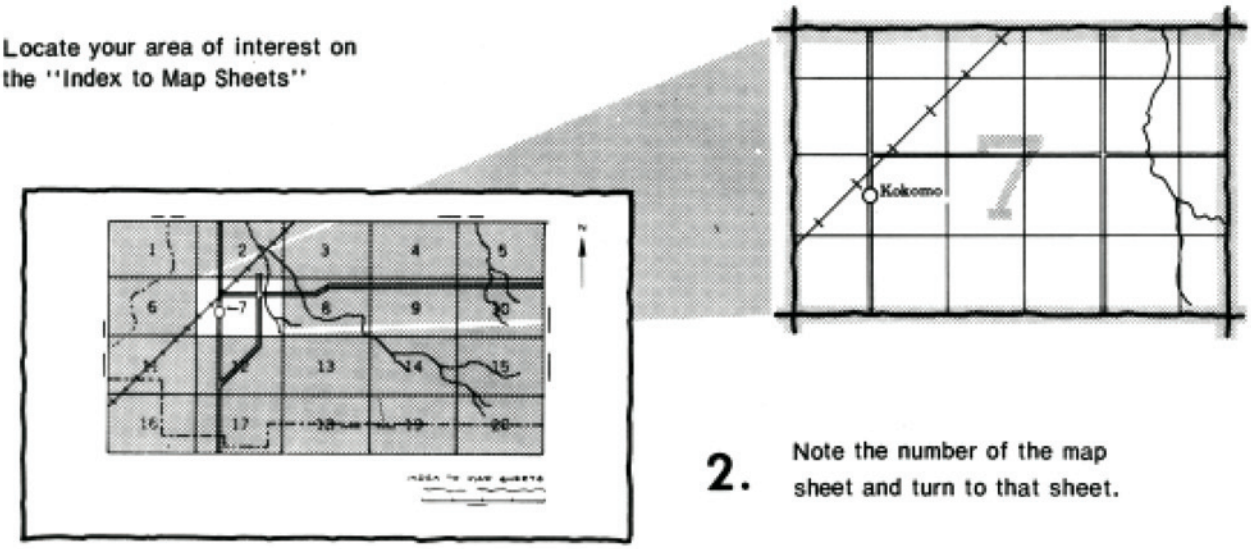
SOIL SURVEY OF

Choctaw County, Oklahoma

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

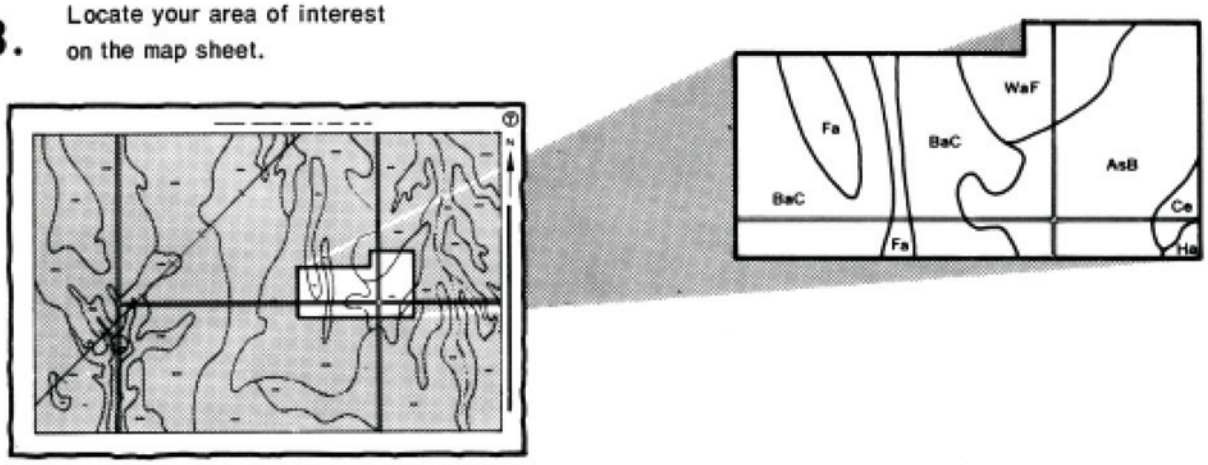
HOW TO USE

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

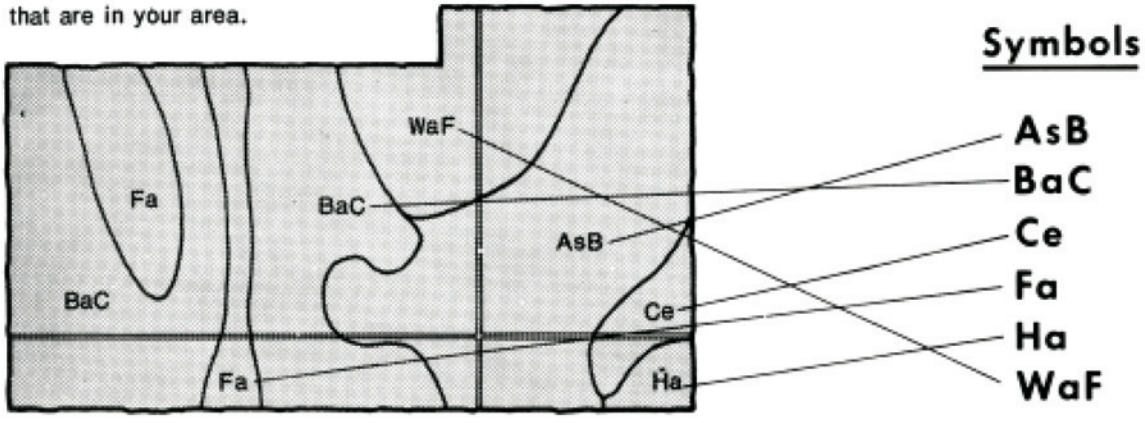


2. Note the number of the map sheet and turn to that sheet.

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

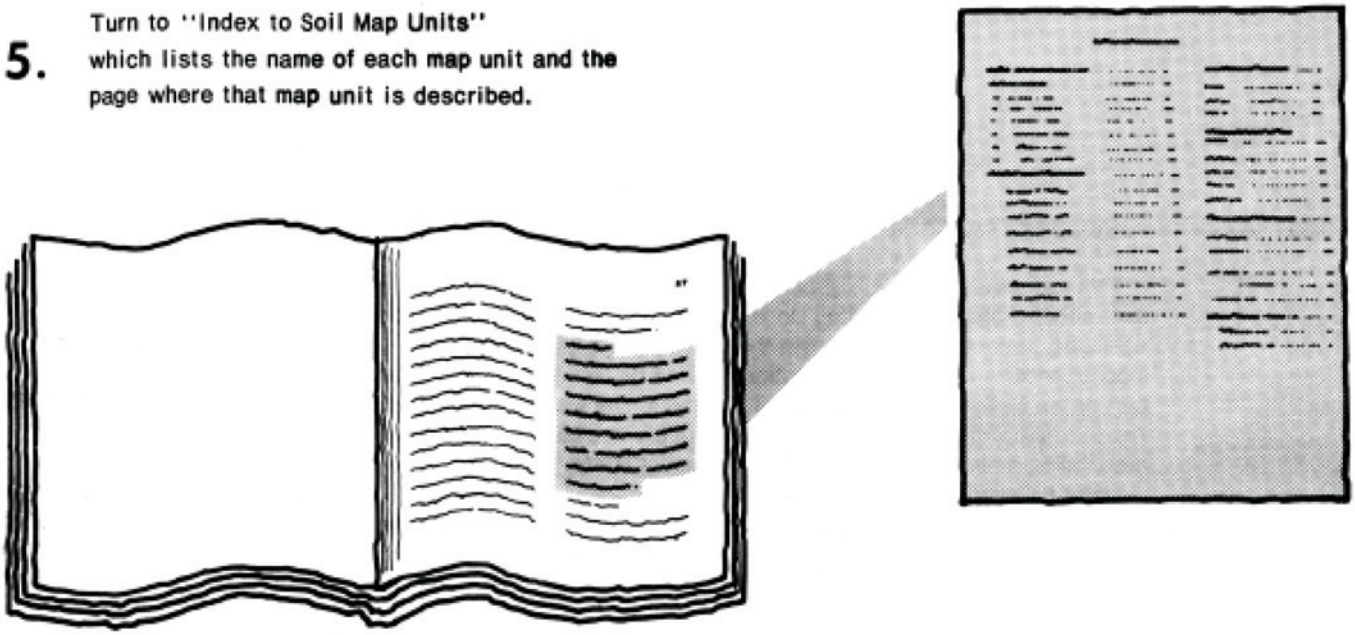


4. List the map unit symbols that are in your area.

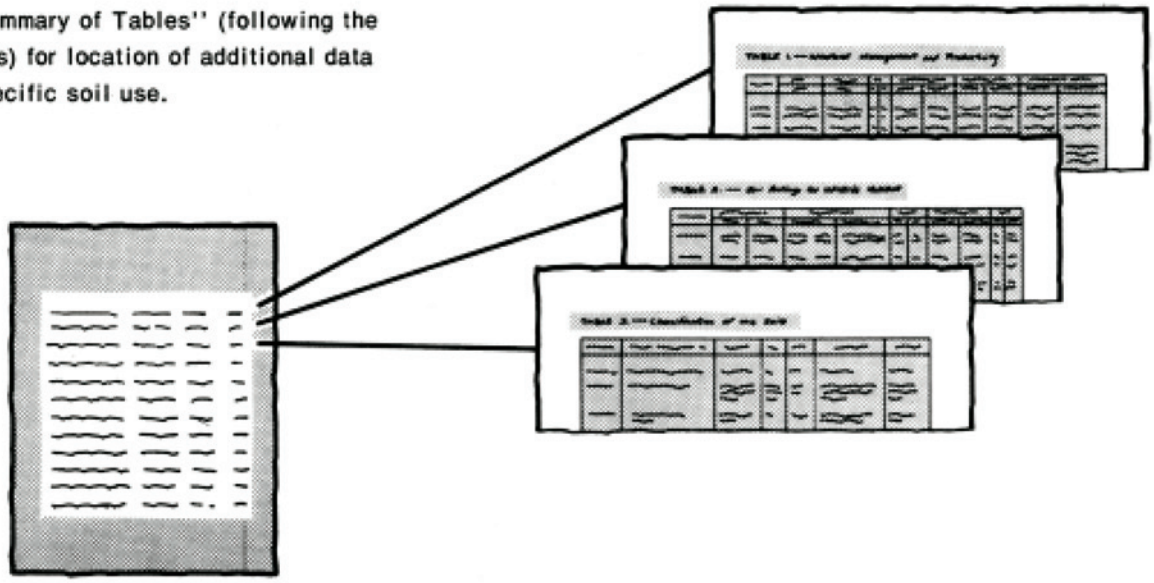


THIS SOIL SURVEY

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 1977. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1977. This survey was made cooperatively by the Soil Conservation Service and the Oklahoma Agricultural Experiment Station. It is part of the technical assistance furnished to the Kiamichi Conservation District and Valliant 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 September 1979

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Foreword

The Soil Survey of Choctaw County 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.

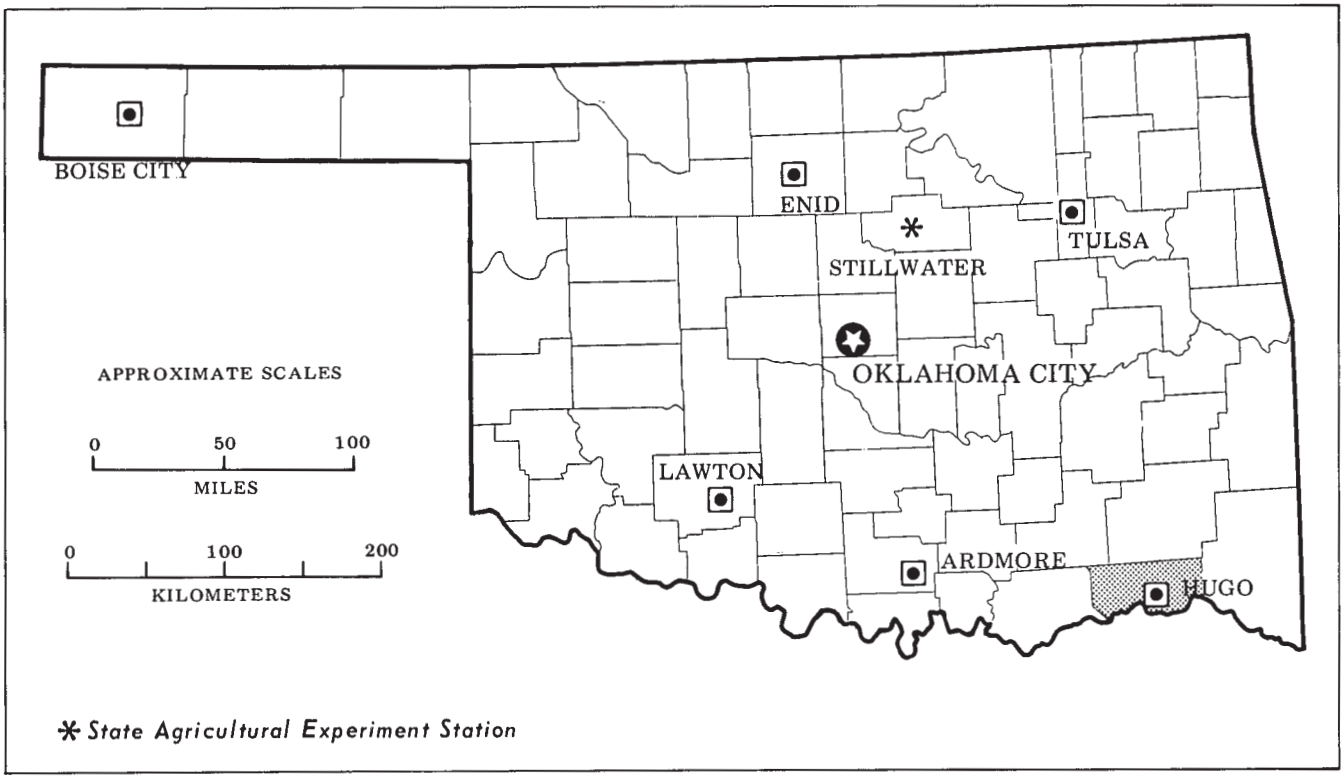
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers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

Roland R. Willis
State Conservationist
Soil Conservation Service



Location of Choctaw County in Oklahoma.

SOIL SURVEY OF CHOCTAW COUNTY, OKLAHOMA

By Billy G. Swafford and Robert C. Reasoner, Soil Conservation Service

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

CHOCTAW COUNTY is in the southeastern part of Oklahoma. It is bounded on the north by Atoka and Pushmataha Counties, on the east by McCurtain County, and on the west by Bryan County in Oklahoma and by Lamar and Red River Counties in Texas. It has an area of 795 square miles, or about 508,800 acres. Hugo is the county seat.

General nature of the county

This section gives general information concerning the county. It describes physiography, drainage, and relief; settlement and development; natural resources; transportation and industry; and climate.

Physiography, drainage, and relief

Choctaw County is mainly on the Southern Coastal Plains and in the Ouachita Mountains physiographic regions. Topographic differences range from the nearly level flood plains along Muddy Boggy and Clear Boggy Creeks and the Kiamichi and Red Rivers to the moderately steep hilly area in the northeastern part of the county. The general slope is toward the south and east. Most of the drainage is into the Red River. Boggy Creek drains a large area in the western part of the county. The Kiamichi River drains most of the eastern part of the county. Nearly all drainage from the county empties into the Red River.

The average elevation is approximately 500 feet above sea level. In small areas in the northeastern part of the county the elevation is 650 feet. The lowest point in the county on the Red River is about 350 feet.

Settlement and development

The early settlement of Choctaw County was mostly by the Choctaw Indians. Land was allotted to the Indians on the basis of its cash value. The largest allotments were on the rolling timbered soils. Land could also be leased for farming subject to the supervision of the Indian Agency. The sale or lease of the land brought white settlers into the county.

Most of the early settlers farmed on small subsistence acreages. Timbered areas were first cleared. Cotton, grain sorghum, peanuts, small grain, and alfalfa hay were the major cash crops. Other crops were grown as feed for chickens, horses, mules, hogs, and beef and dairy cattle. Making a living was difficult because natural fertility was low.

Farmers are specializing in certain types of crop and livestock enterprises to increase efficiency in managing larger farm units. More mechanized machinery is used. Irrigation supplements the moisture needs of field crops in some areas. Old cultivated areas have been converted to tame pasture. One large reservoir, built on the Kiamichi River, is used for recreational, municipal, and industrial purposes. Some industries have been established.

Natural resources

The natural resources of the county are mainly soil, water, timber, gravel, limestone, and wild game and fish.

Soil, the most important natural resource in the county, produces grass for livestock and the timber, crops, and mineral resources that are necessary to sustain the dominant part of economy in the county.

The water supply for towns is mainly from wells and reservoirs. Flood control reservoirs furnish recreation and irrigation water. Farm ponds supply water for livestock needs.

The income from timber is more than it was in past years. Most of the timber has been cut over. The trees that were left to propagate the stands are of poor quality. Many areas are being planted to trees.

Deposits of gravel along streams are an important natural resource. Good sources of gravel occur in the

long narrow areas paralleling the Kiamichi River. The gravel is used mainly for concrete aggregate and road construction.

Limestone, the most common surface mineral in the area, is mined in the northern part of the county for roads and for commercial and agricultural purposes. In some areas this mineral is of excellent quality for agricultural lime.

Wildlife and game are abundant. Deer, quail, dove, rabbit, and duck are hunted in season. Ducks have a resting area along the Red River and Hugo Reservoir.

Clear running streams, small ponds, and lakes attract thousands of visitors each year. The Hugo Reservoir provides recreational facilities in spring and summer.

Transportation and industry

Choctaw County is served by a network of State and Federal highways and one railroad. Indian Nation Turnpike, Federal Highway 271, and State Highways 93 and 147 cross the county in a north-south direction. Federal Highway 70 and State Highway 109 cross the county in a west-east direction. Dirt, gravel, and paved roads in rural areas provide access to State and Federal highways. The St. Louis-San Francisco Railway crosses the county from east to west.

Grain, peanuts, cotton, and livestock are marketed in Choctaw County or in adjacent counties. Limestone and gravel are mined for commercial and agricultural purposes, mostly in the northern or central part of the county. One large timber industry is located in the county. Most of the other industries, small commercial types, are near Hugo.

Climate

Choctaw County is hot in summer but cool in winter when an occasional surge of cold air causes a sharp drop in temperature. Rainfall is uniformly distributed throughout the year, reaching a slight peak in spring. Snowfall is infrequent. The annual total precipitation is normally adequate for cotton, feed grain, and small grain.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Antlers, Oklahoma, for the period 1951 to 1974. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 44 degrees F, and the average daily minimum is 31 degrees. The lowest temperature on record, -10 degrees, occurred at Antlers on February 2, 1951. In summer the average temperature is 80 degrees, and the average daily maximum is 93 degrees. The highest temperature, 111 degrees, was recorded on August 6, 1956.

Growing degree days, shown in table 1, are equivalent to "heat units." Beginning in spring, 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, 28 inches, or 60 percent, usually falls during the period April through September, which includes the growing season for most crops. Two years in ten, the April-September rainfall is less than 22 inches. The heaviest 1-day rainfall during the period of record was 6.18 inches at Antlers on October 31, 1972. Thunderstorms number about 50 each year, 18 of which occur in summer.

Average seasonal snowfall is 3 inches. The greatest snow depth at any one time during the period of record was 6 inches. On the average, 1 day has at least 1 inch of snow on the ground, but the number of days varies greatly from year to year.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night in all seasons, and the average at dawn is about 82 percent. The percentage of possible sunshine is 75 percent in summer and 55 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 13 miles per hour, in March.

Tornadoes and severe thunderstorms, which occur occasionally, are local and of short duration. The pattern of damage is variable and spotty.

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. The ratings of soil potential are based on the assumption that practices in common use in the survey area are being used to overcome soil limitations. These ratings reflect the ease of overcoming the soil limitations and the probability of soil problems persisting after such practices are used.

Each map unit is rated for cultivated farm crops, tame pasture, native grass, woodland, and urban uses. Cultivated farm crops are those grown extensively by farmers in the survey area. Tame pasture refers to land that is producing introduced grasses. Native grass refers to land that is producing grass native to the area. Woodland refers to land that is producing either trees native to the area or introduced species. Urban uses include residential, commercial, and industrial developments.

Areas dominated by very gently sloping to moderately steep loamy and sandy soils on uplands

The three units in this group make up about 51 percent of Choctaw County. The soils are used mainly for tame pasture and woodland. They are used less extensively for field crops and native grass.

1. Bosville-Bernow-Muskogee

Deep, very gently sloping to moderately steep, well drained and moderately well drained loamy soils

This unit consists of soils that formed under a cover of trees in loamy and clayey sediments. It makes up about 33 percent of the county. It is about 36 percent Bosville soils, 24 percent Bernow soils, 22 percent Muskogee soils, and 18 percent Alusa, Larue, Romia, and Saffell soils. All are on uplands.

Bosville soils are deep, very gently sloping to moderately steep, and moderately well drained. They have a loamy surface layer and a clayey subsoil. They are on smooth ridges and side slopes.

Bernow soils are deep, very gently sloping to strongly sloping, and well drained. They have a loamy surface layer and subsoil. They are on side slopes.

Muskogee soils are deep, very gently sloping, and moderately well drained. They have a loamy surface layer and a loamy and clayey subsoil. They are on smooth ridges.

This unit is used mainly for tame pasture. Many areas are woodland. A few areas are used for cultivated crops. The very gently sloping to sloping soils are suited to crops.

The potential is only medium for crops. The soils respond favorably if well managed. Controlling erosion and maintaining soil structure and fertility are the chief concerns of management. The potential is high for tame pasture and medium for native grass and woodland.

The potential is only medium for most urban uses. The high shrink-swell potential of Bosville soils and the wetness of Muskogee soils are the main limitations for most urban uses.

2. Clebit-Tuskahoma

Shallow, strongly sloping, well drained and moderately well drained loamy soils

This unit consists of soils formed in material weathered from sandstone and shale under trees and an understory of grass. It makes up about 1 percent of the county. It is about 35 percent Clebit soils, 19 percent Tuskahoma soils, and 46 percent Ruston, Smithdale, and Tenaha soils. All are on uplands.

Clebit soils are shallow, strongly sloping, and well drained. They are stony and loamy throughout the profile. They are on ridge crests and side slopes.

Tuskahoma soils are shallow, strongly sloping, and moderately well drained. They have a loamy surface layer and a clayey subsoil. They are on side slopes below Clebit soils.

Most of this unit is range. It is well suited to wildlife.

The potential is low for crops, tame pasture, woodland, and native grass. Protecting the soils from erosion is the chief management concern. Also important are proper grazing, preventing fires, controlling undesirable trees, and selectively harvesting trees.

The potential is low for most urban uses. Depth to rock in Clebit soils and wetness in Tuskahoma soils are the main limitations.

3. Tenaha-Smithdale

Deep, very gently sloping to moderately steep, well drained sandy and loamy soils

This unit consists of soils that formed under a cover of trees in material weathered from loamy or clayey sediments. It makes up about 17 percent of the county. It is about 45 percent Tenaha soils, 13 percent Smithdale soils, and 42 percent Clebit, Kirvin, Ruston, and Tuskahoma soils. All are on uplands.

Tenaha soils are deep, very gently sloping to moderately steep, and well drained. They have a sandy surface layer and a loamy subsoil. They are on side slopes and ridges.

Smithdale soils are deep, very gently sloping to moderately sloping, and well drained. They are loamy throughout the profile. They are on side slopes and ridges.

The soils in this unit are used mainly for tame pasture and woodland. Small areas are cultivated. Some eroded and severely eroded areas have been reseeded to pine. The soils are well suited to recreation uses and wildlife habitat.

The potential is low for crops. The main concerns of management are controlling erosion and maintaining soil structure and fertility. The soils respond favorably to good management. Potential is high for tame pasture and medium for native grass and woodland.

Potential is medium for most urban uses. The depth to rock in Tenaha soils and the slope of Smithdale soils are the main limitations for most urban uses.

Areas dominated by nearly level to moderately steep clayey and loamy soils on uplands

The two units in this group make up about 23 percent of Choctaw County. The soils are used mainly for native grass and tame pasture. They are used less extensively for field crops. They do not support trees.

4. Ferris-Panola

Deep, nearly level to strongly sloping, somewhat poorly drained and well drained clayey and loamy soils

This unit consists of soils that formed in loamy and clayey sediments. It makes up about 7 percent of the county. It is about 28 percent Ferris soils, 28 percent Panola soils, and 44 percent Burleson, Durant, Heiden, Hollywood, Swink, and Trinity soils. All are on uplands except the Trinity soils. Trinity soils are on flood plains.

Ferris soils are deep, very gently sloping to strongly sloping, and well drained. They are clayey throughout the profile. They are on side slopes.

Panola soils are deep, nearly level to very gently sloping, and somewhat poorly drained. They have a loamy surface layer and a loamy and clayey subsoil. They are on broad smooth ridges.

About 60 percent of this unit is cultivated. The rest is native range or tame pasture.

Potential is only medium for crops. Preventing excessive erosion and maintaining soil structure and intake of water are the chief management concerns. Fertilization and a cropping system that provides adequate crop residue are beneficial. Terraces are needed where slopes are more than 1 percent. The potential is high for native grass, medium for tame pasture, and low for woodland.

The potential is high for most urban uses. The low strength and the high or very high shrink-swell potential are the main limitations for most urban uses.

5. Hollywood-Swink

Deep, shallow, and very shallow, very gently sloping to moderately steep, moderately well drained and well drained clayey soils

This unit consists of soils that formed under a cover of grass in material weathered from limestone and clayey sediments. It makes up about 16 percent of the county. It is about 45 percent Hollywood soils, 32 percent Swink soils, and 23 percent Burleson, Durant, Ferris, Heiden, Lula, Newtonia, and Panola soils. All are on uplands.

Hollywood soils are deep, very gently sloping to sloping, and well drained. They are clayey throughout the profile. They are on broad smooth ridges and side slopes.

Swink soils are very shallow and shallow, very gently sloping to moderately steep, and well drained. They are clayey throughout the profile. They are on broad smooth ridges and side slopes.

Most areas of Hollywood soils are used for small grain and row crops. Because of the shallowness and the slope, Swink soils are used mostly for native range.

The potential is low for crops. The main concerns of management are controlling water erosion, increasing water intake, and maintaining soil structure and fertility. The potential is medium for tame pasture, high for native grass, and low for woodland.

The potential is low for most urban uses. The shallowness over rock in areas of Swink soils and the high shrink-swell potential of Hollywood soils are the main limitations for most urban uses.

Areas dominated by nearly level to gently sloping clayey and loamy soils on flood plains and terraces

The four units in this group make up about 26 percent of Choctaw County. The soils are used mainly for tame pasture and field crops. They are used less extensively for woodland. Only a few areas are used for native grass.

6. Boggy-Wrightsville

Deep, nearly level, somewhat poorly drained and poorly drained loamy soils on flood plains and terraces

This unit consists of soils that formed under trees in clayey and loamy alluvial sediments. It makes up about 9 percent of the county. It is about 27 percent Boggy soils, 26 percent Wrightsville soils, and 47 percent Dela, Elysian, Guyton, and Speer soils.

Boggy soils are deep, nearly level, and somewhat poorly drained. They are mainly loamy throughout the profile. They are on smooth to slightly concave flood plains.

Wrightsville soils are deep, nearly level, and poorly drained. They have a loamy surface layer and a clayey and loamy subsoil. They are on broad smooth or slightly undulating terraces.

Most of this unit is in tame pasture. A few areas of Wrightsville soils are used for woodland and field crops.

The potential is only medium for crops. The chief concerns of management are controlling wetness, protecting the Boggy soils from flooding, and maintaining soil fertility and structure. The soils respond to fertilizer and other good management. The potential is high for tame pasture and low for native grass. It is also high for woodland.

The potential is low for most urban uses. Flooding is the main limitation.

7. Hopco-Trinity

Deep, nearly level, somewhat poorly drained loamy and clayey soils on flood plains

This unit consists of soils that formed under trees in clayey or loamy sediments. It makes up about 8 percent of the county. It is about 44 percent Hopco soils, 29 percent Trinity soils, and 27 percent Kaufman, Latanier, and Pledger soils.

Hopco soils are deep, nearly level, and somewhat poorly drained. They are loamy throughout. They are on smooth flood plains.

Trinity soils are deep, nearly level, and somewhat poorly drained. They are clayey throughout. They are on broad smooth flood plains.

Most of this unit is in tame pasture or woodland. A few areas are used for crops.

The potential is medium for crops. Flooding, wetness, and maintaining soil structure are the chief concerns of management. Fertilizer, drainage, and residue management are needed. The potential is high for tame pasture, native grass, and woodland.

The potential is low for most urban uses. Flooding is the main limitation.

8. Roebuck-Pledger

Deep, nearly level, poorly drained and somewhat poorly drained clayey soils on flood plains

This unit consists of soils that formed under a cover of trees in clayey or loamy sediments. It makes up about 4 percent of the county. It is about 34 percent Roebuck soils, 22 percent Pledger soils, and 44 percent Coushatta, Garton, Latanier, Redlake, and Tuscumbia soils.

Roebuck soils are deep, nearly level, and somewhat poorly drained to poorly drained. They are clayey to a depth of 40 inches and loamy and clayey below. They are on smooth concave flood plains.

Pledger soils are deep, nearly level, and somewhat poorly drained. They are clayey to a depth of 40 inches and clayey and loamy below. They are on smooth flood plains.

Most areas are used for cultivated crops. Some are used for pasture, woodland, and wildlife.

The potential is medium for crops. The main concerns of management are surface drainage, soil structure, and the hazard of overflow. A few areas are ponded for short

periods. The soils respond favorably to good management. The potential is high for tame pasture and low for native grass. It is medium for woodland.

The potential is low for most urban uses because of the flooding and the high shrink-swell potential.

9. Whakana-Idabel-Karma

Deep, nearly level to gently sloping, well drained loamy soils on terraces and flood plains

This unit consists of soils that formed in loamy sediments. It makes up about 5 percent of the county. It is about 21 percent Whakana soils, 16 percent Idabel soils, 14 percent Karma soils, and 49 percent Caspiana, Garton, Kaufman, Kiomatia, Latanier, Oklared, Pledger, and Severn soils.

Whakana soils are deep, nearly level to gently sloping, and well drained. They have a loamy surface layer and a loamy subsoil. They are on broad smooth terraces.

Idabel soils are deep, nearly level, and well drained. They are loamy throughout the profile. They are on smooth flood plains.

Karma soils are deep, nearly level, and well drained. They have a loamy surface layer and a loamy subsoil. They are on broad smooth terraces.

Most of the unit is used for cultivated crops. The soils are well suited to vegetables.

The potential is high for crops. Maintaining soil structure and fertility are the main concerns of management. The soils respond favorably to good management and are well suited to intensified and diversified farming. They have high potential for tame pasture and medium potential for native grass and woodland.

The potential is high for urban use. Seepage for sewage lagoons and low strength for roads and streets are the main limitations in areas of Idabel soils.

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. The Muskogee series, for example, was named for the town of Muskogee in Muskogee County.

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, Bernow fine sandy loam, 1 to 3 percent slopes, is one of several phases within the Bernow 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. Bernow-Romia complex, 6 to 12 percent slopes, is an example.

A *soil association* is made up of soils that are geographically associated and are shown as one unit on the map because it is not practical to separate them. A soil association has considerable regularity in geographic pattern and in the kinds of soil that are a part of it. The extent of the soils can differ appreciably from one delineation to another; nevertheless, interpretations can be made for use and management of the soils. Tenaha-Kirvin association, moderately steep, 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. Tenaha and Smithdale soils, 2 to 12 percent slopes, gullied, 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 descrip-

tion 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.

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

1—Alusa loam. This deep, poorly drained, nearly level soil is on smooth or slightly depressed uplands. Slopes are 0 to 1 percent. Most areas are 15 to 60 acres; some are only about 5 acres.

Typically, the surface layer is grayish brown loam about 3 inches thick. The subsurface layer is light brownish gray loam about 5 inches thick. The subsoil is light brownish gray clay to a depth of 16 inches and gray clay to 72 inches.

This soil is medium in natural fertility and low in organic matter content. The surface layer is strongly acid or medium acid. Permeability is very slow, and the available water capacity is high. The soil has fair tilth and can be worked throughout a medium range of moisture content. The high water table is within a depth of 1 foot in winter and spring.

Included with this soil in mapping are areas of Muskogee soils and Wrightsville soils. These soils make up about 6 percent of mapped areas. Separate areas are generally less than 3 acres.

This soil has medium potential for row crops and small grain. It is wet in fall and spring and dry late in summer.

Management is needed to remove excess water and to maintain or improve soil structure and soil fertility. A cropping system that provides crops that produce large amounts of residue is needed. Smoothing the surface improves surface drainage. Crop rows can be alined so that the excess surface water can be drained through furrows.

The potential is low for native grass and medium for tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Controlling brush, deferring grazing, and preventing fires improve the quality and quantity of all grasses.

The potential is medium for woodland. The main management concerns are the equipment limitation and seedling mortality. Stands can be maintained or improved by preventing fires, removing or controlling inferior species, planting suitable species, and harvesting on a planned schedule.

This soil has low potential for most urban uses. Wetness is the main limitation for septic tank absorption fields, sewage lagoons, and sanitary landfills. Wetness, a high shrink-swell potential, and low strength are the main limitations for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IIIw. The woodland group is 3w. This soil is not assigned to a range site.

2—Bernow fine sandy loam, 1 to 3 percent slopes. This deep, well drained, very gently sloping soil is on wooded uplands. Slopes are smooth and convex. Most areas are 25 to 200 acres; some are only 15 acres.

Typically, the surface layer is brown fine sandy loam about 10 inches thick. The subsurface layer is strong brown fine sandy loam about 13 inches thick. The subsoil to a depth of about 34 inches is strong brown sandy clay loam. From 34 to 44 inches it is strong brown sandy clay loam. To a depth of about 72 inches or more, the subsoil is yellowish brown sandy clay loam with streaks of clean sand.

This soil is low in natural fertility and organic matter content. Unless limed, the surface layer is medium acid to neutral. Permeability is moderate, and the available water capacity is high.

About 10 percent of this map unit is included areas of Bosville and Muskogee soils and a few intermingled areas of Romia soils. These areas are generally less than 5 acres.

The potential is high for crops. All crops commonly grown in the county can be grown on this soil. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate if cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming reduce runoff and help to control erosion.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for hay and pasture. Fertilizer not only improves the quality of grass but also increases the production of grass, which protects the soil from erosion. The main concerns of management are controlling grazing, preventing fires, and controlling erosion.

The potential is medium for woodland. There are no significant limitations in woodland use or management.

The potential is high for most urban uses. There are no significant limitations for septic tank absorption fields and sanitary landfills. A moderate shrink-swell potential in the upper part of the subsoil is the main limitation for dwellings, small commercial buildings, roads, and streets. This limitation can be easily overcome.

The capability subclass is IIe. The woodland group is 4o. The range site is Sandy Savannah.

3—Bernow fine sandy loam, 3 to 6 percent slopes. This deep, well drained, gently sloping soil is on wooded uplands (fig. 1). Slopes are smooth and convex. Most areas are 40 to 60 acres. Some are only about 15 acres.

Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsurface layer is pale brown

fine sandy loam about 5 inches thick. The subsoil is strong brown clay loam to a depth of about 27 inches, yellowish brown sandy clay loam to 37 inches, and coarsely mottled sandy clay loam with streaks of clean sand to 72 inches.

This soil is low in natural fertility and organic matter content. Unless limed, the surface layer is medium acid to slightly acid. Permeability is moderate, and the available water capacity is high.

Included with this soil in mapping are a few intermingled areas of Bosville and Larue soils. These soils make up about 15 percent of this map unit, but separate areas are generally less than 5 acres.

This soil has medium potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is severe if cultivated crops are grown. Minimum tillage, cover crops, terraces, and contour farming reduce runoff and help to control erosion.

This soil has medium potential for native grass and high potential for tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for hay and pasture. Fertilizer not only improves the quality of grass but also increases production, which protects the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and controlling weeds and brush.

The potential is medium for woodland. The soil has no significant limitations in woodland use or management.

The potential is high for most urban uses. There are no significant limitations for septic tank absorption fields and sanitary landfills. A moderate shrink-swell potential in the upper part of the subsoil is the main limitation for dwellings, small commercial buildings, roads, and streets. This limitation can be easily overcome.

The capability subclass is IIIe. The woodland group is 4o. The range site is Sandy Savannah.

4—Bernow-Romia complex, 6 to 12 percent slopes. This map unit consists of areas of Bernow and Romia soils so intermingled that mapping them separately is not practical at the scale selected for mapping. The unit occurs as narrow areas along side slopes above drainageways. Individual areas of each soil are 2 to 10 acres.

Bernow fine sandy loam makes up about 55 percent of each mapped area. Typically, the surface layer is dark grayish brown and is about 4 inches thick. The subsurface layer is light yellowish brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of 72 inches or more. The upper part to a depth of about 56 inches is yellowish red sandy clay loam. The lower part is yellowish red, red, yellowish brown, and gray sandy clay loam with vertical streaks of clean sand.

This Bernow soil is well drained. It is low in natural fertility and organic matter content. Unless limed, the surface layer is medium acid to slightly acid. Permeability is moderate, and the available water capacity is high.

Romia fine sandy loam makes up about 25 percent of each mapped area. Typically, the surface layer is dark brown and is about 6 inches thick. The subsurface layer is brown fine sandy loam about 8 inches thick. The subsoil to a depth of 32 inches is yellowish red clay loam. To a depth of about 44 inches it is yellowish red sandy clay loam. The underlying material to a depth of 58 inches is soft red sandstone.

This Romia soil is well drained. It is low in natural fertility and organic matter content and is strongly acid to slightly acid. Permeability is moderate, and the available water capacity is medium. Depth to the sandstone ranges from 40 to 60 inches.

Included with this unit in mapping are small areas of Bosville and Larue soils. Also included are soils that have gray mottles in the upper part of the subsoil but otherwise have a profile similar to that of the Bernow soil. These included soils make up about 20 percent of the map unit.

The potential is low for crops. Slope and the severe erosion hazard are the main limitations. This unit is best suited to permanent vegetation.

The potential is medium for native grass and tame pasture. Bermudagrass and bahiagrass are the most commonly grown grasses. The quality of grasses can be maintained or improved by controlling brush, using suitable grazing practices, and preventing fires. Fertilizer not only improves the quality of grass but also increases plant growth, which helps protect the soil from erosion.

The potential is medium for woodland. There is no significant limitation for woodland use and management. Stands can be improved by preventing fire, planting suitable species, removing or controlling the inferior species, and selectively harvesting trees on a planned schedule.

The potential is medium for most urban uses. Slope is the main limitation for sewage lagoons, septic tank absorption fields, sanitary landfills, dwellings, small commercial buildings, roads, and streets.

The capability subclass is VIe. The woodland group is 4o. The range site is Sandy Savannah.

5—Bernow-Romia complex, 2 to 8 percent slopes, eroded. This map unit consists of areas of Bernow and Romia soils so intermingled that mapping them separately is not practical at the scale selected for mapping. These well drained, deep soils are on side slopes of uplands. Areas are about 600 feet wide and several hundred feet long. Slopes are very gently sloping to sloping. Individual areas of each soil are 2 to 8 acres.

These soils are eroded. On about 40 percent of the acreage, material from the subsoil has been mixed with the surface layer. There are a few uncrossable gullies and many rills as a result of water erosion.

Bernow fine sandy loam makes up about 50 to 60 percent of each mapped area. Typically, the surface layer is dark brown and is about 4 inches thick. The subsurface layer is brown fine sandy loam about 6

inches thick. The subsoil extends to a depth of about 64 inches or more. To a depth of about 48 inches it is strong brown clay loam and sandy clay loam. Below this it is mottled reddish yellow sandy clay loam.

This Bernow soil is low in natural fertility and low in organic matter content. The surface layer is medium acid to neutral. Permeability is moderate, and the available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content.

Romia fine sandy loam makes up about 25 to 35 percent of each mapped area. Typically, the surface layer is dark brown and is about 4 inches thick. The subsurface layer is brown fine sandy loam about 6 inches thick. The subsoil, to a depth of about 41 inches, is yellowish red sandy clay loam. The underlying material is soft sandstone that extends to a depth of 56 inches or more. Depth to the sandstone ranges from 40 to 60 inches.

This Romia soil is low in natural fertility and low in organic matter content. The surface layer is strongly acid to slightly acid. Permeability is moderate, and the available water capacity is medium. The soil has fair tilth and can be worked throughout a moderate range of moisture content.

Included with this unit in mapping are areas of the Bosville soils and small areas of the severely eroded Bernow, Bosville, and Romia soils. These areas are generally less than 3 acres.

The potential is low for row crops and small grain. Maintaining soil structure and fertility and protecting the soil from erosion are the chief management concerns. A cropping system that includes small grain and adequate fertilizer to produce maximum residue is needed to control further soil loss by water. Terracing, waterways, and contour farming are needed to reduce the rate of erosion. Clean tilled row crops and excessive tillage should be avoided.

The potential is medium for native grass and tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants increases production, which not only improves the quality of grass but also protects the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is medium for woodland. There are no significant limitations in woodland use or management. Stands can be improved by preventing fires, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is medium for most urban uses. Bernow soils have no significant limitations for septic tank absorption fields and sanitary landfills. The main limitations for septic tank absorption fields in Romia soils are the moderate permeability and depth to rock. Seepage and the slope are limitations for sewage lagoons, and the depth to rock limits trench sanitary landfills. The main limitation for dwellings on Bernow soils is the moderate shrink-swell potential in the upper part of the subsoil. The moderate shrink-swell potential and the slope are limitations for small commercial buildings, and the low strength and the shrink-swell potential are limitations for roads and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IVe. The woodland group is 4o. The range site is Sandy Savannah.

6—Bernow, Bosville and Romia soils, 2 to 8 percent slopes, gullied. This gullied map unit consists of deep, well drained or moderately well drained, very gently sloping to sloping soils on uplands. Bernow, Bosville, and Romia soils are in an irregular pattern on the landscape. Areas of each soil are large enough to be mapped separately, but because of present and predicted use, they were mapped as one unit. Most mapped areas contain all three soils, but a few areas contain only one or two.

These severely eroded soils are on the sides of hills and ridges (fig. 2). On about 50 percent of the acreage, part of the original surface layer has been removed by erosion. On about 20 percent, the original surface layer and material from the upper part of the subsoil have been mixed by tillage. Gullies caused by erosion are about 200 to 400 feet apart, 1 to 6 feet deep, and 10 to 20 feet across.

About 40 percent of the map unit is Bernow soils. Typically, the surface layer is dark brown fine sandy loam about 3 inches thick. The subsurface layer is pale brown fine sandy loam about 5 inches thick. The subsoil is brownish yellow sandy clay loam to a depth of about 30 inches and brownish yellow sandy clay loam and light gray fine sandy loam to about 62 inches or more.

Bernow soils are well drained. They are low in natural fertility and organic matter content. The surface layer is medium acid to neutral. Permeability is moderate, and the available water capacity is medium.

About 35 percent of this map unit is Bosville soils. Typically, the surface layer is dark grayish brown and pale brown fine sandy loam about 6 inches thick. The subsoil is red clay to a depth of about 29 inches and mottled yellowish brown, gray, strong brown, and grayish brown clay to 70 inches or more.

Bosville soils are moderately well drained. They are low in natural fertility and organic matter content. The surface layer is medium acid or strongly acid. Permeability is very slow, and the available water capacity is high. A water table is at a depth of 1 to 2 feet in winter and spring.

About 25 percent of this map unit is Romia soils. Typically, the surface layer is brown fine sandy loam about 2 inches thick. The subsurface layer is pale brown fine sandy loam about 12 inches thick. The subsoil, to a depth of about 44 inches, is reddish brown and yellowish red sandy clay loam. The underlying material is red soft

sandstone that extends to about 58 inches or more. Depth to the soft sandstone ranges from 40 to 60 inches.

Romia soils are well drained. They are low in natural fertility and organic matter content. The surface layer is strongly acid to slightly acid. Permeability is moderate, and the available water capacity is medium.

A few small areas of Larue soils are included in mapping. The acreage is not significant.

The potential is low for crops because of erosion. Some fields have reverted naturally to native grasses or trees.

The potential is medium for native grass and tame pasture. The main concerns of management are controlling erosion and maintaining soil structure and fertility. Areas that have been cultivated should be seeded to tame pasture plants, native grasses, or trees to reduce erosion. Adding fertilizer, reducing excessive runoff, controlling grazing, and shaping gully banks insure the successful establishment of tame pasture plants. The quantity of grasses can be increased by deferring grazing, controlling weeds or brush, and preventing fires.

The potential is low for woodland. The main management concerns are the hazard of erosion, use of equipment, and seedling mortality. Areas suitable for trees can be planted to loblolly pine or shortleaf pine. The quality of trees can be improved by protecting them from fire and by thinning and selectively harvesting on a planned schedule.

The potential is low for most urban uses. The soils have severe limitations for community development because of erosion.

The capability subclass is VIe. The woodland group is 5c. The range site is Eroded Sandy Savannah.

7—Boggy fine sandy loam. This deep, somewhat poorly drained, nearly level soil is on narrow flood plains in wooded areas. Slopes are 0 to 1 percent and are smooth and slightly concave. Most areas are 25 to 130 acres; some are only 15 acres.

Typically, the surface layer is about 13 inches of dark grayish brown fine sandy loam over 11 inches of brown fine sandy loam. Below this is grayish brown fine sandy loam to a depth of about 38 inches and stratified mottled light brownish gray, light gray, and yellowish brown fine sandy loam to about 68 inches or more.

This soil is low in natural fertility and organic matter content. The surface layer is strongly acid to slightly acid. Permeability is moderate, and the available water capacity is high. The soil is subject to frequent flooding. The water table is within a depth of 2 feet in winter and spring.

Included with this soil in mapping are a few intermingled areas of Dela and Guyton soils. Also included are soils that have a brown or yellowish brown profile, which is similar to that of the Boggy series. These included soils make up about 20 percent of the map unit, but separate areas are generally less than 3 acres.

The potential is low for crops because of flooding and a high water table. It is high for tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Fertilizer not only improves the quality of the grass for forage but also increases the vigor of the stand, which protects the soil from erosion. The main management concerns are controlling brush, deferring grazing, and preventing fires.

The potential is high for woodland. Flooding is the main limitation in using equipment.

The potential is low for all urban uses. Flooding and wetness are the main limitations.

The capability subclass is Vw. The woodland group is 2w. This soil is not assigned to a range site.

8—Bosville fine sandy loam, 1 to 4 percent slopes. This deep, moderately well drained, very gently sloping soil is on broad uplands. Slopes are smooth and slightly convex. Most areas are 10 to 20 acres; some are only about 5 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 8 inches thick. The subsurface layer is brownish yellow fine sandy loam about 4 inches thick. The subsoil is strong brown clay to a depth of about 20 inches, red clay to about 32 inches, and red silty clay to about 64 inches or more.

This soil is low in natural fertility and organic matter content. Unless limed, the surface layer is strongly acid to medium acid. Permeability is very slow, and the available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content. A high water table is at a depth of 1 to 2 feet in winter and spring.

Included with this soil in mapping are a few intermingled areas of Bernow, Muskogee, and Romia soils. Also included are soils that have sandstone at a depth of less than 60 inches but are otherwise similar to the Bosville soil. The included soils make up about 5 to 20 percent of the map unit, but separate areas are generally less than 3 acres.

The potential is medium for row crops and small grain. Good tilth can be obtained by returning crop residue to the soil. The erosion hazard is moderate if cultivated crops are grown. Minimum tillage, cover crops, terraces, and contour farming reduce runoff and help to control erosion.

The potential is high for native grass and tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for hay and pasture. Fertilizer not only improves the quality of grass but also increases production, which protects the soil from erosion. The quality of all grasses can be improved by controlling weeds and brush, proper stocking, and preventing fires.

The potential is medium for woodland. The main management problems are seedling mortality and the equipment limitation.

The potential is low for most urban uses. Wetness is the main limitation for septic tank absorption fields, sewage lagoons, and sanitary landfills. Low strength and a high shrink-swell potential are the main limitations for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IIIe. The woodland group is 4c. The range site is Sandy Savannah.

9—Bosville fine sandy loam, 4 to 8 percent slopes. This deep, moderately well drained, gently sloping to sloping soil is in broad upland areas in the southern part of the county. Slopes are smooth and slightly convex. Most areas are 25 to 400 acres; some are only about 15 acres.

Typically, the surface layer is dark brown fine sandy loam about 4 inches thick. The subsurface layer is yellowish brown fine sandy loam about 3 inches thick. The subsoil, to a depth of 64 inches or more, is red silty clay mottled with yellow or gray.

This soil is low in natural fertility and organic matter content. Unless limed, the surface layer is strongly acid to medium acid. Permeability is very slow, and the available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep but is difficult for roots to penetrate because of the high clay content. A high water table is at a depth of 1 to 2 feet in winter and spring.

Included with this soil in mapping are areas of Bernow and Romia soils and areas of eroded clayey soils of less than 1 acre. The included soils make up about 10 percent of this map unit, but separate areas generally are less than 3 acres.

The potential is medium for row crops and small grain. Good tilth can be obtained by returning crop residue to the soil. The erosion hazard is severe, and intensive management is needed to control erosion in cultivated areas. Minimum tillage, cover crops, terraces, and contour farming reduce runoff and help to control erosion.

The potential is high for native grass and tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for hay and pasture. The quality of grass can be maintained or improved by controlling brush, applying fertilizer, and using controlled grazing practices.

The potential is medium for woodland. The chief management problems are seedling mortality and the equipment limitation.

The potential is low for most urban uses. Wetness is the main limitation for septic tank absorption fields, sewage lagoons, and sanitary landfills. Low strength and a high shrink-swell potential are the main limitations for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IVe. The woodland group is 4c. The range site is Sandy Savannah.

10—Bosville fine sandy loam, 3 to 8 percent slopes, eroded. This deep, moderately well drained, gently sloping to sloping eroded soil is on uplands of the Southern Coastal Plains. Slopes are smooth and slightly convex. Individual areas are 15 to 400 acres.

This soil is eroded. On about 15 to 20 percent of the mapped area, the subsoil is exposed. Shallow rills and gullies are common in many areas. There are a few uncrossable gullies.

Typically, the present surface layer is a mixture of the original surface layer and material from the subsoil. The combined thickness of the surface and subsurface layers is 3 to 8 inches less than that of the adjacent uneroded Bosville soils.

Typically, the surface layer is brown fine sandy loam about 4 inches thick. The subsoil is yellowish red clay to a depth of about 52 inches and yellowish brown, yellowish red, or gray clay to about 72 inches or more.

This soil is low in natural fertility and organic matter content. The surface layer is strongly acid to medium acid. Permeability is very slow, and the available water capacity is medium. Tilth is good. A high water table is at a depth of 1 to 2 feet in winter and spring.

About 6 percent of this map unit is included areas of Bernow soils. About 8 percent is soils that have shale at a depth less than 60 inches but are otherwise similar to Bosville soils.

The potential is low for row crops and small grain. The main concerns of management are maintaining tilth and fertility and protecting the soil from erosion. A cropping system that includes small grain and use of adequate fertilizer to produce maximum plant residue is needed to control further erosion. Terraces, waterways, and contour farming are needed to reduce the rate of erosion. In a few areas, gullies should be shaped and planted to permanent vegetation. Clean tilled row crops should be avoided to prevent excessive erosion. Planting native grasses or tame pasture grasses and legumes and adding fertilizer to maintain vigorous growth help to reduce the hazard of erosion.

The potential is medium for native grass and tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production of forage, which helps to protect the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is medium for woodland. The main management concerns are the equipment limitation and seedling mortality.

The potential is low for most urban uses. Wetness is the main limitation for septic tank absorption fields, sewage lagoons, and sanitary landfills. Low strength and a high shrink-swell potential are the main limitations for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IVe. The woodland group is 4c. The range site is Sandy Savannah.

11—Bosville fine sandy loam, 8 to 15 percent slopes. This deep, moderately well drained, strongly sloping to moderately steep soil is on uplands. Slopes are smooth and convex. Most areas are 35 to 200 acres; some are only 15 acres.

Typically, the surface layer is 6 inches of dark grayish brown fine sandy loam. The subsoil is red clay to a depth of about 30 inches and coarsely mottled red, yellowish brown, and gray clay to about 68 inches or more.

This soil is low in natural fertility and organic matter content. Permeability is very slow, and the available water capacity is medium. A high water table is at a depth of 1 to 2 feet in winter and spring.

About 20 percent of this map unit is included areas of Bernow and Romia soils and a few small areas of eroded soils of approximately 1 acre or less. Also included are soils that have shale at a depth of less than 60 inches but are otherwise similar to Bosville soils.

The potential is low for row crops or small grain. Because of the slope and a severe erosion hazard, the soil should not be cultivated.

The potential is medium for native grass and tame pasture. The main concerns of management are controlling erosion and maintaining soil structure and fertility. Proper grazing, controlling weeds and brush, and preventing fires contribute to better native grasses and tame pastures. Fertilizing tame pasture grasses increases forage production.

The potential is medium for woodland. The main management concerns are the equipment limitation and seedling mortality. Stands can be improved by preventing fires, removing or controlling inferior species, planting suitable species, and selectively harvesting on a planned schedule.

The potential is low for most urban uses. Wetness is the main limitation for septic tank absorption fields, sewage lagoons, and sanitary landfills. Low strength and a high shrink-swell potential are the main limitations for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is VIe. The woodland group is 4c. The range site is Sandy Savannah.

12—Burleson clay, 1 to 3 percent slopes. This deep, moderately well drained, very gently sloping soil is on smooth uplands in the western part of the county. Slopes are smooth and slightly convex. Most areas are more than 100 acres; some are only 15 acres.

Typically, the surface layer is black clay about 44 inches thick. The next layer is olive clay that extends to a depth of about 64 inches or more.

This soil is high in natural fertility and organic matter content. It shrinks and forms wide cracks when dry and expands greatly when wet. The surface layer is medium acid to moderately alkaline. Permeability is very slow, and the available water capacity is high. This soil is difficult to till because the surface layer is so clayey.

Included with this soil in mapping are intermingled areas of Heiden, Ferris, and Durant soils. These included soils make up about 15 percent of any one mapped area. Separate areas of these included soils are generally less than 3 acres.

The potential is high for row crops and small grain. The erosion hazard is moderate in areas used for clean tilled crops. For continuous high yields, fertilizer and large amounts of plant residue are needed to improve soil structure, reduce surface crusting, increase the water intake rate, and control erosion. Terraces, contour farming, and cover crops help to control erosion.

The potential is high for native grass and tame pasture. Droughtiness limits pasture production in summer. Tame pasture grasses can be improved by controlling brush, fertilizing, and using suitable grazing practices.

The potential is low for woodland. Trees do not generally grow on this soil.

The potential is low for most urban uses. A high shrink-swell potential is the main limitation for dwellings, small commercial buildings, roads, and streets. Special design is needed for foundations and roadbeds to prevent cracking. The use of this soil for septic tank absorption fields is limited because of the very slow permeability.

The capability subclass is IIe. The range site is Blackclay Prairie. This soil is not assigned to a woodland group.

13—Caspiana silt loam. This deep, well drained, nearly level soil is on terraces along the Red River. Slopes are 0 to 1 percent and are smooth and slightly convex. Areas are 15 to 150 acres.

Typically, the surface layer is about 6 inches of very dark grayish brown silt loam over about 12 inches of dark brown silt loam. The subsoil is reddish brown silty clay loam to a depth of about 48 inches. Below this is reddish brown very fine sandy loam that extends to a depth of about 72 inches or more.

This soil is high in natural fertility and organic matter content. The surface layer is slightly acid or neutral. Permeability is moderate, and the available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are areas of Garton, Roebuck, and Coushatta soils, which make up about 15

percent of the mapped areas. These included soils occur in areas of generally less than 3 acres.

The potential is high for row crops and small grain. Management is needed to maintain or improve soil structure and fertility. Crop residue should be returned to the soil. Excessive tillage should be avoided.

The potential is low for native grass and high for tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Controlling brush, deferring grazing, fertilizing, and preventing fires improve the quality and quantity of grasses.

The potential is high for woodland. There are no significant limitations. Stands can be improved by protecting them from fire, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is medium for most urban uses. There are no significant limitations for area sanitary landfill. The main limitations are the moderate permeability for septic tank absorption fields, seepage for sewage lagoons, and the content of clay in the soil for trench sanitary landfills. Low strength and a moderate shrink-swell potential are the main limitations for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability class is I. The woodland group is 2o. This soil is not assigned to a range site.

14—Clebit-Tuskahoma association, strongly sloping. This map unit consists of well drained and moderately well drained soils in a regular and repeating pattern. Slopes are dominantly 8 to 12 percent but range to 20 percent in some areas. The landscape is mainly one of long and narrow ridges about 1/4 mile wide and 1 to 3 miles long.

Clebit soils are on the crests of ridges and on side slopes in a long, narrow repeating pattern across the slope. They are shallow soils that formed in material weathered from hard sandstone. Tuskahoma soils are on side slopes between areas of Clebit soils. They are also shallow but formed in material weathered from shale. Mapped areas range from 50 to 600 acres. Individual areas of each soil range from 5 to 40 acres.

The well drained Clebit soils make up about 45 to 60 percent of each mapped area. Typically, the surface layer is dark brown stony loam about 4 inches thick. The subsoil, to a depth of about 16 inches, is strong brown stony loam that is about 40 percent fragments of sandstone. Below this to a depth of about 20 inches is yellowish brown and gray, hard sandstone that is tilted and fractured.

Clebit soils are low in natural fertility and organic matter content. The surface layer is strongly acid to slightly acid. Permeability is moderately rapid, and the available water capacity is low.

The moderately well drained Tuskahoma soils make up about 25 to 35 percent of each mapped area. Typically, the surface layer is dark brown loam about 4 inches thick. The subsoil is yellowish red clay to a depth of about 12 inches and mottled yellowish red and gray shaly silty clay from 12 to 18 inches. The underlying material to a depth of about 30 inches is gray shale that has a few fine layers of shaly clay tilted 30 degrees from the horizontal.

Tuskahoma soils are low in natural fertility and organic matter content. The surface layer is neutral to strongly acid. Permeability is very slow, and the available water capacity is low. The perched water table is at a depth of 1/2 foot to 1 1/2 feet in fall through spring.

Included with this unit in mapping are a few small areas of soils that have sandstone at a depth of 20 to 28 inches but are otherwise similar to Clebit soils. Also included are a few small areas of Smithdale soils of generally less than an acre.

The potential is low for native grass and for tame pasture. The quality and quantity of native grass can be improved by controlling brush, proper grazing, and preventing fires.

The potential is also low for woodland. The main management concerns are the erosion hazard, equipment limitation, and seedling mortality.

The potential is low for most urban uses. The shallowness over rock in Clebit soils and the wetness in Tuskahoma soils are the main limitations for septic tank absorption fields, sewage lagoons, and sanitary landfills. The high shrink-swell potential and low strength of Tuskahoma soils, the shallowness over rock and the content of large stones in Clebit soils, and the slope are the main limitations for dwellings, small commercial buildings, roads, and streets. Some of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is VIIs. The woodland group is 5x for Clebit soil and 5d for Tuskahoma soil. The range site is Shallow Savannah.

15—Coushatta silty clay loam. This deep, nearly level, well drained soil is on flood plains along the Red River. Slopes are 0 to 1 percent. Areas are broad and smooth and range from 15 to 100 acres.

Typically, the surface layer is reddish brown silty clay loam about 8 inches thick. The subsoil, to a depth of about 31 inches, is reddish brown silty clay loam. The underlying material, to a depth of 72 inches or more, is stratified reddish brown silt loam, reddish yellow very fine sandy loam, and reddish brown silt loam.

This soil is high in natural fertility and medium in organic matter content. Unless limed, the surface layer is slightly acid or neutral. Permeability is moderate, and the available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content. It is subject to rare flooding.

Included in the mapping are small areas of Latanier and Redlake soils. These included soils make up about

10 percent of mapped areas. Individual areas are generally less than 3 acres.

The potential is high for row crops and small grain. Management is needed to maintain soil structure and fertility. All crop residue should be returned to the soil. Fertilizer should be applied for maximum production.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which protects the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is high for woodland. There are no significant limitations in woodland use or management. Stands can be improved by protecting them from fire, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is low for most urban uses. The rare flooding is the main limitation for area sanitary landfills. The main limitations for septic tank absorption fields are rare flooding and moderate permeability. Seepage is a limitation for sewage lagoons. The content of clay in the soil is a limitation for trench sanitary landfills. Rare flooding is the main limitation for dwellings and small commercial buildings. The main limitations for roads and streets are low strength and the moderate shrink-swell potential. Most of these limitations, except flooding, can be overcome by proper design or by altering the soil.

The capability class is I. The woodland group is 2o. This soil is not assigned to a range site.

16—Dela fine sandy loam. This deep, moderately well drained, nearly level soil is on flood plains. Slopes are 0 to 1 percent and smooth. Most areas are more than 100 acres, but long narrow areas along small creeks are only about 15 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 11 inches thick. The underlying material is stratified dark yellowish brown fine sandy loam to a depth of about 26 inches, brown fine sandy loam to about 48 inches, and light yellowish brown fine sandy loam to about 72 inches.

This soil is medium in natural fertility and organic matter content. The surface layer is medium acid to slightly acid. Permeability is moderately rapid, and the available water capacity is medium. The soil is occasionally flooded. It has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and is easily penetrated by roots.

Included with this soil in mapping are intermingled areas of Guyton and Speer soils. The included soils make up about 5 percent of this map unit, but separate areas generally are less than 3 acres.

The potential is high for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. Minimum tillage and cover crops help to maintain soil structure and to prevent surface crusting.

This soil has high potential for native grass and tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for tame pasture. Fertilizer increases forage production and improves the vigor of the grass. The quality of all grasses can be improved by controlling grazing, preventing fires, controlling brush, and proper stocking.

This soil has high potential for woodland. It has no significant limitations.

The potential is low for urban use. Flooding is the main limitation. This limitation can be reduced only by major flood control measures.

The capability subclass is IIw. The woodland group is 2o. This soil is not assigned to a range site.

17—Durant silt loam, 1 to 3 percent slopes. This deep, moderately well drained, very gently sloping soil is on prairie uplands mostly in the western part of the county. Slopes are smooth and convex. Most areas are more than 100 acres; some are only 15 acres.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil is dark brown silty clay loam to a depth of about 11 inches, olive brown mottled clay to about 48 inches, and light olive brown mottled clay to about 64 inches or more.

This soil is high in natural fertility and organic matter content. It has good tilth and a deep root zone. The surface layer is medium acid or slightly acid. Permeability is very slow, and available water capacity is high.

Included with this soil in mapping are a few intermingled areas of Burleson and Panola soils. These included soils make up about 8 percent of the map unit, but separate areas are generally less than 3 acres.

The potential is medium for row crops and small grain. The erosion hazard is moderate in cultivated areas. Crop residue, minimum tillage, cover crops, and terraces reduce runoff and help to control erosion.

This soil has high potential for tame pasture and native grass. The quality of grass can be improved by controlling brush, using suitable grazing practices, and preventing fires. Fertilizing tame pasture grasses increases the amount of forage and improves the vigor of the plants.

The potential is low for woodland. Trees do not generally grow on this soil.

The potential is low for most urban uses. A high shrink-swell potential and low strength are the main limitations for dwellings, small commercial buildings, roads, and streets. The very slow permeability is a limitation for septic tank absorption fields.

The capability subclass is IIe. The range site is Loamy Prairie. This soil is not assigned to a woodland group.

18—Ferris clay, 3 to 5 percent slopes. This deep, well drained, gently sloping soil is on uplands. Slopes are smooth and slightly convex. Most areas are 20 to 100 acres; some are only 5 acres.

Typically, the surface layer is very dark grayish brown clay about 8 inches thick. The next layer, to a depth of about 48 inches, is olive brown and light olive brown clay. The underlying material is light olive brown shaly clay that extends to a depth of 62 inches or more.

This soil is medium in natural fertility and low in organic matter content. The surface layer is moderately alkaline. Permeability is very slow, and the available water capacity is high. This clayey soil has poor tilth and can be worked within only a narrow range of moisture content. It shrinks and develops wide cracks when dry and expands greatly when wet.

Included with this soil in mapping are a few small areas of eroded Heiden, Ferris, and Burleson soils. These soils make up less than 5 percent of the mapped area. Separate areas are generally less than 3 acres.

The potential is medium for row crops and small grain. A cover crop that produces a large amount of residue is needed to improve soil structure, tilth, and moisture intake. A cover crop also prevents surface crusting, which accelerates erosion. Terracing and contour farming along with high residue crops help to reduce soil loss. Excess tillage and farming activities when the soil is wet should be avoided.

The potential is high for native grass and medium for tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for tame pasture. Controlling weeds, deferring grazing, and preventing fires improve the quality and quantity of all grasses.

The potential is low for woodland; trees do not grow in most areas.

The potential is low for most urban uses. There are no significant limitations for area sanitary landfills. The main limitations are the very slow permeability for septic tank absorption fields, the slope for sewage lagoons, and the clayey texture for trench sanitary landfills. A very high shrink-swell potential and low strength are the main limitations for dwellings, small commercial buildings, roads, and streets. Special design is needed for foundations and roadbeds to prevent cracking.

The capability subclass is IIIe. The range site is Blackclay Prairie. This soil is not assigned to a woodland group.

19—Ferris clay, 2 to 5 percent slopes, eroded. This deep, well drained, gently sloping soil is on uplands. Slopes are smooth and slightly convex. Most areas are 20 to 100 acres; some are only 5 acres.

This soil is eroded. On about 40 percent of the acreage, the original surface layer and the next layer have been mixed by plowing. The present surface layer is light colored. There are small crossable gullies about 100 feet apart. A few rills occur between the gullies.

Typically, the surface layer is dark grayish brown clay about 4 inches thick. The next layer, to a depth of about 52 inches, is olive and pale olive clay. The underlying material is olive shaly clay to a depth of 64 inches or more.

This soil is medium in natural fertility and low in organic matter content. The surface layer is moderately alkaline. Permeability is very slow, and the available water capacity is high. This clay soil has poor tilth, and it can be worked within only a narrow range of moisture content. It shrinks and develops wide cracks when dry and expands greatly when wet.

Included with this soil in mapping are a few small areas of the eroded Heiden and Burleson soils. These included soils make up less than 5 percent of mapped areas, but each area is generally less than 3 acres.

The potential is low for row crops and small grain. A cover crop that produces a large amount of residue is needed to improve soil structure, tilth, and moisture intake. A cover crop also prevents surface crusting and helps to reduce erosion. Terracing and contour farming along with high residue crops help to reduce soil loss. Row crops and excess tillage should be avoided.

The potential is high for native grass and medium for tame pasture. A mixture of bermudagrass and bahiagrass and clover is most commonly used for tame pasture. Controlling weeds, deferring grazing, and preventing fire will improve the quality and quantity of all grasses.

The potential is low for woodland; trees do not grow in most areas.

The potential is low for most urban uses. It has no significant limitations for area sanitary landfills. The main limitations are the very slow permeability for septic tank absorption fields, the slope for sewage lagoons, and the clayey texture for trench sanitary landfills. A very high shrink-swell potential and low strength are the main limitations for dwellings, small commercial buildings, roads, and streets. Special design is needed for foundations and roadbeds to prevent cracking.

The capability subclass is IVe. The range site is Blackclay Prairie. This soil is not assigned to a woodland group.

20—Ferris clay, 5 to 12 percent slopes. This deep, well drained, sloping to strongly sloping soil is on uplands. Slopes are smooth and convex. Most areas are 40 to 300 acres; some are only 15 acres.

Typically, the surface layer is olive gray clay about 6 inches thick. The next layer is olive clay to a depth of 14 inches and grayish brown clay to about 41 inches. The underlying material is light olive brown shaly clay that extends to a depth of 62 inches or more.

This soil is medium in natural fertility and low in organic matter content. The surface layer is moderately alkaline. Permeability is very slow, and the available water capacity is high. This clay soil has poor tilth and can be worked within only a narrow range of moisture content. It

shrinks and develops wide cracks when dry and expands greatly when wet.

About 10 percent of this map unit is included areas of Heiden soils, and about 6 percent is areas of Swink soils. These included areas are generally less than 3 acres.

The potential is low for row crops and small grain. The main limitation is the strong slope.

The potential is high for native grass and medium for tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for tame pasture. Controlling brush, proper grazing, and preventing fires improve the quality and quantity of all grasses.

The potential is low for woodland. Trees do not generally grow on this soil.

The potential is low for most urban uses. The main limitations are the very slow permeability for septic tank absorption fields, the slope for sewage lagoons and area sanitary landfills, and the clayey texture for trench sanitary landfills. A very high shrink-swell potential and low strength are the main limitations for dwellings, small commercial buildings, roads, and streets. Special design is needed for foundations and roadbeds to prevent cracking.

The capability subclass is VIe. The range site is Blackclay Prairie. This soil is not assigned to a woodland group.

21—Garton silty clay loam. This deep, moderately well drained, nearly level soil is on low terraces along the Red River and Boggy Creek. It occurs in the middle part of the terrace. Slopes are 0 to 1 percent and are broad and smooth. Most areas are 40 to 150 acres; some are only about 15 acres.

Typically, the surface layer is very dark gray silty clay loam about 6 inches thick. The subsoil is very dark gray silty clay loam to a depth of 26 inches, dark brown silty clay loam to 36 inches, yellowish red clay loam to 46 inches, and yellowish red loam to a depth of 75 inches or more.

This soil is high in natural fertility and organic matter content. The surface layer is slightly acid or neutral. Permeability is slow, and the available water capacity is high. The soil has fair tilth and can be worked throughout a medium range of moisture content. It is subject to rare flooding.

Included with this soil in mapping are areas of Caspiana and Pledger soils. These included soils make up about 10 percent of any one mapped area. Individual areas are less than 4 acres.

The potential is high for row crops and small grain. Management is needed to maintain fertility and improve soil structure. All crop residue should be returned to the soil. Excessive tillage should be avoided.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Controlling brush, deferring grazing, and preventing fires will improve the quality and quantity of all grasses. Fertilizing tame pasture grasses increases forage production.

The potential is high for woodland. There are no significant limitations for woodland use or management. Trees can be improved by protecting them from fire, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is low for most urban uses. The main limitations are the slow permeability and wetness for septic tank absorption fields, wetness and flooding for sewage lagoons, the content of clay in the soil and wetness for sanitary landfills. A high shrink-swell potential and flooding are the main limitations for dwellings, small commercial buildings, roads, and streets. Most of these limitations, except flooding, can be overcome by proper design or by altering the soil.

The capability class is I. The woodland group is 2o. This soil is not assigned to a range site.

22—Guyton silt loam. This deep, poorly drained, nearly level soil occurs chiefly on the flood plain of the Kiamichi River and Muddy Boggy Creek or its tributaries. Slopes are broad and smooth. Most areas on the main flood plain are more than 100 acres. The long narrow areas along the smaller tributaries are only 5 to 10 acres.

Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The subsurface layer is grayish brown and light brownish gray silt loam about 14 inches thick. The subsoil, to a depth of 28 inches, is gray silty clay loam with vertical streaks and tongues of light brownish gray silt loam. To about 52 inches it is light brownish gray mottled silty clay loam. To 72 inches or more it is light gray silty clay loam.

This soil is medium in natural fertility and organic matter content. The surface layer is medium acid to very strongly acid. Permeability is slow, and the available water capacity is high. Surface crusting and wetness are common. Both affect the tilth. The soil is subject to occasional flooding. A high water table is at a depth of 1 1/2 feet in winter and spring.

Included with this soil in mapping are a few intermingled areas of Boggy, Dela, and Wrightsville soils. Also included are somewhat poorly drained soils that are less clayey but are otherwise similar to the Guyton soil. These included soils make up about 15 percent of the map unit. Separate areas are generally less than 3 acres.

The potential is medium for row crops and small grain because of wetness and surface crusting. Drainage, large amounts of crop residue, and fertilizer are usually needed to obtain high yields.

The potential is medium for tame pasture and low for native grass. Cool season grasses and legumes are best suited. The quality of grass can be improved by fertiliz-

ing, controlling brush, preventing fires, and controlling grazing.

The potential is medium for woodland. The main concerns of management are the equipment limitation and seedling mortality.

The potential is low for most urban uses. Flooding and wetness are the main limitations.

The capability subclass is IVw. The woodland group is 2w. This soil is not assigned to a range site.

23—Heiden clay, 2 to 5 percent slopes. This deep, well drained, gently sloping soil is on uplands mostly in the southwestern part of the county. Slopes are smooth and slightly convex. Most areas are 10 to 40 acres.

Typically, the surface layer is a dark olive gray clay about 18 inches thick. The next layer from 18 to about 40 inches is olive clay. The underlying material is coarsely mottled olive gray, light olive gray, and brownish yellow shaly clay that extends to a depth of about 64 inches or more.

This soil is high in natural fertility and organic matter content. It is mildly alkaline or moderately alkaline. Permeability is very slow, and the available water capacity is high. The soil shrinks and cracks when dry and expands greatly when wet. The root zone is deep but difficult to penetrate by roots because of the high clay content.

Included with this soil are intermingled areas of Burleson and Ferris soils and soils that are less than 40 inches deep over limestone or shale but are otherwise similar to the Heiden soil. The included soils make up about 18 percent of the map unit, but separate areas are generally less than 5 acres.

The potential is medium for row crops and small grain. The erosion hazard is moderate if cultivated crops are grown. Management is needed to improve soil structure, reduce surface crusting, increase water intake, and reduce the risk of erosion. Returning large amounts of crop residue, terracing, and farming on the contour are needed. Tillage should be timely and kept to a minimum.

The potential is high for native grass and tame pasture. The quality of all grasses can be improved by preventing fires, proper stocking, and controlling weeds. Fertilizer increases forage production on tame pasture and improves the quality of grass.

The potential is low for woodland. Trees do not generally grow on this soil.

The potential is low for most urban uses. A very high shrink-swell potential is the main limitation for dwellings, small commercial buildings, roads, and streets. Special design is needed to prevent cracking of building foundations. The very slow permeability is the main limitation for septic tank absorption fields. This limitation can be reduced by increasing the size of the absorption area or altering the soil.

The capability subclass is IIIe. The range site is Blackclay Prairie. This soil is not assigned to a woodland group.

24—Hollywood silty clay, 1 to 3 percent slopes. This deep, moderately well drained, very gently sloping soil is on uplands. It is on broad, smooth ridges. Most areas are 40 to 300 acres; some are only 15 acres.

Typically, the surface layer is black silty clay to a depth of 19 inches and very dark gray silty clay to 30 inches. The underlying material is olive brown silty clay that extends to about 72 inches or more.

This soil is high in natural fertility and organic matter content. The surface layer is slightly acid to moderately alkaline. Permeability is very slow, and the available water capacity is high. The soil has poor tilth and can be worked within only a narrow range of moisture content.

Included with this soil in mapping are small areas of Panola and Swink soils. Areas of these soils make up about 10 percent of the mapped areas. They are generally less than 1 acre.

The potential is medium for row crops and small grain. Management is needed to prevent surface crusting, increase water intake, and control erosion. A suitable cropping system is one that provides high residue crops. Cover crops, terraces, and contour farming are needed in erosion control. Sown crops can be grown continuously if fertilizer is added and large amounts of crop residue are returned to the soil. Excessive tillage destroys structure in the surface layer and reduces water intake.

The potential is high for native grass and medium for tame pasture. The quality and quantity of native grass can be improved by controlling weeds, deferring grazing, and preventing fires. Fertilizing tame pasture grasses increases forage production.

The potential is low for woodland. Trees do not generally grow on this soil.

The potential is low for most urban uses. There are no significant limitations for sewage lagoons or area sanitary landfills. The main limitation for septic tank absorption fields is the very slow permeability. The clayey texture and depth to rock are limitations for trench sanitary landfills. A high shrink-swell potential and low strength are the main limitations for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IIe. The range site is Blackclay Prairie. This soil is not assigned to a woodland group.

25—Hollywood silty clay, 3 to 5 percent slopes. This deep, moderately well drained, gently sloping soil is on uplands. Slopes are broad and smooth. Most areas are 15 to 100 acres.

Typically, the surface layer is black silty clay about 24 inches thick. The next horizon is silty clay. It is olive gray to about 46 inches and olive brown to 70 inches. Below 70 inches is limestone bedrock.

This soil is high in natural fertility and organic matter content. The surface layer is slightly acid to moderately alkaline. Permeability is very slow, and the available

water capacity is high. The soil has poor tilth and can be worked within only a narrow range of moisture content.

About 8 percent of this map unit is small areas of Panola and Swink soils. About 12 percent is eroded soils with a profile similar to the Hollywood soil, but the surface layer is thinner and lighter in color. Areas of these included soils are generally less than 3 acres.

The potential is medium for row crops and small grain. Management is needed to reduce the erosion hazard, to prevent surface crusting, and to improve soil structure and water intake. A large amount of crop residue should be returned to the soil. Cover crops, terraces, and contour tillage help to reduce the risk of erosion. Sown crops can be grown continuously if fertilizer is added and crop residue is used. Excess tillage should be avoided.

The potential is high for native grass and medium for tame pasture. Bermudagrass or a mixture of tall fescue and clover is most commonly used for tame pasture. Controlling brush, deferring grazing, and preventing fires will improve the quality and quantity of all grasses. Fertilizing tame pasture grasses increases forage production.

The potential is low for woodland. Trees do not generally grow on this soil.

The potential is low for most urban uses. There are no significant limitations for area sanitary landfills. The main limitation for septic tank absorption fields is very slow permeability; for sewage lagoons, the slope; and for trench sanitary landfills, the clayey texture and depth to rock. A high shrink-swell potential and low strength are the main limitations for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IIIe. The range site is Blackclay Prairie. This soil is not assigned to a woodland group.

26—Hollywood-Swink complex, 2 to 8 percent slopes. This map unit consists of small areas of Hollywood and Swink soils so intermingled that mapping them separately is not practical at the scale selected for mapping. These moderately well drained or well drained, deep and shallow soils are on uplands. Most areas are 100 to 1,000 acres; some are only 2 to 15 acres. The deep Hollywood soil is in the more gently sloping areas. The shallow Swink soil is chiefly on the more sloping parts of the landscape.

Hollywood silty clay makes up about 50 percent of each mapped area. Typically, the surface layer is black and is about 28 inches thick. The next layer, to a depth of about 60 inches, is olive gray and olive brown silty clay. Below 60 inches is hard limestone bedrock.

This Hollywood soil is high in natural fertility and organic matter content. The surface layer is slightly acid to moderately alkaline. Permeability is very slow. The available water capacity is high.

Swink stony clay makes up about 42 percent of each mapped area. Typically, the surface layer is very dark grayish brown stony clay about 14 inches thick. Below this is fractured hard limestone.

This Swink soil is high in natural fertility and medium in organic matter content. It is neutral to moderately alkaline, very slowly permeable, and low in available water capacity.

About 4 percent of this map unit is included areas of Panola soils. About 4 percent is soils that are similar to Lula soils but have more than 35 percent fragments of chert throughout the profile. These included soils are less than 3 acres.

The potential is low for row crops and for small grain. Slope, stones, and shallowness over rock are the main limitations for cultivated crops.

The potential is medium for native grass and tame pasture. The quality of grass can be maintained or improved by controlling brush and weeds, preventing fires, and using suitable grazing practices. Where the grass cover is overgrazed, encroachment of woody brush is a common concern and brush control is often needed. Fertilizing tame pasture plants increases forage production.

The potential is low for woodland. Trees do not generally grow on these soils.

The potential is low for most urban uses. There are no significant limitations for area sanitary landfills. Shallowness of the Swink soil over rock is the main limitation for trench sanitary landfills, septic tank absorption fields, and sewage lagoons. Low strength and a high shrink-swell potential are the main limitations for dwellings, small commercial buildings, roads, and streets. Some of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is VIe. The range site is Blackclay Prairie for Hollywood soil and Shallow Prairie for Swink soil. These soils are not assigned to a woodland group.

27—Hopco silty clay loam. This deep, somewhat poorly drained, nearly level soil is on flood plains. Slopes are 0 to 1 percent and are broad and smooth. Individual areas are 15 to 300 acres.

Typically, the surface layer is about 40 inches of silty clay loam. The upper 22 inches is very dark brown, and the lower part is very dark grayish brown. The subsoil is dark gray clay loam that extends to 60 inches or more.

This soil is high in natural fertility and organic matter content. The surface layer is medium acid to mildly alkaline. Permeability is moderately slow, and the available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content. It is subject to occasional flooding. The water table is at a depth of about 1 foot in winter and spring.

About 4 percent of this map unit is areas of Kaufman soils. About 20 percent is areas of soils that are similar to this Hopco soil but have a surface layer of silt loam or

have silty clay below 24 inches. These included areas are generally less than 3 acres.

The potential is high for row crops and small grain. The main concerns of management are surface wetness, ponding, flooding, soil structure, and water intake. The cropping system should provide for the return of adequate amounts of crop residue. Wet and ponded areas can be established to water tolerant grasses. Simple drainage systems where necessary and practical help in establishing and producing better crops.

The potential is high for native grass and tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which helps to protect the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires. A good grass mulch helps to maintain soil structure and improve water intake.

The potential is high for woodland. The main management concern is the equipment limitation. Thinning, selective cutting, and preventing fires will improve the quality of the stand.

The potential is low for most urban uses. The flood hazard is the main limitation for septic tank absorption fields, sewage lagoons, sanitary landfills, dwellings, small commercial buildings, roads, and streets. This limitation can be reduced, but not completely eliminated, by upstream flood control structures. The hazard is high for houses built on the flood plain.

The capability subclass is IIw. The woodland group is 2w. This soil is not assigned to a range site.

28—Idabel silt loam. This deep, well drained, nearly level soil is on flood plains along the Red River. Slopes are 0 to 1 percent and slightly undulating. Areas are 15 to 200 acres.

Typically, the surface layer is dark reddish brown silt loam about 8 inches thick. The subsoil, to a depth of 24 inches, is reddish brown silt loam. The underlying material, to about 52 inches, is reddish brown and yellowish red very fine sandy loam. Below 52 inches it is reddish brown silt loam stratified with very fine sandy loam or fine sandy loam.

This soil is high in natural fertility and medium in organic matter content. The surface layer is neutral to mildly alkaline. Permeability is moderately rapid, and the available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content. It is subject to rare flooding.

About 10 percent of this map unit is areas of Severn soils, and about 8 percent is areas of Oklared soils. Areas of these included soils are less than 3 acres.

The potential is high for row crops and small grain. Management is needed to maintain or improve soil structure and fertility. All crop residue should be returned to the soil.

The potential is high for native grass and tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which helps to protect the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is high for woodland. There are no significant limitations. Stands can be improved by preventing fires, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is low for most urban uses. Flooding is the chief limitation for septic tank filter fields, dwellings, and small commercial buildings. Seepage is the main limitation for sewage lagoons and sanitary landfills. Low strength is the main limitation for roads and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability class is I. The woodland group is 2o. This soil is not assigned to a range site.

29—Karma fine sandy loam, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on terraces along the Red River. Slopes are smooth and slightly convex. Individual areas are 15 to 200 acres.

Typically, the surface layer is about 18 inches of fine sandy loam. The upper 8 inches is dark grayish brown, and the lower 10 inches is brown. The subsoil to about 46 inches is yellowish red sandy clay loam. The underlying material is yellowish red very fine sandy loam that extends to a depth of 80 inches or more.

This soil is high in natural fertility and medium in organic matter content. The surface layer is medium acid to neutral. Permeability is moderate, and the available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are small areas of Kiomatia, Oklared, and Severn soils. These included soils, generally less than 3 acres, make up about 15 percent of any mapped area. They are mainly along drains.

The potential is high for row crops and small grain. Management is needed to maintain soil structure and fertility. Crop residue should be returned to the soil.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass or weeping lovegrass and clover is most commonly used for tame pasture. Controlling brush, deferring grazing, and preventing fires will improve the quality and quantity of all grasses. Fertilizing tame pasture grasses will increase forage production.

The potential is medium for woodland. There are no significant limitations in woodland use or management. Stands can be improved by preventing fires, planting

suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is high for most urban uses. There are no significant limitations for septic tank filter fields, area sanitary landfills, dwellings, and small commercial buildings. The main limitations are seepage for sewage lagoons and low strength for roads and streets. These limitations can be overcome by proper design or by altering the soil.

The capability class is I. The woodland group is 3o. This soil is not assigned to a range site.

30—Kaufman clay. This deep, somewhat poorly drained, nearly level soil is on flood plains. Slopes are 0 to 1 percent and are slightly concave to slightly convex. Individual areas are 15 to 800 acres.

Typically, the surface layer is black clay to a depth of 16 inches. The next layer is very dark gray clay to about 65 inches.

This soil is high in natural fertility and organic matter content. The surface layer is slightly acid to mildly alkaline. Permeability is very slow, and the available water capacity is high. The soil has poor tilth and can be worked within only a narrow range of moisture content. It shrinks and develops wide cracks when dry and expands greatly when wet. It is subject to occasional flooding. The water table is within a depth of 3 1/2 feet in winter and spring.

Included with this soil in mapping are areas of Hopco and Trinity soils. These included soils, generally less than 3 acres, make up about 10 percent of mapped areas.

The potential is high for row crops and small grain. The main concerns of management are surface wetness and ponding, soil structure, and water intake. The cropping system should provide for the return of adequate crop residue. Wet and ponded areas can be established to water tolerant grasses. Simple drainage systems, where practical, help to increase production of field crops.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Controlling brush, deferring grazing, and preventing fires will improve the quality and quantity of all grasses. Fertilizing tame pasture grass will increase the quantity of forage. A good grass mulch improves soil structure and increases water intake.

The potential is high for woodland. The main management concerns are the equipment limitation and seedling mortality.

The potential is low for most urban uses. There are no significant limitations for sewage lagoons in areas protected from flooding. The flood hazard is the main limitation for septic tank absorption fields and sanitary landfills. A high or very high shrink-swell potential and flooding are the main limitations for dwellings, small commercial buildings, roads, and streets. The flood hazard can be reduced, but not completely eliminated, by upstream flood control structures. The potential hazard is high for houses built on the flood plain.

The capability subclass is IIIw. The woodland group is 2w. This soil is not assigned to a range site.

31—Kaufman clay, depressional. This deep, somewhat poorly drained, nearly level soil is on flood plains. Slopes are 0 to 1 percent and are concave. Individual areas are 15 to 300 acres.

Typically, the surface layer is black clay about 26 inches thick. The next layer, to a depth of about 44 inches, is very dark gray clay. Below this to a depth of 60 inches or more is dark gray silty clay.

This soil is high in natural fertility and organic matter content. The surface layer is slightly acid to mildly alkaline. Permeability is very slow, and the available water capacity is high. The soil is subject to frequent flooding and ponding. It shrinks and develops wide cracks when dry and expands greatly when wet. The water table is within a depth of 3 1/2 feet in winter and spring.

Included with this soil in mapping is about 15 percent Hopco and Trinity soils and a few small areas of soils with a profile similar to the Kaufman soil, but the surface layer is silt loam. Areas of these included soils are mostly less than 3 acres in area.

Because of flooding and wetness, this soil has low potential for row crops and small grain.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. The main concerns of management are surface wetness and ponding, frequent flooding, soil structure, and water intake. Wet and ponded areas can be established to water tolerant grasses. Simple drainage systems, where needed and practical, help in establishing tame pasture grasses. The growth of tame pasture plants can be increased by fertilizing and by proper grazing. Overstocking compacts the surface and decreases water intake. A good grass mulch helps to maintain soil structure and increases water intake.

The potential is high for woodland. The main management concerns are the equipment limitation and seedling mortality.

The potential is low for most urban uses. There are no significant limitations for sewage lagoons in areas protected from flooding. The flood hazard is the main limitation for septic tank absorption fields and sanitary landfills. A high or very high shrink-swell potential and flooding are the main limitations for dwellings, small commercial buildings, roads, and streets. The flood hazard can be reduced, but not completely eliminated, by upstream flood control structures. The hazard is high for houses built on the flood plain.

The capability subclass is Vw. The woodland group is 2w. This soil is not assigned to a range site.

32—Kiomatia loamy fine sand. This deep, well drained, nearly level soil is on flood plains along the Red River. Slopes are 0 to 1 percent and are smooth but slightly convex and concave. Individual areas are 15 to 150 acres.

Typically, the surface layer is reddish brown loamy fine sand about 6 inches thick. The underlying material, to a depth of 18 inches, is yellowish red loamy fine sand. Below 18 inches is light reddish brown fine sand that extends to a depth of 62 inches or more.

This soil is high in natural fertility and has low organic matter content. The surface layer is slightly acid to moderately alkaline. Permeability is rapid, and the available water capacity is low. The soil has fair tilth and can be worked throughout a wide range of moisture content. It is subject to occasional flooding.

Included with this soil in mapping are small areas of Karma, Severn, and Oklared soils. These included soils, mostly less than 3 acres, make up about 10 percent of any one mapped area.

The potential is low for row crops and small grain. The main concerns of management are fertility, flooding, erosion, and soil structure. Additions of fertilizer help to produce a large amount of crop residue, which helps in maintaining soil structure and the supply of organic matter. Stripcropping close growing crops with row crops perpendicular to the prevailing wind helps to control wind erosion. A winter cover crop is needed if the soil is used for clean tilled row crops. Excessive tillage destroys soil structure.

The potential is high for native grass and tame pasture. A mixture of bermudagrass or weeping lovegrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which protects the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is high for woodland. The chief management concerns are the equipment limitation and seedling mortality.

The potential is low for most urban uses. There are no significant limitations for roads and streets. Flooding is the main limitation for septic tank absorption fields, flooding and seepage for sewage lagoons, and seepage for sanitary landfills. The flood hazard is the main limitation for dwellings and small commercial buildings. It can be reduced, but not completely eliminated, by upstream flood control structures. The hazard is high for houses built on the flood plain.

The capability subclass is IIIs. The woodland group is 2w. This soil is not assigned to a range site.

33—Larue loamy fine sand, 2 to 5 percent slopes. This deep, well drained, gently sloping soil is on uplands. Slopes are broad, smooth, and slightly convex. Most areas are 15 to 100 acres; some are smaller.

Typically, the surface layer is brown loamy fine sand about 10 inches thick. The subsurface layer is light yellowish brown loamy fine sand about 18 inches thick. The subsoil is yellowish red sandy clay loam to a depth of about 42 inches and is mottled yellowish red sandy clay loam to 80 inches or more.

This soil is low in natural fertility and organic matter content. The surface layer is medium acid or slightly acid. Permeability is moderate, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are areas of Romia soils and a few intermingled areas of Bernow soils. The included soils make up about 15 percent of this map unit, but separate areas generally are less than 5 acres.

The potential is medium for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is severe in cultivated areas. Soil blowing is a problem if the surface is bare of vegetation during the windy season. Minimum tillage, cover crops, and contour farming reduce runoff and help to control erosion.

The potential is high for native grass and tame pasture. A mixture of bermudagrass, lovegrass, or bahiagrass and clover is most commonly used for tame pasture. Fertilizer increases the amount of forage, and the increased plant growth helps to control erosion. The quality of all grasses can be improved by deferring grazing, proper stocking, controlling weeds and brush, and preventing fires.

The potential is medium for woodland. The main concerns of management are seedling mortality and the equipment limitation.

This soil has high potential for most urban uses. It has no significant limitations for sanitary landfills, dwellings, small commercial buildings, roads, and streets. Seepage is the main limitation for sewage lagoons.

The capability subclass is IIIe. The woodland group is 4s. The range site is Deep Sand Savannah.

34—Latanier clay. This deep, somewhat poorly drained, nearly level soil is on flood plains. Slopes are 0 to 1 percent and are broad, smooth, slightly concave, and convex. Most areas are 15 to 200 acres; some are only 5 acres.

Typically, the surface layer is dark reddish brown clay about 12 inches thick. The subsoil is dark reddish brown clay to a depth of about 23 inches. The underlying material, to a depth of about 32 inches, is reddish brown loam. Below this is reddish brown very fine sandy loam that extends to 66 inches or more.

This soil is high in natural fertility and in organic matter content. The surface layer is mildly alkaline or moderately alkaline. Permeability is very slow, and the available water capacity is high. The soil has poor tilth and can be worked within only a narrow range of moisture content. It

is occasionally flooded. The water table is at a depth of 1 to 3 feet in winter and spring.

Included with this soil in mapping are small areas of Coushatta and Redlake soils and a few small areas of soils that are similar to the Latanier soil, but the surface layer is less than 10 inches thick. Areas of these included soils are generally less than 5 acres.

The potential is low for row crops and small grain. Management is needed to control wetness and to maintain soil structure. The soil is difficult to till because of the clayey surface layer. Tillage should be timely and kept to a minimum. Soil fertility and structure can be maintained by seeding legumes and grasses, adding fertilizer, and returning crop residue. Land smoothing and adequate surface drainage are needed. Water stands in low depressional areas for short periods after flooding.

The potential is high for native grass and tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which helps to protect the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is high for woodland. The main management concerns are the equipment limitation and seedling mortality. Stands can be improved by preventing fires, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is low for most urban uses. Flooding and wetness are the main limitations for septic tank absorption fields, sanitary landfills, dwellings, and small commercial buildings. The main limitations are low strength and a very high shrink-swell potential for roads or streets and flooding for sewage lagoons. Most of these limitations, except flooding, can be overcome by proper design or by altering the soil.

The capability subclass is IVw. The woodland group is 2w. This soil is not assigned to a range site.

35—Lula silt loam, 1 to 3 percent slopes. This deep, well drained, very gently sloping soil is on broad upland ridges. Slopes are smooth and slightly convex. Individual areas are mostly 15 to 80 acres.

Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsoil is dark reddish brown clay loam to a depth of about 12 inches and red silty clay loam to about 56 inches. Below 56 inches is hard fractured limestone. The depth to hard limestone bedrock ranges from 40 to 60 inches.

This soil is high in natural fertility and organic matter content. The surface layer is medium acid or slightly acid. Permeability is moderate, and the available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content.

About 3 percent of this map unit is included areas of Newtonia soils. About 10 percent is soils that are similar to Lula soils, but the surface layer is lighter in color and the lower part of the subsoil is 25 to 35 percent fragments of limestone. Areas of these included soils are generally less than 3 acres.

This soil has medium potential for row crops and small grains. It responds well to good management. Erosion is a moderate hazard if row crops are grown. Minimum tillage, fertilizer, crop residue, and cover crops in the cropping system help to maintain fertility and control erosion.

The potential is high for native grass and tame pasture. A mixture of bermudagrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which protects the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is low for woodland. Trees do not generally grow on this soil, but they encroach in some areas.

The potential is medium for most urban uses. There are no significant limitations for area sanitary landfills. Depth to rock is the main limitation for septic tank absorption fields, sewage lagoons, and trench sanitary landfills. Low strength and a moderate shrink-swell potential are the main limitations for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by better structural design or by altering the soil.

The capability subclass is IIe. The range site is Loamy Prairie. This soil is not assigned to a woodland group.

36—Muskogee silt loam, 1 to 3 percent slopes. This deep, moderately well drained, gently sloping soil is on uplands. Slopes are smooth and slightly convex. Individual areas are mostly 15 to 200 acres.

Typically, the surface layer is dark grayish brown silt loam about 5 inches thick. The subsurface layer is light yellowish brown silt loam about 5 inches thick. The subsoil, to a depth of about 26 inches, is yellowish brown silty clay loam. From 26 to 72 inches it is light gray clay mottled with yellowish brown and red.

This soil is medium in natural fertility and organic matter content. The surface layer is strongly acid or medium acid. Permeability is slow, and the available water capacity is high. The soil has fair tilth and can be worked throughout a moderate range of moisture content. The water table is at a depth of 1 to 2 feet in winter and spring.

Included with this soil in mapping are areas of Alusa and Bernow soils. These included soils, generally less than 3 acres, make up about 15 percent of mapped areas.

The potential is high for row crops and small grain. Management is needed to maintain or improve soil fertility and structure and control erosion. The hazard of ero-

sion can be reduced by using terraces, contour tillage, and crop residue. Plant cover is needed in winter and spring to protect the soil from water erosion. Sown crops can be grown continuously if fertilizer is added and crop residue is well managed. Terracing and contour farming are needed if row crops are grown. Crop residue should be returned to the soil, and excessive tillage avoided.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which helps to protect the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is medium for woodland. There are no significant limitations in woodland use or management. Stands can be improved by preventing fires, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is low for most urban uses. Slow permeability and wetness are the main limitations for septic tank absorption fields, slope for sewage lagoons, and wetness for sanitary landfills. The high shrink-swell potential and the low strength are the main limitations for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IIe. The woodland group is 3o. This soil is not assigned to a range site.

37—Newtonia silt loam, 1 to 3 percent slopes. This deep, well drained, very gently sloping soil is on uplands. Slopes are smooth and slightly convex. Individual areas are 15 to 80 acres.

Typically, the surface layer is very dark brown silt loam about 6 inches thick. The subsoil is dark brown silt loam to a depth of about 10 inches, dark reddish brown and yellowish red silty clay loam to about 32 inches, and red silty clay loam and silty clay to about 68 inches.

This soil is high in natural fertility and organic matter content. The surface layer is medium acid or slightly acid. Permeability is moderate, and the available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content.

About 8 percent of this map unit is included areas of Lula soils and about 15 percent soils similar to this Newtonia soil, but the surface layer is brown.

The potential is high for row crops and small grain. Management is needed to maintain or improve soil structure and fertility and control erosion. The hazard of erosion is moderate. Terraces, contour tillage, and the use of crop residue reduce the erosion hazard and maintain fertility. Sown crops can be grown continuously if fertilizer is added and crop residue is used. Excessive tillage should be avoided.

The potential is high for native grass and tame pasture. A mixture of bermudagrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which helps to protect the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is low for woodland. Trees do not generally grow on this soil, but brush and trees encroach in some areas.

The potential is medium for most urban uses. There are no significant limitations for area sanitary landfills. The main limitations are the moderate permeability for septic tank absorption fields, the seepage and slope for sewage lagoons, and the content of clay for trench sanitary landfills. Low strength and a high shrink-swell potential are the main limitations for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IIe. The range site is Loamy Prairie. This soil is not assigned to a woodland group.

38—Oklared very fine sandy loam. This deep, well drained, nearly level soil is on flood plains along the Red River. Slopes are 0 to 1 percent and are smooth to slightly undulating. Most areas are 15 to 200 acres.

Typically, the surface layer is yellowish red very fine sandy loam about 10 inches thick. The underlying material is stratified reddish yellow fine sandy loam to a depth of about 24 inches, yellowish red loamy very fine sand to 44 inches, reddish brown silt loam to 50 inches, and reddish yellow fine sandy loam to 72 inches.

This soil is high in natural fertility and medium in organic matter content. The surface layer is moderately alkaline. Permeability is moderately rapid, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. It is subject to rare flooding. The water table is at a depth of 3 to 4 feet in spring.

About 10 percent of this map unit is included areas of Idabel and Severn soils. Separate areas of these soils are mostly less than 5 acres.

The potential is high for row crops and small grain. Management is needed to maintain soil fertility and structure. Soil structure can be improved by stubble mulch tillage. Legumes and cover crops are beneficial in maintaining the soil structure and the supply of organic matter.

The potential is high for native grass and tame pasture. A mixture of bermudagrass or weeping lovegrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants increases production and improves the quality of grass. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is high for woodland. There are no significant limitations for woodland use or management. Stands can be improved by preventing fires, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is low for most urban uses. Rare flooding is a significant limitation for dwellings and small commercial buildings. Other limitations are wetness for dwellings with basements or septic tank absorption fields, seepage for sewage lagoons or sanitary landfills, and low strength for roads and streets. Except for flooding, most of these limitations can be overcome by proper design or by altering the soil.

The capability class is I. The woodland group is 2o. This soil is not assigned to a range site.

39—Panola silt loam, 0 to 2 percent slopes. This deep, somewhat poorly drained, nearly level soil is on uplands. Slopes are broad, smooth, and slightly convex. Most areas are 25 to 120 acres; some are only 15 acres.

Typically, the surface layer is about 9 inches of very dark grayish brown silt loam. The subsoil is mottled brown silty clay loam to a depth of about 18 inches, mottled dark grayish brown clay to about 39 inches, mottled dark gray and olive brown clay to about 55 inches, and mottled olive brown clay that extends to a depth of 72 inches or more.

This soil is medium in natural fertility and organic matter content. The surface layer is strongly acid to slightly acid. Permeability is very slow, and the available water capacity is high. The soil has fair tilth and can be worked throughout a moderate range of moisture content. The water table is 1/2 to 1 foot below the surface in winter and spring.

Included with this soil in mapping are small areas of Burleson, Hollywood, and Swink soils. These included soils make up about 15 percent of most mapped areas. Separate areas of these soils are generally less than 5 acres.

The potential is medium for row crops and small grain. Management is needed to maintain soil structure and fertility, to improve water intake, and to control erosion. The hazard of erosion can be reduced by terraces, contour tillage, and crop residue. Crops are needed that provide a large amount of residue to improve soil structure and increase water intake. Sown crops can be grown year after year if fertilizer is applied in adequate amounts so that large amounts of crop residue can be returned to the soil.

The potential is high for native grass and medium for tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Controlling weeds, proper grazing, and preventing fires improve the quality and quantity of all grasses. Fertilizer will increase the quantity of forage.

The potential is low for woodland. Trees do not generally grow on this soil.

The potential is low for most urban uses. Wetness is the main limitation for septic tank absorption fields, sewage lagoons, and sanitary landfills. Wetness, low strength, and a high shrink-swell potential are the main limitations for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IIIe. The range site is Loamy Prairie. This soil is not assigned to a woodland group.

40—Pledger clay. This deep, somewhat poorly drained, nearly level soil is on flood plains along the Red River and at the mouth of other major streams in the county. Slopes are 0 to 1 percent and smooth. Most areas are 20 to 200 acres.

Typically, the surface layer is very dark brown and black clay about 30 inches thick. The subsoil to a depth of about 56 inches is dark brown and reddish brown clay. The underlying material to about 72 inches is reddish brown clay that has thin strata of clay loam and silt loam.

This soil is high in natural fertility and organic matter content. The surface layer is slightly acid to mildly alkaline. Permeability is very slow, and the available water capacity is high. The soil has poor tilth and can be worked within only a narrow range of moisture content. It is subject to rare flooding. The water table is within a depth of 2 1/2 feet in winter.

Included with this soil in mapping are small areas of Roebuck and Redlake soils that total less than 6 percent of the map unit. Separate areas of these soils are generally less than 3 acres.

The potential is high for row crops and small grain. The main concerns of management in cultivated areas are flooding, surface wetness, soil structure, and slow water intake. Most crops can be grown continuously if adequate fertilizer is added for maximum crop residue. A large amount of residue helps to maintain organic matter and contributes to soil particle aggregation, which improves water intake. When the soil is wet, tillage or grazing animals compact the surface, break down soil structure, and reduce water intake. Drainage is needed for better crop production. Crop rows can be alined so that excess surface water can be drained through the furrows.

The potential is high for native grass and tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Fertilizing tame pasture plants increases production and improves the quality of grass. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is medium for woodland. The main management concerns are the equipment limitation and seedling mortality.

The potential is low for most urban uses. Wetness is the main limitation for septic tank absorption fields,

sewage lagoons, and sanitary landfills. A high shrink-swell potential and flooding are the main limitations for dwellings, small commercial buildings, roads, and streets. Except for flooding, most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IIs. The woodland group is 3c. This soil is not assigned to a range site.

41—Redlake clay. This deep, moderately well drained, nearly level soil is on flood plains along the Red River. Slopes are 0 to 1 percent and are broad and smooth. Areas are 15 to 200 acres.

Typically, the surface layer is dark reddish brown clay about 8 inches thick. The subsoil, to a depth of about 42 inches, is reddish brown clay. The underlying material, to 72 inches or more, is yellowish red clay loam stratified with lenses of silt loam.

This soil is high in natural fertility and medium in organic matter content. The surface layer is mildly alkaline or moderately alkaline. Permeability is very slow, and the available water capacity is high. The soil has poor tilth and can be worked within only a narrow range of moisture content. It is occasionally flooded.

Included with this soil in mapping are small areas of Latanier and Roebuck soils. These included soils make up about 10 percent of the map unit. Separate areas of these soils are mostly less than 5 acres.

The potential is high for row crops and small grain. Management is needed to control surface wetness, increase water intake, and maintain soil structure. Flooding occurs in low areas in periods of high rainfall. The soil is difficult to till because of the clay surface layer. Soil structure and fertility can be improved by proper use of crop residue and addition of fertilizer. Land smoothing and drainage outlets are used to reduce surface wetness.

This soil has medium potential for native grass and high potential for tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Fertilizing tame pasture plants increases production and improves the quality of grass. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is medium for woodland. The main management concerns are the equipment limitation and seedling mortality.

The potential is low for most urban uses. Flooding is the main limitation for septic tank absorption fields, sewage lagoons, and sanitary landfills. Flooding, a high or moderate shrink-swell potential, and low strength are the main limitations for dwellings and small commercial buildings. Low strength and shrink-swell are limitations for roads and streets. Except for flooding, most of these limitations can be overcome by proper design or by altering the soil. The flood hazard can be reduced, but not completely eliminated, by upstream flood control structures. The hazard is high for houses built on the flood plain.

The capability subclass is IIIw. The woodland group is 3w. This soil is not assigned to a range site.

42—Roebuck clay. This deep, somewhat poorly drained to poorly drained, nearly level soil is on flood plains. Slopes are 0 to 1 percent. The surface is concave. Most areas are 15 to 100 acres.

Typically, the surface layer is about 5 inches of very dark grayish brown clay over about 15 inches of very dark brown clay. The subsoil is reddish brown clay to a depth of about 42 inches. The underlying material is reddish brown clay that extends to a depth of 70 inches or more.

This soil is high in natural fertility and organic matter content. The surface layer is slightly acid to mildly alkaline. Permeability is very slow, and the available water capacity is high. The soil has poor tilth and can be worked within only a narrow range of moisture content. It is subject to occasional flooding.

Included with this soil in mapping are small areas of Pledger and Redlake soils. Areas of these included soils make up about 15 percent of the map unit. Separate areas are less than 5 acres.

The potential is medium for row crops and small grain. Management is needed that improves soil structure and moisture intake. Excessive tillage, especially when the soil is wet, should be avoided on this clay soil. Large amounts of crop residue returned to the soil improve tilth and water intake. Land smoothing and drainage outlets reduce surface ponding.

The potential is high for native grass and tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Fertilizing tame pasture plants increases production and improves the quality of grass. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is high for woodland. The main management concerns are the equipment limitation and seedling mortality.

The potential is low for most urban uses. The hazard of flooding is the main limitation for septic tank absorption fields, sewage lagoons, and sanitary landfills. Low strength, a high shrink-swell potential, and flooding are the main limitations for dwellings, small commercial buildings, roads, and streets. Except for flooding, most of these limitations can be overcome by proper design or by altering the soil. The flood hazard can be reduced, but not completely eliminated, by upstream flood control structures. The hazard is high for houses built on the flood plain.

The capability subclass is IIIw. The woodland group is 3w. This soil is not assigned to a range site.

43—Ruston fine sandy loam, 1 to 3 percent slopes. This deep, well drained, very gently sloping soil is on uplands. It is on smooth broad ridges. Areas are 15 to 300 acres.

Typically, the surface layer is dark brown fine sandy loam to about 6 inches thick. The subsurface layer is light yellowish brown fine sandy loam about 10 inches thick. The subsoil is red clay loam to a depth of about 32 inches, yellowish red sandy clay loam to about 58 inches, and yellowish red sandy clay loam that extends to 80 inches or more (fig. 3).

This soil is low in natural fertility and organic matter content. The surface layer is strongly acid to slightly acid but ranges to neutral in limed areas. Permeability is moderate, and the available water capacity is medium. The soil has fair tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are small areas of Kirvin and Tenaha soils. These included soils make up about 10 percent of the map unit. Separate areas of these soils are less than 10 acres.

The potential is medium for row crops and small grain. Management is needed to maintain soil structure and fertility and to control erosion. The erosion hazard can be reduced by terraces, waterways, contour tillage, and the use of crop residue. The addition of fertilizer increases crop residue and crop yields. Excessive tillage should be avoided to prevent a breakdown of soil structure and an increase in the hazard of erosion.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants increases production, improves the quality of grass, and protects the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is medium for woodland (fig. 4). There are no significant limitations for woodland use or management. Stands can be improved by protecting them from fire, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is high for most urban uses. There are no significant limitations for septic tank absorption fields, sanitary landfills, dwellings, and small commercial buildings. Seepage and slope are the main limitations for sewage lagoons. Low strength is the main limitation for roads and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IIe. The woodland group is 3o. This soil is not assigned to a range site.

44—Ruston fine sandy loam, 3 to 5 percent slopes. This deep, well drained, gently sloping soil is on uplands. Slopes are slightly convex. Areas are 15 to 150 acres.

Typically, the surface layer is 6 inches of dark grayish brown fine sandy loam. The subsurface layer is light yellowish brown fine sandy loam about 10 inches thick. The subsoil extends to a depth of 66 inches or more. It is yellowish red sandy clay loam.

This soil is low in natural fertility and organic matter content. Reaction is strongly acid to slightly acid in the surface layer but ranges to neutral in limed areas. Permeability is moderate, and the available water capacity is medium. This soil has fair tilth and can be worked throughout a wide range of moisture content.

Included with this Ruston soil in mapping are small areas of Kirvin, Smithdale, and Tenaha soils. These included soils make up about 15 percent of the map unit. Separate areas are generally less than 5 acres.

The potential is medium for row crops and small grain. The main concerns of management are an erosion hazard, soil structure, and fertility. Large amounts of crop residue should be returned to the soil because the fine sandy loam surface layer is highly erodible. Fertilizer helps to maintain soil structure and fertility. Lime is needed to correct acidity and to supply calcium in some areas. The cropping system should consist dominantly of high residue crops, such as small grain. Terracing, waterways, and contour farming help to control erosion. Excess tillage should be avoided because it breaks down crop residue and destroys soil structure.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which helps to protect the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is medium for woodland. There are no significant limitations for woodland use or management. Stands can be improved by protecting them from fire, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is high for most urban uses. There are no significant limitations for septic tank absorption fields, sanitary landfills, and dwellings. Seepage and slope are the main limitations for sewage lagoons. Slope is the main limitation for small commercial buildings and low strength for roads and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IIIe. The woodland group is 3o. This soil is not assigned to a range site.

45—Saffell gravelly fine sandy loam, 3 to 8 percent slopes. This deep, well drained, gently sloping to sloping soil is on uplands. Slopes are broad, smooth, and slightly convex. Most areas are 10 to 30 acres; some are smaller.

Typically, the surface layer is dark grayish brown gravelly fine sandy loam about 4 inches thick. The subsurface layer is yellowish brown gravelly fine sandy loam

about 7 inches thick. The subsoil is yellowish red very gravelly sandy clay loam to a depth of about 48 inches and strong brown very gravelly loam to about 58 inches. The underlying material, to about 65 inches, is yellowish brown very gravelly sandy loam and loamy sand.

This soil is low in natural fertility and organic matter content. Reaction is very strongly acid to strongly acid in the surface layer except in limed areas. Permeability is moderate, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are intermingled areas of Bernow and Bosville soils and small areas of Saffell soils where slopes are more than 8 percent. The included soils make up about 10 percent of this map unit, but separate areas generally are less than 5 acres.

The potential is medium for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate if cultivated crops are grown. Minimum tillage, cover crops, terracing, and contour farming reduce runoff and help control erosion.

The potential is medium for tame pasture and low for native grass. A mixture of bermudagrass or bahiagrass and clover is commonly used for tame pasture. Fertilizing improves the quantity of grass cover, which helps to control erosion. Proper stocking and grazing, controlling brush, and preventing fires increase the quality of forage.

The potential is medium for woodland. The main concern of management is seedling mortality.

The potential is high for most urban uses. There are no significant limitations for dwellings, roads, streets, septic tank absorption fields, and sanitary landfills. Seepage and slope are the main problems for sewage lagoons.

The capability subclass is IIIe. The woodland group is 4f. This soil is not assigned to a range site.

46—Severn very fine sandy loam. This deep, well drained, nearly level soil is on flood plains along the Red River. Slopes are 0 to 1 percent and are broad and smooth. Areas are mostly 15 to 100 acres.

Typically, the surface layer is reddish brown very fine sandy loam about 10 inches thick. The underlying material, to a depth of about 72 inches, is reddish brown very fine sandy loam, thinly stratified with loam or loamy fine sand.

This soil is high in natural fertility and medium in organic matter content. The surface layer is moderately alkaline. Permeability is moderately rapid, and the available water capacity is high. This soil has good tilth and can be worked throughout a wide range of moisture content. It is subject to rare flooding.

Included with this soil in mapping are small areas of Idabel, Kiomatia, and Oklared soils and areas of Severn soils that have a silt loam or loam surface layer. These included soils make up about 20 percent of the map unit. Separate areas of these soils are less than 5 acres.

The potential is high for row crops and small grain. Management is needed to maintain or improve soil structure and fertility. Crop residue should be returned to the soil. Rotating crops with a nitrogen-fixing legume helps to maintain soil fertility and structure.

The potential is high for native grass and tame pasture. A mixture of bermudagrass or weeping lovegrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants increases production and improves the quality of grass. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is high for woodland. There are no significant limitations for woodland use or management. Stands can be improved by protecting them from fire, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is low for most urban uses. Rare flooding is the main limitation for septic tank absorption fields. Seepage is the main limitation for sewage lagoons and sanitary landfills. Rare flooding and low strength are the main limitations for dwellings, small commercial buildings, roads, and streets. Except for flooding, most of these limitations can be overcome by proper design or by altering the soil.

The capability class is I. The woodland group is 2o. This soil is not assigned to a range site.

47—Smithdale fine sandy loam, 5 to 12 percent slopes. This deep, well drained, sloping to strongly sloping soil is on uplands. Slopes are slightly convex. Areas are mostly 15 to 200 acres.

Typically, the surface layer is dark brown fine sandy loam about 5 inches thick. The subsurface layer is light yellowish brown fine sandy loam about 11 inches thick. The subsoil, to a depth of about 38 inches, is yellowish red sandy clay loam. To about 66 inches, it is yellowish red sandy loam.

This soil is low in natural fertility and organic matter content. The surface layer is very strongly acid or strongly acid in the surface layer but ranges to neutral in areas that are limed. Permeability is moderate, and the available water capacity is medium. The soil has fair tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are areas of Ruston and Tenaha soils. These soils make up about 15 percent of most mapped areas. Separate areas of these soils are generally less than 3 acres.

The potential is low for row crops and small grain. The slope and the potential erosion hazard are the main limitations for cultivation.

The potential is medium for native grass and tame pasture. A mixture of bermudagrass or bahiagrass and

clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which helps to protect the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires. A good grass cover improves soil structure and helps to control erosion. Proper grazing, rotational grazing, and preventing fires improve the quantity and quality of forage.

The potential is medium for woodland. There are no significant limitations in woodland use or management. Stands can be improved by protecting them from fire, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is medium for most urban uses. There are no significant limitations for trench sanitary landfills. Slope is the main limitation for septic tank absorption fields, sewage lagoons, area sanitary landfills, dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is VIe. The woodland group is 3o. This soil is not assigned to a range site.

48—Smithdale fine sandy loam, 2 to 8 percent slopes, eroded. This deep, well drained, very gently sloping to sloping eroded soil is on uplands. Slopes are slightly convex and are cut by rills and a few gullies. Individual areas are irregular in shape and range from 15 to 80 acres.

This soil is eroded. On about 40 percent of the acreage, the subsoil has been mixed with the surface layer. There are a few uncrossable gullies and many rills caused by water erosion.

Typically, the surface layer is dark grayish brown fine sandy loam about 4 inches thick. The subsurface layer is brown fine sandy loam about 4 thick. The subsoil is strong brown and yellowish red sandy clay loam that extends to a depth of 64 inches or more.

This soil is low in natural fertility and organic matter content. Reaction is very strongly acid or strongly acid in the surface layer but ranges to neutral in limed areas. Permeability is moderate, and the available water capacity is medium. This soil has fair tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are eroded areas of Kirvin and Tenaha soils. These included soils make up about 10 percent of mapped areas. Separate areas of these soils are generally less than 5 acres.

The potential is low for row crops and small grain. The main concerns of management are protecting the soil from further erosion and maintaining soil fertility and structure. Terraces, waterways, and contour farming help to control erosion. A cropping system that includes small grain and adequate amounts of fertilizer to produce maximum residue is needed to control further soil loss by water. Clean-tilled row crops can be planted occasionally if very intensive erosion control measures are used.

The potential is medium for native grass and tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which helps to protect the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is medium for woodland. There are no significant limitations for woodland use or management. Stands can be improved by protecting them from fire, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is high for most urban uses. There are no significant limitations for septic tank absorption fields, sanitary landfills, dwellings, roads, and streets. Slope is the main limitation for sewage lagoons and small commercial buildings. This limitation can be overcome by proper design or by altering the soil.

The capability subclass is IVe. The woodland group is 3o. This soil is not assigned to a range site.

49—Speer fine sandy loam. This deep, well drained, nearly level soil is on low stream terraces. It occurs as broad, smooth slightly convex areas of 15 to 120 acres. Slopes are 0 to 1 percent.

Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsoil is brown fine sandy loam to about 12 inches, strong brown loam to about 38 inches, and yellowish brown loam and pale brown sandy loam to about 72 inches.

This soil is medium in natural fertility and low in organic matter content. Reaction is strongly acid or medium acid in the surface layer but ranges to neutral in limed areas. Permeability is moderate, and the available water capacity is high. This soil has fair tilth and can be worked throughout a wide range of moisture content. It is subject to rare flooding.

Included with this soil in mapping are areas of Dela and Whakana soils. Areas of these included soils, generally less than 4 acres, make up about 10 percent of the map unit.

The potential is high for row crops and small grain. The main concerns of management are controlling erosion and maintaining soil structure and fertility. This soil can be used for continuous clean tilled crops if adequate fertilizer is added and crop residue is returned to the soil. Crop residue is needed to maintain soil structure and to improve water intake.

The potential is high for native grass and for tame pasture. A mixture of bermudagrass or weeping lovegrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which

helps to protect the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is high for woodland. There are no significant limitations for woodland use or management. Stands can be improved by protecting them from fire, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is low for most urban uses. Flooding is the main limitation for septic tank absorption fields, sewage lagoons, sanitary landfills, dwellings, small commercial buildings, roads, and streets. The flood hazard can be reduced, but not completely eliminated, by upstream flood control structures. The hazard is high for houses built on the flood plain.

The capability class is I. The woodland group is 2o. This soil is not assigned to a range site.

50—Swink-Hollywood complex, 5 to 20 percent slopes. This map unit consists of the shallow Swink and deep Hollywood soils in such an intricately mixed pattern that mapping them separately is not practical at the scale selected for mapping. The Swink soil occurs on crests, microcrests, and microescarpments on side slopes near the outcrops of limestone. The Hollywood soil occurs on upper, middle, and lower slopes of less than 8 percent between areas of the Swink soil and the limestone outcrop. Most areas are 1/2 acre to 5 acres in size.

The Swink soil makes up 50 to 70 percent of each mapped area. Typically, the upper 5 inches of the surface layer is black stony clay, and the lower 9 inches is very dark grayish brown stony clay. Fractured limestone and thin strata of calcareous shale are at a depth of 14 inches.

This soil is high in natural fertility and medium in organic matter content. The surface layer is neutral to moderately alkaline. Permeability is slow, and the available water capacity is low.

Hollywood silty clay makes up 20 to 40 percent of each area mapped. Typically, the surface layer is black and is about 18 inches thick. The next layer, to a depth of about 56 inches, is olive brown and light olive brown silty clay. Below 56 inches is limestone bedrock.

This soil is high in natural fertility and organic matter content. The surface layer is slightly acid to moderately alkaline. Permeability is very slow, and the available water capacity is high.

About 10 percent of this map unit is small included areas of Ferris soils and soils that are similar to Lula soils but are 35 percent fragments of chert throughout the profile.

The potential is low for row crops and small grain. Slope, stones, and shallowness over rock are the main limitations for cultivation.

The potential is high for native grass (fig. 5) and low for tame pasture. The quality and quantity of all grasses can be improved by controlling weeds and brush, proper grazing, and preventing fires.

The potential is low for woodland. Trees do not generally grow on these soils.

The potential is low for most urban uses. There are no significant limitations for area sanitary landfills. The shallowness of the Swink soil over rock is the main limitation for trench sanitary landfills, septic tank absorption fields, and sewage lagoons. Low strength and a high shrink-swell potential are the main limitations for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is VIIs. The range site is Shallow Prairie for Swink soil and Blackclay Prairie for Hollywood soil. This soil is not assigned to a woodland group.

51—Tenaha loamy fine sand, 1 to 5 percent slopes. This deep, well drained, very gently sloping to gently sloping soil is on ridges and side slopes of uplands. Slopes are smooth and convex. Individual areas are 15 to 150 acres.

Typically, the surface layer is brown loamy fine sand about 6 inches thick. The subsurface layer is yellowish brown and brownish yellow loamy fine sand about 22 inches thick. The subsoil is yellowish red sandy clay loam and loam that extends to a depth of 56 inches. Below this is yellowish red soft sandstone. The depth to sandstone ranges from 40 to 60 inches.

This soil is low in natural fertility and organic matter content. The surface layer is strongly acid or medium acid but ranges to neutral in limed areas. Permeability is moderate, and the available water capacity is medium. This soil has fair tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are areas of Kirvin soils; small areas of Smithdale soils of less than 3 acres; and areas of soils that are similar to Tenaha soils but have a surface layer less than 20 inches thick and are more than 60 inches deep over sandstone. These included soils make up about 15 percent of the map unit.

The potential is medium for row crops and small grain. The main concerns of management are controlling erosion and maintaining of soil structure and fertility. Large amounts of crop residue should be returned to the soil and fertilizer added. High residue crops, such as small grain, should be included in the cropping system. Cover crops should be planted to prevent soil blowing in the windy season. Excess tillage should be avoided.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which helps to protect the soil from erosion. The quality of all

grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is medium for woodland. There are no erosion hazards or significant limitations for woodland use or management of equipment. Stands can be improved by protecting them from fire, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is high for most urban uses. There are no significant limitations for area sanitary landfills, dwellings, small commercial buildings, roads, and streets. The main limitations are the depth to rock for septic tank absorption fields and trench sanitary landfills and seepage for sewage lagoons. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IIIe. The woodland group is 3s. This soil is not assigned to a range site.

52—Tenaha loamy fine sand, 5 to 8 percent slopes. This deep, well drained, sloping soil is on side slopes of uplands. Slopes are smooth and slightly convex. Individual areas are 15 to 200 acres.

Typically, the surface layer is dark grayish brown loamy fine sand about 5 inches thick. The subsurface layer, to a depth of 32 inches, is light yellowish brown loamy fine sand. The subsoil, to about 56 inches, is yellowish red sandy clay loam and very fine sandy loam. The underlying material, to 60 inches, is yellowish red, soft sandstone with a few thin discontinuous lenses of red hard sandstone. The depth to sandstone ranges from 40 to 60 inches.

This soil is low in natural fertility and organic matter content. Reaction is strongly acid or medium acid in the surface layer but ranges to neutral in limed areas. Permeability is moderate, and the available water capacity is medium. This soil has fair tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are small areas of Kirvin and Smithdale soils and areas of a soil that is similar to the Tenaha soil but has sandstone at a depth of about 34 inches. These included soils make up about 20 percent of the map unit. Separate areas of these soils are generally less than 3 acres.

The potential is low for row crops and small grain. The main concerns of management are protecting the soil from wind and water erosion, maintaining soil structure, and increasing fertility. A cropping system of mostly small grain and adequate amounts of fertilizer for maximum residue is needed to control erosion. Excessive tillage should be avoided.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which helps to protect the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is medium for woodland. There are no erosion hazards or significant limitations for woodland use or management of equipment. Stands can be improved by protecting them from fire, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is high for most urban uses. There are no significant limitations for area sanitary landfills, dwellings, roads, and streets. The main limitations are seepage for sewage lagoons, slope for small commercial buildings, and depth to rock for septic tank absorption fields and trench sanitary landfills. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IVe. The woodland group is 3s. This soil is not assigned to a range site.

53—Tenaha-Kirvin association, moderately steep. This map unit consists of well drained soils in a regular and repeating pattern. The landscape is one of smooth rounded hills and moderately steep side slopes. The moderately steep Tenaha soils are on side slopes. The strongly sloping to moderately steep Kirvin soils are on hilltops. Slopes are predominantly 12 to 20 percent but range from 8 to 20 percent. The soils formed in material weathered from sandstone. Mapped areas range up to several hundred acres in size. Individual areas of each soil make up 5 to 40 acres.

Tenaha soils make up about 40 percent of the map unit. Typically, the surface layer is dark grayish brown loamy fine sand about 7 inches thick. The subsurface layer, to a depth of 28 inches, is light yellowish brown loamy fine sand. The subsoil, to a depth of 56 inches, is yellowish red sandy clay loam and loam. The underlying material is reddish yellow soft sandstone that extends to a depth of 65 inches or more. The depth to sandstone ranges from 40 to 60 inches.

Tenaha soils are low in natural fertility and organic matter content. Reaction is strongly acid or medium acid in the surface layer but ranges to neutral in limed areas. Permeability is moderate, and available water capacity is medium.

Kirvin soils make up about 30 percent of the map unit. Typically, the surface layer is dark grayish brown fine sandy loam about 3 inches thick. The subsurface layer is pale brown fine sandy loam about 5 inches thick. The subsoil is red and yellowish red sandy clay to a depth of about 45 inches and mottled yellowish red, strong brown, and gray sandy clay loam to 52 inches. The underlying material is yellowish red and light gray interbedded sandstone and clayey shale that extends to a depth of 65 inches or more.

Kirvin soils are low in natural fertility and organic matter content. The surface layer is medium acid or

strongly acid. Permeability is moderately slow, and the available water capacity is high.

About 30 percent of this map unit is included areas of soils, generally less than 5 acres in size. These included soils have a sandy surface layer less than 20 inches thick or more than 40 inches thick. Otherwise their profile is similar to that of Tenaha soils.

The potential is low for row crops and small grain. The main limitations are the slope and the hazard of erosion.

The potential is medium for native grass and tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for tame pasture. Controlling brush, proper grazing, and preventing fires improve the quality and quantity of all grasses. Fertilizing tame pasture plants increases forage production, which helps to control erosion.

This association has medium potential for woodland. Except for seedling mortality on Tenaha soils, there are no significant limitations. Stands can be improved by protecting them from fires, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is medium for most urban uses. Slope is the main limitation for sewage lagoons and area sanitary landfills. Depth to rock in areas of Tenaha soils is the main limitation for septic tank absorption fields and trench sanitary landfills. The slope is the main limitation for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is VIe. The woodland group is 3s for Tenaha soil and 3o for Kirvin soil. This soil association is not assigned to a range site.

54—Tenaha and Smithdale soils, 2 to 12 percent slopes, gullied. This map unit consists of deep, well drained, very gently sloping to strongly sloping soils on eroded uplands. Tenaha and Smithdale soils are in an irregular pattern on the landscape. Individual areas of each soil are large enough to be mapped separately, but because of present and predicted use, they were mapped as one unit. Most mapped areas contain both soils, but many areas contain only one.

About 25 percent of this map unit is gullied. The gullies are 2 to 10 feet deep, 4 to 12 feet wide, and 150 to 350 feet apart. On about 10 percent of the unit, erosion has removed all of the original surface layer. On about 50 percent, erosion has removed part of the original surface layer. Plowing has mixed the rest with material from the subsoil.

About 55 percent of this map unit is the Tenaha soil. Typically, the surface layer is grayish brown loamy fine sand about 3 inches thick. The subsurface layer is pale brown loamy fine sand about 19 inches thick. The subsoil, to a depth of 54 inches, is strong brown sandy clay loam. The underlying material is soft sandstone that extends to a depth of about 65 inches or more. The depth to sandstone ranges from 40 to 60 inches.

The Tenaha soil is low in natural fertility and organic matter content. The surface layer is strongly acid or medium acid but ranges to neutral in limed areas. Permeability is moderate, and the available water capacity is medium.

About 30 percent of this map unit is the Smithdale soil. Typically, the surface layer is dark grayish brown fine sandy loam about 2 inches thick. The subsurface layer is brown fine sandy loam about 10 inches thick. The subsoil is yellowish red sandy clay loam to a depth of about 56 inches and yellowish red sandy clay loam and white fine sandy loam to about 64 inches.

The Smithdale soil is low in natural fertility and organic matter content. Reaction is very strongly acid or strongly acid in the surface layer but ranges to neutral in areas that are limed. Permeability is moderate, and the available water capacity is medium.

About 7 percent of this unit is included areas of Kirvin soils. About 8 percent is included areas of soils that have a sandy surface layer less than 20 inches thick but are otherwise similar to Tenaha soils. Areas of these included soils are less than 5 acres.

The potential is low for row crops and small grain. The main limitations for cultivated crops are the slope and the severe hazard of erosion.

The potential is low for native grass and tame pasture. The main concerns of management are controlling erosion and maintaining soil structure and fertility. Cultivated areas should be planted to permanent vegetation, such as tame pasture, native grasses, or trees to reduce soil erosion. Adding fertilizer, diverting overhead water, and shaping gully banks insure the successful establishment of tame pasture plants. The quality and quantity of pasture plants can be improved by proper grazing, controlling weeds or brush, and adding plant food.

The potential is medium for woodland. There is no significant limitation in woodland use and management. Stands can be improved by protecting them from fires, thinning and selectively harvesting on a planned schedule, planting suitable species, and removing or controlling inferior species.

This map unit has medium potential for most urban uses. Gullies should be shaped and vegetated. Slope and the depth to rock are the main limitations of the Tenaha soil for septic tank absorption fields. Seepage and the slope are limitations for sewage lagoons, and depth to rock is a limitation for trench sanitary landfill. Slope is the main limitation for dwellings, small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is VIe. The woodland group is 3o. This unit is not assigned to a range site.

55—Trinity clay. This deep, somewhat poorly drained, nearly level soil is in smooth or slightly concave flood plains. Slopes are 0 to 1 percent. Most areas are 25 to 200 acres; some are only 10 acres.

Typically, the surface layer is black clay about 14 inches thick. The next layer is clay. It is very dark gray to about 26 inches and dark gray to about 40 inches. The underlying material is olive gray clay that extends to a depth of 62 inches or more.

This soil is high in natural fertility and organic matter content. The surface layer is mildly alkaline or moderately alkaline. Permeability is very slow, and the available water capacity is high. This soil is subject to frequent flooding. The water table is within a depth of 3 feet in winter and spring.

Included with this soil in mapping are areas of Kaufman and Tuscumbia soils and soils that have a profile similar to that of Trinity soils but are well drained. These included soils make up about 8 percent of the map unit.

The potential is low for row crops and small grain. The main concerns of management are surface drainage, ponding, flooding, soil structure, and water intake.

The potential is medium for native grass and high for tame pasture. Wet and ponded areas can be planted to water-tolerant grasses. Simple drainage systems help in establishing tame pasture grasses. Growth of pasture can be increased by adding fertilizer and deferring grazing. A good grass mulch helps to maintain soil structure and improve water intake.

The potential is high for woodland. The main management concerns are the use of equipment and seedling mortality. Thinning, selective cutting, and preventing fires increase tree production.

The potential is low for urban use. Flooding and a very high shrink-swell potential are the main limitations for most urban uses.

The capability subclass is Vw. The woodland group is 2w. This soil is not assigned to a range site.

56—Tuscumbia clay. This deep, poorly drained, nearly level soil is on smooth or slightly concave flood plains. Most areas are 30 to 150 acres; some are only 10 acres. Slopes are 0 to 1 percent.

Typically, the surface layer is very dark gray clay about 8 inches thick. The subsoil, to a depth of about 20 inches, is dark gray clay. Below 20 inches it is gray silty clay that extends to a depth of 64 inches or more.

This soil is high in natural fertility and organic matter content. It is medium acid to mildly alkaline. Permeability is very slow, and the available water capacity is high. This soil has poor tilth and can be worked within only a narrow range of moisture content. It is subject to occasional flooding.

Included with this soil in mapping are areas of Hopco, Kaufman, Roebuck, and Trinity soils. Also included are soils that have a profile similar to that of the Tuscumbia soil but are calcareous below a depth of 20 inches. The included soils make up less than 15 percent of the map unit.

The potential is medium for row crops and small grain. The main concerns of management are flooding, surface wetness, slow water intake, and soil structure. Close growing crops are needed to prevent soil loss during flooding. The planting of spring crops should be delayed until after most periods of flooding. Crops can be grown continuously if fertilizer is added for maximum crop residue. Large amounts of crop residue help to prevent surface crusting and to improve the water intake. Tillage and overgrazing during wet periods break down soil structure, compact the surface, and reduce permeability. Installing drainage ditches parallel with cultivated rows reduces surface wetness.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Fertilizing tame pasture plants increases production and improves the quality of grass. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

Potential is high for woodland. Equipment use and seedling mortality are significant limitations in woodland use or management. Stands can be improved by protecting them from fires, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is low for most urban uses. Flooding and a very high shrink-swell potential are the main limitations.

The capability subclass is IIIw. The woodland group is 2w. This soil is not assigned to a range site.

57—Udorthents. This map unit is mostly areas of Bernow, Clebit, Durant, Endsaw, Saffell, and Swink soils from which soil material, gravel, and limestone fragments have been excavated for building roads, dams, foundations, and other similar structures. The pits are 5 to 30 feet deep, 300 to 2,000 feet long, and 150 to 600 feet wide. They have nearly vertical sides and very gently sloping to sloping bottoms. The soil material consists of varying mixtures of sand, loamy fine sand, loam, sandy clay loam, clay loam, and clay. Reaction is mostly medium acid to mildly alkaline.

This map unit is suited to native grasses and improved bermudagrass. It also provides wildlife habitat. The erosion hazard is severe unless a suitable plant cover is maintained.

The main concerns in management are leveling the steep slopes, controlling erosion, and maintaining structure and fertility. Intensive management is needed to establish or to improve and maintain the plant cover. Land leveling, desirable plant cover, controlled grazing, and plant food are needed in places.

The capability subclass is VIe. This soil is not assigned to a range site or woodland group.

58—Whakana very fine sandy loam, 1 to 4 percent slopes. This deep, well drained, very gently sloping to gently sloping soil is on terraces. Slopes are smooth and slightly convex. Most areas are 15 to 100 acres; some are only 5 acres.

Typically, the surface layer is brown very fine sandy loam about 6 inches thick. The subsurface layer is light yellowish brown very fine sandy loam about 6 inches thick. The subsoil, to a depth of about 37 inches, is red clay loam. To about 72 inches it is red sandy clay loam with pink and white streaks and pockets of loamy fine sand.

This soil is medium in natural fertility and low in organic matter content. The surface layer is medium acid or slightly acid. Permeability is moderate, and the available water capacity is high. This soil has good tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are small areas of Bernow and Bosville soils. Also included are a few small areas of soils that are similar to the Whakana soil, but the subsoil is mainly clay or fine sandy loam. Areas of these included soils, mostly less than 3 acres, make up about 10 percent of mapped areas.

The potential is high for row crops and small grain. The main concerns of management are controlling soil loss from erosion and maintaining soil structure and fertility. The cropping system should provide for the return of adequate amounts of residue to the soil. Erosion can be reduced by contour farming and terracing and by managing crop residue. Cover crops are needed in spring and winter to help prevent soil loss by erosion. Fertilizer increases plant growth and provides additional crop residue for erosion control. Terracing, contour farming, and cover crops are especially needed where clean tilled row crops are grown.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which helps to protect the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is medium for woodland. There are no significant limitations in woodland use or management. Stands can be improved by protecting them from fire, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is high for most urban uses. There are no significant limitations for septic tank absorption fields, sanitary landfills, dwellings, small commercial buildings, roads, and streets. Seepage and slope are the main limitations for sewage lagoons. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IIe. The woodland group is 3o. This soil is not assigned to a range site.

59—Whakana very fine sandy loam, 4 to 8 percent slopes. This deep, well drained, sloping soil is on terraces. Slopes are smooth and slightly convex. Most areas are 15 to 200 acres; some are only 5 acres.

Typically, the surface layer is dark brown very fine sandy loam about 4 inches thick. The subsurface layer is strong brown fine sandy loam about 6 inches thick. The subsoil extends to a depth of 74 inches or more. To about 48 inches it is red clay loam and sandy clay loam. The lower part is red sandy clay loam with light colored streaks and pockets of sandy material.

This soil is medium in natural fertility and low in organic matter content. The surface layer is medium acid or slightly acid. Permeability is moderate, and the available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are small areas of Bernow and Bosville soils and a few small areas of soils that are similar to the Whakana soil, but the subsoil is mainly clay or fine sandy loam. These included soils make up about 10 percent of any one mapped area. Separate areas of these soils are less than 5 acres.

This soil has medium potential for row crops and small grain. The main concerns of management are the erosion hazard, soil structure, and fertility. The cropping system should provide for the return of large amounts of crop residue to the soil. Cover crops are needed to reduce the erosion hazard. Terracing, contour farming, and cover crops are especially needed if clean tilled row crops are grown.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass or bahiagrass and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which helps to protect the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is medium for woodland. There are no significant limitations for woodland use or management. Stands can be improved by protecting them from fire, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is high for most urban uses. There are no significant limitations for dwellings, septic tank absorption fields, and sanitary landfills. Slope and seepage are the main limitations for sewage lagoons. Slope is the main limitation for small commercial buildings, roads, and streets. Most of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IIIe. The woodland group is 3o. This soil is not assigned to a range site.

60—Wrightsville-Elysian complex, undulating. This map unit consists of small areas of deep, poorly drained and moderately well drained, nearly level to undulating

Wrightsville and Elysian soils on terraces. These soils are so intermingled that mapping them separately is not practical at the scale selected for mapping. The Wrightsville soil occurs in the nearly level areas. The Elysian soil occurs on the slightly higher undulating mounds. Slopes are predominantly 0 to 1 percent, but some are up to 3 percent. Individual areas are 5 to 100 acres.

The poorly drained Wrightsville soil makes up 60 percent of each area mapped. Typically, the surface layer is grayish brown silt loam 4 inches thick. The subsurface layer is light brownish gray mottled silt loam about 8 inches thick. The next layer, about 14 inches thick, is gray mottled silty clay that has vertical streaks of light gray silt loam. The subsoil to a depth of 70 inches or more is gray mottled silty clay.

This Wrightsville soil has medium natural fertility and low organic matter content. The surface layer is very strongly acid or strongly acid. Permeability is very slow, and the available water capacity is high. The soil has good tilth and can be worked throughout a medium range of moisture content.

The moderately well drained Elysian soil makes up 25 percent of each area mapped. Typically, the surface layer is dark grayish brown very fine sandy loam about 5 inches thick. The subsoil is brownish yellow fine sandy loam to a depth of about 34 inches and yellowish brown mottled loam that has vertical streaks of light gray fine sandy loam to about 72 inches.

This Elysian soil is low in natural fertility and organic matter content. The surface layer is slightly acid to very strongly acid. Permeability is moderate, and the available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content.

Included with this unit in mapping are areas of Guyton soils. The included soils make up about 15 percent of this map unit.

The potential is medium for row crops and small grain. Seasonal wetness on the Wrightsville soil sometimes delays planting or harvesting. Both soils have fair tilth and can be worked throughout a medium range of moisture content. Tilth can be improved by returning crop residue to the soil and by using minimum tillage.

The potential is medium for native grass and high for tame pasture. A mixture of bermudagrass or tall fescue and clover is most commonly used for tame pasture. Fertilizing tame pasture plants not only improves the quality of grass but also increases production, which helps to protect the soil from erosion. The quality of all grasses can be improved by controlling grazing, proper stocking, and preventing fires.

The potential is medium for woodland. Except for seedling mortality on the Wrightsville soil, there are no significant limitations in woodland use or management. Stands can be improved by protecting them from fires, planting suitable species, removing or controlling inferior species, and selectively harvesting on a planned schedule.

The potential is low for most urban uses. There are no significant limitations for sewage lagoons on the Wrightsville soil. Wetness is the main limitation for septic tank absorption fields and sanitary landfills. Wetness, low strength, and the high shrink-swell potential of the Wrightsville soil are the main limitations for dwellings, small commercial buildings, roads, and streets. Some of these limitations can be overcome by proper design or by altering the soil.

The capability subclass is IIIw. The woodland group is 3w for Wrightsville soil and 2o for Elysian soil. This unit is not assigned to a range site.

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

Odes G. Hensen, 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 explained; and the estimated yields of the main crops and hay and pasture plants are presented for each soil.

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

In 1967 more than 214,000 acres in the survey area was used for crops and pasture, according to the Conservation Needs Inventory (*3*). Of this total, about 184,000 acres was used for permanent pasture; 6,000 acres for row crops, 5,000 acres for close-growing crops, mainly wheat and oats; and 8,000 areas for rotation hay and pasture. The rest was idle cropland.

The soils in Choctaw County have good potential for increased production of food.

The acreage in crops and pasture is gradually decreasing as more and more land is used for urban development. In 1967 about 12,000 acres in the survey area was urban and built-up land. This figure has been increasing at the rate of about 20 acres per year. The use of this soil survey can help in making land use decisions that will influence the future role of farming in the survey area. See "General soil map for broad land use planning."

Soil erosion is the chief concern on about one-third of the cropland and pasture in Choctaw County. If the slope is more than 1 percent, erosion is a hazard. Bernow, Bosville, Burleson, Heiden, and Muskogee soils, for example, have slopes of more than 1 percent.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil. Bosville, Burleson, Durant, and Panola soils are examples.

Erosion also reduces productivity on soils that tend to be droughty, for example, Kiomatia loamy fine sand. Second, soil erosion on farmland results in sedimentation of streams. Controlling erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use and recreation and for fish and wildlife.

In many sloping fields, tilling or preparing a good seedbed is difficult on clayey spots because the original friable surface soil has been eroded away. Such spots are common in areas of the moderately eroded Bosville and Ferris soils.

Erosion control provides a protective surface cover, reduces runoff, and increases infiltration. A cropping system that keeps a plant cover on the soil for extended periods can hold soil erosion losses to amounts that will not reduce the productive capacity of the soils. On livestock farms that need pasture and hay, the legume and grass forage crops in the cropping system reduce erosion on sloping land, provide nitrogen, and improve tilth for the following crop.

A cropping system that provides substantial plant cover is needed to control erosion. Minimum tillage and crop residue on the surface increase infiltration and reduce the hazards of runoff and erosion. Both can be adapted to most soils in the survey area but are more difficult on the eroded soils and on the soils that have a clayey surface layer, for example, Burleson, Ferris, Heiden, Kaufman, Latanier, Pledger, Redlake, Roebuck, Trinity, and Tuscumbia soils.

Terraces and diversions reduce the length of slope and reduce runoff and erosion. They are not practical on deep sandy soils. Panola soils are suitable for terraces.

Contouring and contour farming, erosion control practices in the survey area, are best adapted to soils that have smooth, uniform slopes, including most areas of Bernow, Bosville, Burleson, Durant, Ferris, Heiden, Hollywood, Lula, Muskogee, Newtonia, Panola, Ruston, and Whakana soils.

Soil blowing is a slight hazard on the sandy Kiomatia and Tenaha soils. Blowing can damage these soils if winds are strong and the soils are dry and bare of plant cover or surface mulch. Maintaining a plant cover, a surface mulch, or a rough surface through proper tillage minimizes the risk of soil blowing.

Information on the design of erosion control practices for each kind of soil is available in the Technical Guide in the local offices of the Soil Conservation Service.

Soil drainage is the chief management need on about one-fifth of the acreage used for crops and pasture in the survey area. Some soils are so wet that the production of crops commonly grown in the area is generally not possible. These are the somewhat poorly drained or

poorly drained Alusa, Boggy, Guyton, Hopco, Kaufman, Latanier, Panola, Pledger, Roebuck, Trinity, Tuscumbia, and Wrightsville soils.

Soil fertility is naturally low in most soils on uplands in the survey area. The soils on flood plains or terraces are naturally higher in plant nutrients than most soils on uplands.

Unless limed, forest soils on uplands are acid. Sufficient ground limestone is needed to raise the pH level for good growth of alfalfa and other crops that grow only on nearly neutral soils. Available phosphorus and potash levels are naturally low in most of these soils. On all soils, additions of lime and fertilizer should be based on the results of soil tests, on the needs of the crop, and on the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to be applied.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils that have good tilth are granular and porous.

Many soils used for crops in the survey area have a surface layer of fine sandy loam or loamy fine sand that is light in color and low in content of organic matter. Generally the structure of such soils is weak, and intense rainfall causes the formation of a crust on the surface. The crust reduces infiltration and increases runoff. Regular additions of crop residue, manure, and other organic material can improve soil structure and reduce crust formation.

The dark colored Burleson, Ferris, and Heiden soils are clayey. Tilth is a concern because the soils often stay wet until late in spring. If wet when plowed, these soils tend to be very cloddy when dry and a good seedbed is difficult to prepare. Fall plowing on such wet soils generally results in good tilth in spring.

Field crops suited to the soils and climate of the survey area include many that are not now commonly grown. Grain sorghum, peanuts, and soybeans are the main row crops. Wheat, cotton, alfalfa, and similar crops can be grown.

Special crops grown commercially in the survey area are vegetables, small fruits, tree fruits, and nursery plants. A small acreage throughout the survey area is used for melons, potatoes, green beans, sweet corn, tomatoes, peppers, and other vegetables and small fruits. In addition, large areas can be adapted to other special crops, such as blueberries, grapes, and many vegetables. Apples and peaches are the most important tree fruits grown in the survey area.

The latest information and suggestions on growing special crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Farming and other land uses are competing for parts of the survey area. In 1967 about 12,000 acres was urban or built-up land, according to the Conservation Needs Inventory. Much of this acreage was well suited as cropland. Each year additional land is being developed for urban uses in Hugo and other small towns in the survey area.

Tame pasture

Much of the acreage in the county is tame pasture. The trend is toward converting cropland and woodland and also some rangeland to pasture.

The principal grass is improved bermudagrass. Some of the better pastures of bermudagrass are overseeded with legumes. The additional plant food improves the quality and increases the quantity of forage.

Some bermudagrass pastures are overseeded with fescue. This grass mixture is especially well suited to soils on flood plains where additional moisture is available. It provides grazing in nearly all months and furnishes added protein for livestock when the bermudagrass is dormant.

Fescue, another commonly grown grass in the county, provides a sufficient quantity of forage for grazing on soils that have a large amount of available moisture. Fescue used with other forage furnishes grazing and additional protein late in fall and in spring. Fescue should be fertilized early in spring and early in fall. It should not be grazed in summer.

Bahiagrass, a deep-rooted, warm season perennial grass, is better suited to soils of low fertility than most perennial summer grasses, but it responds well to high levels of fertility, especially nitrogen. It is best suited to deep, well drained loamy or sandy soils. It furnishes grazing at about the same time of year as bermudagrass.

Weeping lovegrass is grown to a limited extend in the county. It is a warm season perennial bunchgrass suited to well drained loamy and sandy soils. It begins growth earlier in spring and remains green later in fall than bermudagrass. It reponds well to fertilizer, especially nitrogen. It becomes less palatable to cattle as it matures.

Some areas of cropland are used for forage plants that supplement the permanent grasses. Small grain provides grazing and additional protein for livestock late in fall and in spring. It produces the maximum amount of forage if it is seeded and fertilized late in summer or early in fall. Small grain can be grazed until maturity, or livestock can be removed in spring and a seed crop can be harvested. Wheat, oats, barley, and rye are the main small grains used for grazing.

Sudangrass, an annual grass, is also used on some cropland to supplement permanent grasses. It provides grazing in summer or forage that can be harvested for hay. In some areas sudangrass is allowed to grow until frost and is grazed in winter. Fertilization is needed for maximum growth.

The kinds of soil and plants must be considered in managing tame pasture. A desirable kind and stand of plants must be maintained. Plants must have vigor to

keep a proper balance in the stand. Grazing must be compatible with the kind of growth pasture plants make.

Proper grazing and rotation grazing help to lengthen the life of most tame pasture plants. Deferred grazing is beneficial. It allows the plants to regain vigor by helping to maintain a large root system where food can be stored for the next growing season, and it therefore increases total production of forage.

Plant nutrients are needed for vigorous pasture plants. They increase forage production and lengthen the lifespan of the plants. Nitrogen can be supplied by seeding a grass-legume mixture or by using a commercial fertilizer. The acidity of the soil should be adjusted to the kinds of plants desired in the stand. Unless legumes are grown with the grass, large amounts of plant nutrients, especially nitrogen, are needed.

Desirable pasture plants can be maintained in the stand only by controlling the invasion of undesirable plants. Weed control is needed. Brush control, mowing, or spraying is needed in wooded areas.

A pasture program can be planned so that forage is available throughout the year. A study of the growth habits of the different plants is needed to insure adequate forage each month. The percentage of growth for each kind of plant is illustrated in figure 6. For example, bermudagrass makes 22 percent of its yearly growth in June.

Soils vary in their capacity to produce forage for grazing. The Newtonia soil produces more forage than the Saffell soil mainly because it furnishes more available moisture to the plant. The total yearly production of various kinds of pasture plants on each soil is given in animal unit months (AUM) in table 5. For example, bermudagrass on Newtonia silt loam, 1 to 3 percent slopes, furnishes grazing for one animal unit 7.5 months during the year.

In planning a pasture program one must consider the total yearly production of the pasture plant in animal unit months, as listed in table 5, and the amount of growth during a given month, as shown in figure 6. In figure 6, bermudagrass furnishes 22 percent of its annual forage in June. In June, therefore, according to the total yearly production shown in table 5, bermudagrass on the Newtonia soil provides grazing for 1.6 animal units. Accordingly, a pasture of 50 acres would furnish grazing for 80 animal units (50 acres X 1.6 AUM = 80 AUM) during the month of June. Personnel in the Soil Conservation Service or County Extension Office can assist in planning a total pasture program for your farm.

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 6. 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. See figure 6. A few farmers may be obtaining average yields higher than those shown in table 6.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

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

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

Crops other than those shown in table 6 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 two levels: capability class and subclass. 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* 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 subclass is identified in the description of each soil map unit in the section "Soil maps for detailed planning."

Rangeland

Ernest C. Snook, range conservationist, Soil Conservation Service, helped prepare this section.

About 50 percent of Choctaw County is range. More than half of the farm income is derived from livestock, principally cattle. Cow-calf-steer operations are dominant.

On many ranches the forage produced on rangeland is supplemented by crop stubble and small grain. In winter the native forage is often supplemented with protein concentrate. Creep feeding of calves and yearlings to increase market weight is practiced on some ranches.

The native vegetation in many parts of the survey area has been greatly depleted by continued excessive use. Much of the acreage that was once open grassland is now covered with brush and weeds. The amount of forage produced may be less than half of that originally produced. Productivity of the range can be increased by using management practices that are effective for specific kinds of soil and range sites.

Where climate and topography are about the same, differences in the kind and amount of vegetation that rangeland can produce are related closely to the kind of soil. Effective management is based on the relationships among soils, vegetation, and water.

Table 7 shows, for each kind of soil, the name of the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the expected percentage of each species in the composition of the potential natural plant community. Soils not listed cannot support a natural plant community of dominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. The following are explanations of column headings in table 7.

A *range site* is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. Soils that produce a similar kind, amount, and proportion of range plants are grouped into range sites. For those areas where the relationship between soils and vegetation has been established, range sites can be interpreted directly from the soil map. Properties that determine the capacity of the soil to supply moisture and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

Total production refers to the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the amount and distribution of precipitation and the temperatures are such that growing conditions are substantially better than average; in a

normal year these conditions are about average for the area; in an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight refers to the total air-dry vegetation produced per acre each year by the potential natural plant community. Vegetation that is highly palatable to livestock and vegetation that is unpalatable are included. Some of the vegetation can also be grazed extensively by wildlife.

Characteristic species of grasses, grasslike plants, forbs, and shrubs that make up most of the potential natural plant community on each soil are listed by common name. Under *Composition*, the expected proportion of each species is presented as the percentage, in air-dry weight, of the total annual production of herbaceous and woody plants. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season. Generally all of the vegetation produced is not used.

Range management requires, in addition to knowledge of the kinds of soil and the potential natural plant community, an evaluation of the present condition of the range vegetation in relation to its potential. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the maximum production of vegetation, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

The major management concern on most of the rangeland is control of grazing so that the kinds and amounts of plants that make up the potential plant community are re-established. Controlling brush and minimizing soil erosion are also important management concerns. If sound range management based on the soil survey information and rangeland inventories is applied, the potential is good for increasing the productivity of range in the area.

Woodland management and productivity

Norman E. Smola, forester, Soil Conservation Service, helped prepare this section.

Choctaw County is about 45 percent natural stands of commercial timber. Soils capable of supporting commercial species make up about 74 percent of the area.

The principal commercial species are loblolly pine and shortleaf pine. Southern red oak, sweetgum, ash, black walnut, cottonwood, hackberry, hickory, pecan, sycamore, and water oak are harvested in lesser amounts.

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

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, t, d, c, s, f, and r.

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. 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.

Woodland understory vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. Some types of forest, under proper management, can produce enough understory vegetation to support grazing of livestock or wildlife, or both.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees, the density of the canopy, and the depth and condition of the forest litter. The density of the forest canopy affects the amount of light that understory plants receive during the growing season.

Table 9 shows, for each soil suitable for woodland, the potential for producing understory vegetation. The table also lists the common names of the characteristic vegetation that grows on a specified soil and the percentage composition, by air-dry weight, of each kind of plant. The kind and percentage of understory plants listed in the table are those to be expected where canopy density is most nearly typical of forests that yield the highest production of wood crops.

The total production of understory vegetation is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the soil moisture is above average during the optimum part of the growing season; in a normal year soil moisture is average; and in an unfavorable year it is below average.

Engineering

Charles E. Bolliger, assistant state conservation engineer, and George D. Ensminger, area 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 10 shows, for each kind of soil, the degree and kind of limitations for building site development; table 11, for

sanitary facilities; and table 13, for water management. Table 12 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 10. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

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

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

Dwellings and *small commercial buildings* referred to in table 10 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 10 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 11 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.

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 11 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 12 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 16 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 12 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 16.

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 13 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 13 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.

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 14 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 14 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 11, and interpretations for dwellings without basements and for local roads and streets, given in table 10.

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

Jerry F. Sykora, biologist, Soil Conservation Service, helped prepare this section.

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

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

In table 15, 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.

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.

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.

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.

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.

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.

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.

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.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow.

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 hori-

zon of each soil in the survey area. They also present data about pertinent soil and water features.

Engineering properties

Table 16 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 16 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 16 in the standard terms used by 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. The estimated classification, without group index numbers, is given in table 16. Also in table 16 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. Range in liquid limit and plasticity index is estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 17 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 17. 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.

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 18 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 18 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.

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.

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" (*5*).

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 19, 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 Entisol.

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 Fluvent (*Fluv*, meaning flood plain, plus *ent*, from Entisol).

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 Udifluvents (*Ud*, meaning moist horizons, plus *fluvent*, the suborder of Entisols that have an Udic 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 preceding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Udifluvents.

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 coarse-loamy, siliceous, nonacid, thermic Typic Udifluvents.

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.

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.

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

Alusa series

The Alusa series consists of deep, poorly drained, very slowly permeable soils that formed in clayey and loamy marine sediments. These soils are on nearly level or slightly depressed uplands. They have a perched water table within a depth of 1 foot in winter and spring. The slope is 0 to 1 percent.

Alusa soils are associated with Elysian, Muskogee, and Wrightsville soils on the landscape. Elysian soils have a coarse-loamy control section. In contrast with Alusa soils, Muskogee soils have a B1 horizon, are better drained, and are slightly more sloping. Wrightsville soils have tonguing of the A2 horizon into the argillic horizon.

Typical pedon of Alusa loam 1,900 feet north and 200 feet west of the southeast corner sec. 17, T. 6 S., R. 20 E.

A1—0 to 3 inches; grayish brown (10YR 5/2) loam; few fine faint yellowish brown mottles; weak fine granular structure; friable; few fine black concretions; medium acid; clear smooth boundary.

A2g—3 to 8 inches; light brownish gray (10YR 6/2) loam; common fine faint yellowish brown mottles; weak fine granular structure; friable; organic stains in root channels; few fine black concretions; medium acid; abrupt wavy boundary.

B21tg—8 to 16 inches; light brownish gray (10YR 6/2) clay; common medium and coarse faint yellowish brown (10YR 5/4) and distinct yellowish red (5YR 5/8) mottles; moderate medium blocky structure; very firm; common pressure faces or clay films on faces of peds; thin coatings of light brownish gray loam on faces of some peds and in root channels; few fine black concretions; very strongly acid; gradual wavy boundary.

B22tg—16 to 36 inches; gray (10YR 6/1) clay; common medium and coarse faint light brownish gray (10YR 6/2) and prominent red (2.5YR 4/8) mottles; moderate medium blocky structure; very firm; pressure faces or clay films on faces of peds; few fine and medium black concretions; strongly acid; gradual smooth boundary.

B23tg—36 to 54 inches; gray (10YR 6/1) clay; many coarse distinct yellowish brown (10YR 5/8) and strong brown (7.5YR 5/6) mottles; weak coarse blocky structure; very firm; pressure faces or clay films on faces of peds; few slickensides that do not intersect; common fine and medium soft black bodies and black concretions; neutral; gradual smooth boundary.

B3g—54 to 72 inches; gray (10YR 6/1) clay; many medium and coarse distinct yellowish brown (10YR 5/8) and strong brown (7.5YR 5/6) mottles; weak coarse blocky structure; very firm; shiny pressure faces on peds; few intersecting slickensides, many fine and medium black concretions; mildly alkaline.

Solum thickness is more than 60 inches.

The A1 or Ap horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), or grayish brown (10YR 5/2). It is medium acid or strongly acid.

The A2g horizon is light brownish gray (10YR 6/2) or grayish brown (10YR 5/2). It is mottled in shades of brown. It is medium acid or strongly acid.

The B2tg horizon is light brownish gray (10YR 6/2), gray (10YR 5/1, 6/1), dark gray (10YR 4/1), or grayish brown (10YR 5/2). It has common or many, fine to coarse, faint to prominent mottles in shades of brown, red, or gray. This horizon is clay or silty clay. It is very strongly acid to neutral.

The B3g horizon is gray (10YR 6/1, 5/1), dark gray (10YR 4/1), and light brownish gray (10YR 6/2). It has common or many, medium or coarse, faint or distinct mottles in shades of brown, red, and yellow. The B3g horizon has texture similar to that in the B2tg horizon. It is mildly alkaline or moderately alkaline.

Bernow series

The Bernow series consists of deep, well drained, moderately permeable soils that formed in loamy marine sediments. These very gently sloping to strongly sloping soils are on uplands. Slopes range from 1 to 12 percent.

Bernow soils are associated with Bosville, Larue, Muskogee, Romia, Saffell, and Speer soils. They are more permeable and contain less clay in the lower part of the B horizon than Bosville or Muskogee soils. They have a thicker solum than Romia soils. They have a thinner A horizon than Larue soils. In contrast with Saffell soils, they are not gravelly. They have a higher base saturation than Speer soils.

Typical pedon of Bernow fine sandy loam, 1 to 3 percent slopes, 250 feet east and 250 feet south of the northwest corner sec. 15, T. 5 S., R. 18 E.

A1—0 to 10 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; slightly acid; clear smooth boundary.

A2—10 to 23 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine subangular blocky structure; friable; strongly acid; clear smooth boundary.

B21t—23 to 34 inches; strong brown (7.5YR 5/6) sandy clay loam; few fine faint yellowish red mottles and few fine faint pale brown mottles in lower part; weak medium subangular blocky structure; friable; thin clay films on faces of peds; strongly acid; gradual smooth boundary.

B22t—34 to 44 inches; strong brown (7.5YR 5/6) sandy clay loam; common fine and medium distinct pale brown (10YR 6/3) and few medium prominent red (2.5YR 4/6) mottles; weak medium subangular blocky structure; friable; thick continuous clay films on faces of peds; few clean sand grains in root channels; strongly acid; gradual wavy boundary.

B&A'2—44 to 72 inches; yellowish brown (10YR 5/4) sandy clay loam; many coarse faint or distinct light yellowish brown (10YR 6/4), strong brown (7.5YR 5/6), pale brown (10YR 6/3), and light gray (10YR 6/1) mottles; weak medium subangular blocky structure; firm; continuous clay films on faces of peds (B part); 10 percent light gray (10YR 6/1) fine sandy loam; massive; friable; pockets of clean sand and silt grains (A'2 part); strongly acid.

Solum thickness ranges from 60 to more than 80 inches.

The A1 or Ap horizon is very dark grayish brown (10YR 3/2), brown (10YR 4/3), dark grayish brown (10YR 4/2), or grayish brown (10YR 5/2). It ranges from neutral to medium acid.

The A2 horizon is brown (10YR 5/3, 7.5YR 5/2, 5/4), light yellowish brown (10YR 6/4), yellowish brown (10YR 5/4), strong brown (7.5YR 5/6), or pale brown (10YR 6/3). It ranges from neutral to strongly acid.

The B21t or B22t horizon is yellowish brown (10YR 5/4, 5/6, 5/8), strong brown (7.5YR 5/6), reddish yellow (7.5YR 6/6, 6/8), or yellowish red (5YR 5/6, 5/8). It is mottled in shades of brown, red, or gray. The gray mottles occur below 30 inches. The B horizon is clay loam or sandy clay loam. It ranges from medium acid to very strongly acid.

In some profiles the B part of the B&A'2 horizon is the same color as the B2t horizon. In others it is coarsely mottled in shades of red, yellow, brown, or gray. The A'2 part of the B&A'2 horizon is light gray (10YR 6/1, 7/1, 7/2), pinkish gray (7.5YR 6/2, 7/2), light brownish gray (10YR 6/2), or white (10YR 8/1, 8/2). The B&A'2 horizon is strongly acid or very strongly acid. It is 5 to 15 percent pockets of clean sand and silt grains.

Boggy series

The Boggy series consists of deep, somewhat poorly drained, moderately permeable soils that formed in recent alluvial sediments of Cretaceous age. These nearly level soils are on narrow, forested flood plains. They have an apparent water table within a depth of 2 feet in winter and spring. The slope is dominantly less than 1 percent.

Boggy soils are associated with Guyton soils. They are more stratified than Guyton soils. Boggy soils contain less silt and do not have glossic properties.

Typical pedon of Boggy fine sandy loam 2,000 feet south and 300 feet west of the northeast corner sec. 10, T. 7 S., R. 19 E.

A11—0 to 13 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; medium acid; clear smooth boundary.

A12—13 to 22 inches; brown (10YR 5/3) fine sandy loam; common fine distinct gray mottles; weak fine granular structure; friable; strongly acid; clear smooth boundary.

C1—22 to 38 inches; grayish brown (10YR 5/2) fine sandy loam, common medium distinct light brownish gray (10YR 6/2) mottles; massive; few thin strata of loamy fine sand; friable; few dark stains in lower part; strongly acid; clear smooth boundary.

C2—38 to 68 inches; coarsely mottled light gray (10YR 7/2), light brownish gray (10YR 6/2), and yellowish brown (10YR 5/6) fine sandy loam; massive; friable; common thin lenses of loamy fine sand and loam; few dark stains; very strongly acid.

The A horizon ranges from very dark gray (N 3/0; 10YR 3/1) to gray (N 6/0; 10YR 6/1) and from dark brown (7.5YR 3/2) or very dark grayish brown (10YR 3/2) to pinkish gray (7.5YR 6/2) or light brownish gray (10YR 6/2). The dark brown, very dark gray, and very dark grayish brown A horizon is less than 6 inches thick. Mottles are in shades of brown or gray. This horizon ranges from slightly acid to strongly acid.

The C horizon ranges from dark gray (N 4/0; 10YR 4/1), dark brown (7.5YR 4/2), or dark grayish brown (10YR 4/2) to pinkish gray (7.5YR 7/2) or light gray (N 7/0; 10YR 7/1, 7/2) in more than 50 percent of the pedons but includes brown (10YR 5/3) in some pedons. Mottles are in shades of brown or gray. This horizon ranges from medium acid to strongly acid.

The Boggy soils in Choctaw County are taxadjuncts to the Boggy series. They are less gray to a slightly greater depth than the typical Boggy soils and have more acid lower horizons. In behavior, use, and management, however, they are similar to Boggy soils.

Bosville series

The Bosville series consists of deep, moderately well drained, very slowly permeable soils that formed in mainly clayey marine sediments. These very gently sloping to moderately steep soils are on uplands. They have a perched water table at a depth of 1 to 2 feet in winter and spring. Slopes range from 1 to 15 percent.

Bosville soils are associated with Bernow, Larue, Muskogee, Romia, and Saffell soils. Bosville soils contain more clay in the argillic horizon than Bernow and Romia soils. They are deeper than Romia soils. Bosville soils contain more clay in the upper B2t horizon than Muskogee soils. They do not have the thick A horizon that is typical of Larue soils. In contrast with Saffell soils, Bosville soils are not gravelly.

Typical pedon of Bosville fine sandy loam, 1 to 4 percent slopes, 750 feet east and 100 feet north of the southwest corner sec. 25, T. 6 S., R. 13 E.

A1—0 to 8 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable; slightly acid (limed); clear smooth boundary.

A2—8 to 12 inches; brownish yellow (10YR 6/6) fine sandy loam; weak fine granular structure; friable; slightly acid (limed); abrupt wavy boundary.

B21t—12 to 20 inches; strong brown (7.5YR 5/6) clay; strong medium subangular blocky structure; very firm; continuous clay films on faces of peds; strongly acid; gradual smooth boundary.

B22t—20 to 32 inches; red (2.5YR 4/8) clay; common medium distinct pale olive (5Y 6/3) and gray (10YR 6/1) mottles and few fine distinct light yellowish brown mottles; strong medium subangular blocky structure; very firm; continuous clay films on faces of peds; strongly acid; gradual smooth boundary.

B23t—32 to 64 inches; red (2.5YR 4/8) silty clay; many coarse prominent gray (10YR 5/1) and common medium distinct brownish yellow (10YR 6/6) mottles; strong coarse blocky structure; firm; common shiny surfaces on faces of peds; few fine black concretions; strongly acid.

Solum thickness is more than 60 inches.

The A1 or Ap horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), or dark brown (10YR 4/3, 7.5YR 4/2). Unless limed, it is medium acid or strongly acid.

The A2 horizon is brown (10YR 5/3), brownish yellow (10YR 6/6), yellowish brown (10YR 5/4), or pale brown (10YR 6/3). It is medium acid or strongly acid.

The B2t horizon is strong brown (7.5YR 5/6), brown (7.5YR 5/4), red (2.5YR 4/6, 4/8), or yellowish red (5YR 4/6, 4/8, 5/6). It is mottled in shades of brown, red, or gray. Below 10 inches, the amount of gray increases with depth. The B2t horizon is clay or silty clay. It is strongly acid or very strongly acid.

Some pedons have a B3 horizon. This horizon is the same color as the B2t horizon. In places it is mottled in shades of gray, brown, or red. The B3 horizon is clay or silty clay. It is medium acid to very strongly acid.

Burleson series

The Burleson series consists of deep, moderately well drained, very slowly permeable soils that formed in mostly clayey sediments. These very gently sloping soils are on slightly convex, smooth ridges of prairie uplands. The slope is 1 to 3 percent.

These soils are mapped next to Durant, Ferris, Heiden, and Panola soils. They have a thicker A horizon than Durant, Ferris, and Heiden soils. Burleson soils are better drained than Panola soils.

Typical pedon of Burleson clay, 1 to 3 percent slopes, 2,500 feet east and 100 feet south of the northwest corner sec. 8, T. 6 S., R. 16 E.

A11—0 to 12 inches; black (5Y 2/1) clay; moderate fine blocky structure; very firm; neutral; gradual wavy boundary.

A12—12 to 44 inches; black (5Y 2/1) clay; moderate medium blocky structure; very firm; shiny pressure faces on peds; few intersecting slickensides; mildly alkaline; gradual wavy boundary.

AC1—44 to 48 inches; olive (5Y 4/3) clay; weak coarse blocky structure; extremely firm; shiny pressure faces on peds; few intersecting slickensides; few concretions of calcium carbonate; few fine black concretions; calcareous, moderately alkaline; gradual wavy boundary.

AC2—48 to 64 inches; olive (5Y 5/4) clay; common fine distinct olive yellow mottles and few coarse distinct pale olive (5Y 6/3) mottles; few intersecting slickensides; very firm; calcareous, moderately alkaline.

Solum thickness ranges from 40 to 75 inches.

The A horizon ranges from very dark gray (10YR 3/1; 5Y 3/1) to black (10YR 2/1; 5Y 2/1). It is medium acid to moderately alkaline.

The AC horizon is dark gray (10YR 4/1), olive (5Y 4/3, 4/4, 5/3, 5/4, 5/6), olive gray (5Y 5/2), dark grayish brown (2.5Y 4/2), or gray (10YR 5/1). It is mildly alkaline or moderately alkaline and calcareous or noncalcareous.

The Burleson soils in this survey area are taxadjuncts to the Burleson series because they have grayer colors in the upper horizons. In behavior, use, and management they are similar to Burleson soils.

Caspiana series

The Caspiana series consists of deep, well drained, moderately permeable soils that formed in loamy sediments on forested flood plains. These nearly level soils occur along the Red River. They have a water table at a

depth of more than 4 feet in winter and spring. Slopes are 0 to 1 percent and are broad and smooth.

Caspiana soils are associated with Coushatta, Garton, and Karma soils. Coushatta soils do not have an argillic horizon. Karma soils do not have a mollic epipedon. Garton soils have a fine control section.

Typical pedon of Caspiana silt loam, 1,200 feet east and 600 feet north of the southwest corner sec. 3, T. 8 S., R. 18 E.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; very friable; slightly acid; clear smooth boundary.
A12—6 to 18 inches; dark brown (7.5YR 3/2) silt loam; moderate medium and fine granular structure; friable; slightly acid; clear smooth boundary.
B2t—18 to 32 inches; reddish brown (5YR 4/4) silty clay loam; moderate medium and fine subangular blocky structure; friable; weak thin patchy clay films on faces of peds; neutral; gradual smooth boundary.
B3—32 to 48 inches; reddish brown (5YR 5/3) silty clay loam; moderate medium subangular blocky structure; friable; neutral; gradual smooth boundary.
C—48 to 72 inches; reddish brown (5YR 4/4) very fine sandy loam; massive; friable; calcareous in the lower part; moderately alkaline.

Solum thickness ranges from 30 to 60 inches.

The A1 or Ap horizon is very dark grayish brown (10YR 3/2) or dark brown (7.5YR 3/2; 10YR 3/3). It is slightly acid to neutral.

The B horizon is reddish brown (5YR 4/3, 4/4, 5/3), red (2.5Y 4/6, 5/6), or yellowish red (5YR 4/6, 5/6). It is silt loam or silty clay loam. It ranges from slightly acid to moderately alkaline.

The C horizon is reddish brown (5YR 4/3 4/4, 5/4) or yellowish red (5YR 4/6, 5/6). It is very fine sandy loam, loam, or silty clay loam. It ranges from neutral to moderately alkaline.

Clebit series

The Clebit series consists of shallow, well drained, moderately rapidly permeable soils that formed in material weathered from sandstone of Pennsylvanian age. These strongly sloping soils are on ridge crests and side slopes of forested uplands. Slopes are dominantly 8 to 12 percent but range to 20 percent in some areas.

Clebit soils are associated with Tuskahoma and Smithdale soils. Tuskahoma and Smithdale soils have an argillic horizon, which is lacking in the Clebit soils.

Typical pedon of Clebit stony loam in an area of Clebit-Tuskahoma association, strongly sloping, 2,600 feet north and 600 feet east of the southwest corner sec. 14, T. 5 S., R. 18 E.

A1—0 to 4 inches; dark brown (10YR 4/3) stony loam; weak fine granular structure; about 10 percent pebbles and about 20 percent cobble and stone fragments of sandstone; friable; medium acid; clear smooth boundary.
B2—4 to 16 inches; strong brown (7.5YR 4/6) stony loam; weak fine granular structure; friable; about 40 percent pebble, cobble, and stone fragments of sandstone; strongly acid; clear irregular boundary.
R—16 to 20 inches; yellowish brown and gray hard sandstone; tilted and fractured.

Solum thickness is 10 to 20 inches.

The A horizon is dark grayish brown (10YR 4/2), dark brown (10YR 4/3, 3/3), or brown (10YR 5/3). It is 25 to 40 percent by volume fragments of sandstone less than 3 inches in diameter and 0 to 20 percent fragments more than 3 inches in diameter. The A horizon ranges from slightly acid to strongly acid.

The B horizon is strong brown (7.5YR 4/6, 5/6), yellowish brown (10YR 5/4, 5/6), or brownish yellow (10YR 6/6). It is 35 to 60 percent by volume sandstone fragments. The B horizon is medium acid or strongly acid.

Coushatta series

The Coushatta series consists of deep, well drained, moderately permeable soils that formed in mainly loamy alluvial sediments. These nearly level soils are on broad flood plains of the Red River. They have an apparent water table at a depth of 4 to 6 feet in winter and spring. The slope is dominantly less than 1 percent.

Coushatta soils are associated with Caspiana, Karma, and Severn soils. They differ from Caspiana and Karma soils in not having an argillic horizon. They are better drained than Latanier soils. They contain more clay than Severn soils and less clay than Latanier soils.

Typical pedon of Coushatta silty clay loam, 1,600 feet east and 900 feet south of the northwest corner sec. 7, T. 8 S., R. 19 E.

A1—0 to 8 inches; reddish brown (5YR 4/3) silty clay loam; weak medium granular structure; friable; mildly alkaline (limed); abrupt smooth boundary.
B21—8 to 15 inches; reddish brown (5YR 4/3) silty clay loam; moderate fine subangular blocky structure; friable; mildly alkaline; clear smooth boundary.
B2—15 to 31 inches; reddish brown (5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; calcareous in spots; moderately alkaline; clear smooth boundary.
C1—31 to 40 inches; reddish brown (5YR 4/4) silt loam; massive; friable; calcareous; moderately alkaline; clear smooth boundary.
C2—40 to 55 inches; reddish yellow (5YR 6/6) very fine sandy loam; massive; very friable; common bedding planes; calcareous; moderately alkaline; clear smooth boundary.
C3—55 to 72 inches; reddish brown (5YR 5/4) silt loam; common fine strata of yellowish red (5YR 5/6) very

fine sandy loam and loamy very fine sand; massive; friable; calcareous; moderately alkaline.

Solum thickness is 15 to 36 inches. This soil is calcareous at depths of 15 to 30 inches.

The A horizon is reddish brown (5YR 4/3, 4/4). Unless limed, it is slightly acid to neutral.

The B2 horizon is reddish brown (5YR 4/3, 4/4, 5/3, 5/4) and light reddish brown (5YR 6/3, 6/4). It is slightly acid to moderately alkaline.

The C horizon is reddish brown (5YR 4/3, 4/4, 5/3, 5/4), light reddish brown (5YR 6/3, 6/4), and reddish yellow (5YR 6/6). It contains strata of silt loam, very fine sandy loam, loamy very fine sand, or silty clay loam. This horizon is neutral to moderately alkaline.

Dela series

The Dela series consists of deep, moderately well drained, moderately rapidly permeable soils that formed in mainly loamy sediments. These nearly level soils are on broad forested flood plains along major streams and rivers. They have an apparent water table at a depth of 3 to 5 feet in winter and spring. The slope is dominantly less than 1 percent.

Dela soils are associated with Guyton and Speer soils. Both Guyton and Speer soils have an argillic horizon. Guyton soils are poorly drained.

Typical pedon of Dela fine sandy loam, about 2,200 feet north and 250 feet east of the southwest corner sec. 9, T. 5 S., R. 16 E.

A1—0 to 11 inches; dark grayish brown (10YR 4/2) fine sandy loam; moderate medium granular structure; friable; medium acid; clear smooth boundary.

C1—11 to 26 inches; dark yellowish brown (10YR 4/4) fine sandy loam; structureless; friable; few thin strata of yellowish brown (10YR 5/4) loam and sandy loam; strongly acid; clear smooth boundary.

C2—26 to 48 inches; brown (7.5YR 5/4) fine sandy loam; few medium faint light yellowish brown (10YR 6/4) mottles; structureless; friable; few thin strata of pale brown (10YR 6/3) loam and sandy loam; strongly acid; clear smooth boundary.

C3—48 to 72 inches; light yellowish brown (10YR 6/4) fine sandy loam; few fine distinct pale brown mottles; structureless; friable; common strata of brown (7.5YR 5/4) loam and sandy loam; strongly acid.

The A horizon is dark grayish brown (10YR 4/2) or brown (10YR 4/3, 5/3). It ranges from slightly acid to medium acid.

The C horizon is brown (7.5YR 4/4, 5/4; 10YR 4/3, 5/3), dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/4, 5/6), light yellowish brown (10YR 6/4), pale brown (10YR 6/3), very pale brown (10YR 7/3), or brownish yellow (10YR 6/6). In some pedons it has mottles of 2 chroma below 24 inches. It is fine sandy loam, sandy loam, or loam. Some pedons have a buried horizon below 40 inches. The C horizon ranges from slightly acid to strongly acid.

Durant series

The Durant series consists of deep, moderately well drained, very slowly permeable soils that formed in material weathered from calcareous shales or clay beds. These very gently sloping soils are on smooth prairie uplands. The slope is 1 to 3 percent.

Durant soils are associated with Burleson soils. They differ in having an argillic horizon.

Typical pedon of Durant silt loam, 1 to 3 percent slopes, 1,200 feet west and 1,100 feet north of the southeast corner sec. 29, T. 5 S., R. 16 E.

A1—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; slightly acid; clear smooth boundary.

B1—8 to 11 inches; dark brown (10YR 3/3) silty clay loam; weak fine subangular blocky structure; firm; slightly acid; clear smooth boundary.

B21t—11 to 36 inches; olive brown (2.5Y 4/4) clay; many fine prominent red mottles; strong medium subangular blocky structure; extremely firm; many shiny faces on peds; few vertical streaks of A horizon material; slightly acid; gradual smooth boundary.

B22t—36 to 48 inches; olive brown (2.5Y 4/4) clay; strong medium subangular blocky structure; extremely firm; many shiny faces on peds; neutral; gradual smooth boundary.

B3—48 to 64 inches; light olive brown (2.5Y 5/6) clay; many coarse distinct olive yellow (2.5Y 6/6) and light brownish gray (2.5Y 6/2) mottles; weak coarse blocky structure; extremely firm; few fine black concretions; calcareous, moderately alkaline.

Solum thickness ranges from 46 to more than 60 inches. The depth to disseminated lime is more than 40 inches but less than 59 inches.

The A1 horizon is very dark grayish brown (10YR 3/2) or dark brown (10YR 3/3). Reaction ranges from slightly acid to medium acid.

The B1 horizon is dark brown (10YR 3/3), dark yellowish brown (10YR 3/4, 4/4), very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), yellowish brown (10YR 5/4), or brown (10YR 4/3; 7.5YR 4/4). Some pedons have mottles in shades of red, yellow, or brown. This horizon is silty clay loam, clay loam, or clay. It ranges from strongly acid to slightly acid.

The B2t horizon is dark grayish brown (10YR 4/2; 2.5Y 4/2), brown (10YR 4/3; 7.5YR 4/2), dark yellowish brown (10YR 3/4, 4/4), olive brown (2.5Y 4/4), or very dark grayish brown (10YR 3/2). Mottles are in shades of red, yellow, brown, or gray. This horizon ranges from medium acid to neutral.

Colors and mottles in the B3 horizon are similar to those in the B2t horizon but include light yellowish brown (2.5Y 6/4), light olive brown (2.5Y 5/4, 5/6), and olive yellow (2.5Y 6/6). The B3 horizon is clay or silty clay. It ranges from slightly acid to moderately alkaline.

Elysian series

The Elysian series consists of deep, moderately well drained, moderately permeable soils that formed in loamy sediments. These nearly level soils are on circular mounds on broad forested terraces. They have a perched water table at a depth of 3 to 6 feet in winter and spring. The slope is dominantly less than 1 percent.

Elysian soils are associated with Alusa, Guyton, Muskogee, and Wrightsville soils. They are not so clayey in the argillic horizon as those soils.

Typical pedon of Elysian very fine sandy loam in an area of Wrightsville-Elysian complex, undulating, 1,400 feet north and 100 feet east of the southwest corner sec. 7, T. 5 S., R. 18 E.

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

B1—5 to 34 inches; brownish yellow (10YR 6/6) very fine sandy loam; weak fine granular structure; very friable; medium acid; clear wavy boundary.

B2t&A'2—34 to 72 inches; yellowish brown (10YR 5/6) loam; many fine and medium distinct yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; friable (B21t part); about 15 percent light gray (10YR 7/2) streaks and tongues of very fine sandy loam 3 to 14 mm wide and dark gray (10YR 4/1) tongues of sandy clay 5 to 10 mm wide; common pockets of clean sand grains (A'2 part); 10 percent brittle peds; strongly acid.

Solum thickness is more than 60 inches. The A1 and B1 horizons are slightly acid to very strongly acid.

The A horizon is dark grayish brown (2.5Y 4/2; 10YR 4/2), grayish brown (10YR 5/2), or dark brown (10YR 4/3, 5/3).

The B1 horizon has colors similar to those in the A1 horizon but includes brownish yellow (10YR 6/6) and strong brown (7.5YR 5/6).

The B2t part of the B2t&A'2 horizon is dark yellowish brown (10YR 4/4) or yellowish brown (10YR 5/4, 5/6, 5/8). It has mottles in shades of brown. The A'2 part of the B2t&A'2 horizon is light gray (10YR 6/1, 7/1, 7/2), gray (10YR 5/1), very pale brown (10YR 7/3), or brown (10YR 5/3). Brittle peds make up 5 to 25 percent of the B2t&A'2 horizon. The reaction ranges from very strongly acid to medium acid.

Ferris series

The Ferris series consists of deep, well drained, very slowly permeable soils that formed in material weathered from calcareous shales and clays. These gently sloping to strongly sloping soils are on prairie uplands. Slopes range from 3 to 12 percent.

Ferris soils are associated with Burleson, Heiden, and Swink soils. They have a thinner A horizon than Burleson and Heiden soils. They are deeper than Swink soils.

Typical pedon of Ferris clay, 3 to 5 percent slopes, 2,500 feet west and 100 feet south of the northeast corner sec. 25, T. 5 S., R. 13 E.

A—0 to 8 inches; very dark grayish brown (10YR 3/2) clay; moderate fine granular structure; very firm; calcareous, moderately alkaline; clear smooth boundary.

AC1—8 to 26 inches; olive brown (2.5Y 4/4) clay; few fine faint gray mottles; moderate medium blocky structure; extremely firm; pressure faces on peds; common intersecting slickensides; calcareous, moderately alkaline; gradual wavy boundary.

AC2—26 to 48 inches; light olive brown (2.5Y 5/6) clay; common medium distinct gray (10YR 5/1) mottles; weak coarse blocky structure; very firm; intersecting slickensides; few crystals of gypsum, common concretions of calcium carbonate; few fine black concretions; calcareous, moderately alkaline; gradual wavy boundary.

C—48 to 62 inches; light olive brown (2.5Y 5/4) shaly clay; common medium distinct gray (10YR 5/1) mottles; weak coarse blocky structure breaking to strong medium platy in the lower part; very firm; few fine crystals of gypsum and concretions of calcium carbonate; calcareous, moderately alkaline.

Solum thickness ranges from 30 to more than 60 inches. Cracks extend to more than 20 inches.

The A horizon is very dark grayish brown (10YR 3/2; 2.5Y 3/2), dark grayish brown (10YR 4/2; 2.5Y 4/2), grayish brown (10YR 5/2; 2.5Y 5/2), light brownish gray (10YR 6/2; 2.5Y 6/2), brown (10YR 4/3), light olive brown (2.5Y 5/4), olive brown (2.5Y 4/4), olive gray (5Y 5/2, 4/2), or olive (5Y 5/3). In pedons where the moist value is less than 3.5, the A horizon is less than 12 inches thick.

The AC horizon is light brownish gray (2.5Y 6/2), olive brown (2.5Y 4/4), yellowish brown (10YR 5/4), grayish brown (2.5Y 5/2), olive gray (5Y 4/2), light olive gray (5Y 6/2), olive (5Y 4/3, 5/3, 4/4, 5/4), or light olive brown (2.5Y 5/4, 5/6).

The C horizon is grayish brown (2.5Y 5/2), gray (5Y 6/1), light brownish gray (2.5Y 6/2), light olive brown (2.5Y 5/4, 5/6), light yellowish brown (2.5Y 6/4), olive (5Y 5/3, 5/4), pale olive (5Y 6/3, 6/4), brown (10YR 5/3), dark yellowish brown (10YR 4/4), or yellow (2.5Y

7/8). Many pedons are coarsely and prominently mottled. This horizon is strongly weathered shaly clay or calcareous shale.

Garton series

The Garton series consists of deep, moderately well drained, slowly permeable soils formed in loamy alluvial sediments. These nearly level soils are on forested low terraces along the Red River and Boggy Creek. They have a perched water table at a depth of 2 to 3 feet in winter and spring. The slope is 0 to 1 percent.

Garton soils are associated with Caspiana and Pledger soils. In contrast with Caspiana soils, they have gray mottles in the upper B2t horizon. They are better drained than Pledger soils and have less clay in the A horizon.

Typical pedon of Garton silty clay loam, 400 feet west and 450 feet south of the northeast corner sec. 10, T. 8 S., R. 18 E.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, moderate medium and fine granular structure; friable; neutral; clear smooth boundary.

B1—6 to 26 inches; very dark gray (10YR 3/1) silty clay loam; few fine faint light gray mottles; moderate medium and fine subangular blocky structure; firm; neutral; gradual smooth boundary.

B21t—26 to 36 inches; dark brown (7.5YR 3/2) silty clay loam; few medium distinct reddish brown (5YR 5/4) mottles; moderate medium and fine granular structure; firm; patchy clay films or pressure faces on faces of peds; slightly acid; clear smooth boundary.

B22t—36 to 46 inches; yellowish red (5YR 5/6) clay loam; weak medium and fine subangular blocky structure; friable; clay films or pressure faces on faces of peds; neutral; gradual smooth boundary.

B3—46 to 75 inches; yellowish red (5YR 5/6) loam; thin strata of reddish yellow (5YR 6/8) clay loam; weak fine subangular blocky structure; very friable; few concretions of calcium carbonate; mildly alkaline.

Solum thickness ranges from 40 to more than 60 inches. The A and B1 horizons are black (10YR 2/1), very dark brown (10YR 2/2), very dark gray (10YR 3/1), or very dark grayish brown (10YR 3/2). They are slightly acid or neutral.

The B1 horizon is silty clay loam or clay loam. Mottles are few to many and fine or medium in shades of gray.

The B21t horizon is dark brown (7.5YR 3/2), dark reddish brown (5YR 3/3, 3/4), or reddish brown (5YR 4/3). Mottles are few to many and fine or medium in shades of red or brown.

The B22t horizon is dark brown (7.5YR 4/4), reddish brown (5YR 4/3, 5/4), or yellowish red (5YR 5/6). The B2t horizon is clay loam, silty clay loam, silty clay, or clay. It is slightly acid to mildly alkaline.

The B3 horizon is yellowish red (5YR 5/6) or reddish yellow (5YR 6/6). It is loam or clay loam. It is neutral or mildly alkaline.

Guyton series

The Guyton series consists of deep, poorly drained, slowly permeable soils that formed in loamy alluvial sediments. These nearly level soils are on forested flood plains along the Kiamichi River and Boggy Creek. They have an apparent water table within a depth of 1 1/2 feet in winter and spring. The slope is 0 to 1 percent.

Guyton soils are mapped next to Boggy, Dela, Elysian, and Wrightsville soils. Guyton soils have more clay than Boggy, Dela, and Elysian soils. They have less clay in the B horizon than Wrightsville soils.

Typical pedon of Guyton silt loam, 400 feet west at the southeast corner sec. 20, T. 5 S., R. 18 E.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam; few fine faint gray mottles; weak fine granular structure; friable; strongly acid; clear smooth boundary.

A21g—4 to 10 inches; grayish brown (10YR 5/2) silt loam; few medium distinct dark yellowish brown (10YR 4/4) and few fine faint gray mottles; weak fine granular structure; friable; strongly acid; clear wavy boundary.

A22g—10 to 18 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; common fine and medium pores; tongues about 1 inch wide extending through the next horizon are more compact and brittle than surrounding material; strongly acid; clear irregular boundary.

B21t&A—18 to 28 inches; gray (10YR 5/1) silty clay loam; many coarse distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; common fine and medium pores; few thin patchy clay films on faces of peds; few black concretions; 20 percent of the horizon is tongues of light brownish gray (10YR 6/2) silt loam; few clean sand grains; strongly acid; gradual irregular boundary.

B22t&A—28 to 52 inches; light brownish gray (10YR 6/2) silty clay loam; few medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) mottles; moderate medium and fine subangular blocky structure; friable; many fine pores; few brittle peds; thin patchy clay films on faces of peds and in pores; few fine soft bodies and fine black concretions; about 5 percent dark gray and light gray silt loam tongues 5 to 10 mm wide extending to 52 inches; strongly acid; gradual smooth boundary.

B3tg—52 to 72 inches; light gray (10YR 6/1) silty clay loam; few medium distinct yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; friable; few brittle yellowish brown peds; few thin clay films on faces of peds and in pores; few vertical pockets and streaks of gray (10YR 5/1) silty clay loam; strongly acid.

The A1 horizon is dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or brown (10YR 4/3). It is very strongly acid to medium acid.

The A2g horizon is gray (10YR 5/1, 6/1), grayish brown (10YR 5/2), or light brownish gray (10YR 6/2). It has mottles in shades of brown. The A2g horizon is very strongly acid or strongly acid.

The B2t horizon is gray (10YR 5/1, 6/1) or light brownish gray (10YR 6/2). It has mottles in shades of brown or yellow. It is silty clay loam or silt loam. The A2g horizon extends into the B2t horizon. Reaction is strongly acid or very strongly acid.

The B3tg horizon has the same color and texture as the B2t horizon. It ranges from strongly acid to moderately alkaline.

Heiden series

The Heiden series consists of deep, well drained, very slowly permeable soils that formed in clayey material weathered from calcareous shales. These very gently sloping to gently sloping soils are on prairie uplands. Slopes are 2 to 5 percent.

Heiden soils are associated with Burleson, Durant, and Ferris soils. Durant soils have an argillic horizon. Burleson soils have chroma of 1.5 or less below 12 inches. Ferris soils have a thinner A horizon.

Typical pedon of Heiden clay, 2 to 5 percent slopes, 1,700 feet east and 200 feet north of the southwest corner sec. 36, T. 5 S., R. 13 E.

A11—0 to 8 inches; dark olive gray (5Y 3/2) clay; strong fine granular structure; firm; surface cracked; calcareous, mildly alkaline; clear smooth boundary.

A12—8 to 18 inches; dark olive gray (5Y 3/2) clay; moderate medium blocky structure; very firm; few pressure faces; calcareous, moderately alkaline; gradual wavy boundary.

AC1—18 to 28 inches; olive (5Y 5/4) clay; common fine distinct olive yellow (5Y 6/8) mottles; moderate medium subangular blocky structure; few intersecting slickensides; very firm; shiny faces on peds; calcareous, moderately alkaline; gradual wavy boundary.

AC2—28 to 40 inches; olive (5Y 5/4) clay; many fine and coarse distinct olive yellow (5Y 6/8) mottles; moderate coarse blocky structure; extremely hard, common intersecting slickensides; few fine concretions of calcium carbonate; few fine black concretions; common vertical streaks of A horizon material; few fine crystals and threads of gypsum; calcareous, moderately alkaline; gradual wavy boundary.

C—40 to 64 inches; coarsely mottled olive gray (5Y 5/2), light olive gray (5Y 6/2), and brownish yellow (10YR 6/8) shaly clay; massive; hard; few pressure faces; few soft bodies and concretions of calcium carbonate; top 3 inches has vertical streaks of A horizon material; calcareous, strongly alkaline.

Solum thickness ranges from 40 to 60 inches.

The A horizon is dark olive gray (5Y 3/2) or very dark grayish brown (10YR 3/2). Where the chroma is less than 1.5, it is less than 12 inches thick. In some places the A horizon is noncalcareous and mildly alkaline in the upper 12 inches. In others it is moderately alkaline and calcareous.

The AC horizon is olive brown (2.5Y 4/4), light olive brown (2.5Y 5/4, 5/6), olive (5Y 4/4, 5/4, 5/6), olive gray (5Y 4/2), dark yellowish brown (10YR 4/4), or dark grayish brown (10YR 4/2, 2.5Y 4/2).

The C horizon is weathered shaly clay of mixed soil and rock structure.

Hollywood series

The Hollywood series consists of deep, moderately well drained, very slowly permeable soils that formed in clayey sediments or from material weathered from limestone. These very gently sloping to sloping soils are on prairie uplands. Slopes are 1 to 6 percent.

Hollywood soils are associated with Lula, Panola, and Swink soils. Hollywood soils have a higher content of clay than Lula soils. They are deeper than Swink soils and are darker and better drained than Panola soils.

Typical pedon of Hollywood silty clay, 1 to 3 percent slopes, 600 feet south and 200 feet east of the northwest corner sec. 34, T. 5 S., R. 16 E.

A11—0 to 19 inches; black (10YR 2/1) silty clay; strong medium and fine subangular blocky structure; firm; pressure faces on many peds; few fine fragments of limestone on surface; mildly alkaline; diffuse wavy boundary.

A12—19 to 30 inches; very dark gray (10YR 3/1) silty clay; moderate coarse blocky structure parting to strong fine subangular blocky; very firm; few intersecting slickensides and parallelepipeds having long axes tilted about 40 degrees; shiny pressure faces on many peds; few fine black concretions; moderately alkaline; gradual irregular boundary.

AC—30 to 48 inches; olive brown (2.5Y 4/4) silty clay; many medium and coarse distinct very dark gray (10YR 3/1) mottles; common intersecting slickensides; few parallelepipeds; pressure faces are on most peds; few fine black concretions; moderately alkaline; clear wavy boundary.

ACca—48 to 72 inches; olive brown (2.5Y 4/4) silty clay; many medium and coarse distinct olive gray (5Y

4/2) and dark brown (7.5YR 4/4) mottles; peds are irregular shaped; many distinct grooved intersecting slickensides with distinct parallelepipeds tilted 30 to 60 degrees; few slickensides have neutral gray color on the surface of the slickenside; very firm; few fine reddish brown concretions; common soft masses and few pitted concretions of calcium carbonate; few fragments of limestone in lower part; calcareous, moderately alkaline.

Thickness of the solum ranges from 36 to 80 inches. Depth to limestone bedrock is more than 48 inches. Untilled soils have a gilgai microrelief. The cycles of microrelief consist of knolls 3 to 10 inches higher than depressions, repeated at linear intervals of 5 to 12 feet. Thickness of the A horizon ranges from 6 inches on the knolls to 42 inches in the depressions.

The A horizon is black (10YR 2/1) or very dark gray (10YR 3/1). It is slightly acid to moderately alkaline.

The ACca or AC horizon is olive brown (2.5Y 4/4), light olive brown (2.5Y 5/4), or olive gray (5Y 4/2). Mottles are in shades of gray, brown, and yellow. A few fragments of limestone occur in some pedons. The AC or ACca horizon is mildly alkaline or moderately alkaline.

Hopco series

The Hopco series consists of deep, somewhat poorly drained, moderately slowly permeable soils. These nearly level soils formed in loamy alluvium on forested flood plains along Boggy Creek in the western half of the county. They have an apparent water table at a depth of about 1 foot in winter and spring. The slope is 0 to 1 percent.

Hopco soils are associated with Kaufman, Trinity, and Tuscumbia soils. Hopco soils contain less clay than the associated soils. In contrast with Trinity soils, they are noncalcareous. They have a thicker, darker A horizon than Tuscumbia soils.

Typical pedon of Hopco silty clay loam, 3,200 feet west and 500 feet north of the southeast corner sec. 10, T. 5 S., R. 13 E.

A11—0 to 22 inches; very dark brown (10YR 2/2) silty clay loam; weak medium granular structure; friable; slightly acid; gradual smooth boundary.

A12—22 to 40 inches; very dark grayish brown (10YR 3/2) silty clay loam; few fine distinct strong brown mottles; moderate medium subangular blocky structure; friable; slightly acid; gradual smooth boundary.

B2g—40 to 60 inches; dark gray (10YR 4/1) clay loam, many medium and distinct brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; slightly acid.

The mollic epipedon ranges from 24 to more than 30 inches in thickness.

The A horizon is very dark grayish brown (10YR 3/2), very dark gray (10YR 3/1), dark brown (10YR 3/3; 7.5YR 3/2), or very dark brown (10YR 2/2). It ranges from medium acid to mildly alkaline. The A12 horizon has distinct or prominent mottles in shades of yellow or brown.

The B2g horizon is dark gray (10YR 4/1) or gray (10YR 5/1) and has few to common, fine or medium, distinct mottles in shades of brown. The lower part also ranges to brown (10YR 4/3) or dark yellowish brown (10YR 4/4) and is mottled in shades of gray. The B2g horizon ranges from medium acid to mildly alkaline. This horizon is silt loam, silty clay loam, or clay loam.

The Hopco soils in this survey area are considered taxadjuncts to the Hopco series. They have a grayer B horizon than is typical of the series. In behavior, use, and management, however, they are closely similar to Hopco soils.

Idabel series

The Idabel series consists of deep, well drained, moderately rapidly permeable soils that formed in loamy alluvial sediments. These nearly level soils are on forested flood plains along the Red River. Slopes are dominantly less than 1 percent.

Idabel soils are associated with Oklared and Severn soils. They differ in having a cambic horizon and a solum thickness of 20 to 40 inches.

Typical pedon of Idabel silt loam, 1,600 feet south and 600 feet west of the northeast corner sec. 3, T. 8 S., R. 19 E.

Ap—0 to 8 inches; dark reddish brown (5YR 3/3) silt loam; weak fine granular structure; very friable; few worm casts; calcareous in part of the mass, mildly alkaline; abrupt smooth boundary.

B—8 to 24 inches, reddish brown (5YR 4/3) silt loam; weak medium and fine subangular blocky structure; friable; many worm casts; calcareous in part of the mass, moderately alkaline; clear smooth boundary.

IIC1—24 to 35 inches; reddish brown (5YR 4/4) very fine sandy loam; structureless; very friable; few worm casts; thin bedding planes with lenses of loam and fine sandy loam; calcareous in the upper part of the mass and calcareous below, moderately alkaline; clear smooth boundary.

IIC2—35 to 52 inches; yellowish red (5YR 5/6) very fine sandy loam; structureless; very friable; common bedding planes; calcareous, moderately alkaline; gradual smooth boundary.

IIC3—52 to 72 inches; reddish brown (5YR 5/4) silt loam; structureless; friable; common bedding planes; strata of reddish yellow (5YR 7/6) and yellowish red (5YR 5/6) very fine sandy loam and fine sandy loam; calcareous, moderately alkaline.

Solum thickness ranges from 20 to 40 inches. Typically, this soil is calcareous at the surface, calcareous in parts of the mass between 10 and 25 inches, and calcareous in all parts below 25 inches.

The Ap or A1 horizon is reddish brown (5YR 4/3, 4/4) or dark reddish brown (5YR 3/3, 3/4). Reaction is neutral or mildly alkaline.

The B or C horizon is reddish brown (5YR 4/3, 4/4, 5/3, 5/4), yellowish red (5YR 4/6, 5/6), or reddish yellow (5YR 6/6). Texture of the B horizon and upper part of the C horizon is loam, silt loam, very fine sandy loam, and fine sandy loam. The lower part of the C horizon is fine sandy loam, very fine sandy loam, loam, silt loam, and silty clay loam.

The B horizon ranges from neutral to moderately alkaline. The C horizon is mildly alkaline or moderately alkaline.

Karma series

The Karma series consists of deep, well drained, moderately permeable soils that formed in loamy sediments under a mixed cover of hardwood forest. These nearly level soils are on forested terraces along the Red River. The slope is 0 to 1 percent.

Karma soils are associated with Caspiana, Coushatta, and Kiomatia soils. Caspiana soils have a mollic epipedon. Coushatta soils do not have an argillic horizon. Karma soils are not so coarse textured as Kiomatia soils.

Typical pedon of Karma fine sandy loam, 0 to 1 percent slopes, 1,320 feet west and 1,000 feet north of the southeast corner sec. 3, T. 8 S., R. 18 E.

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

A1—8 to 18 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; friable; slightly acid; clear wavy boundary.

B2t—18 to 46 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium subangular blocky structure, breaking to moderate fine granular; friable; pale brown (10YR 6/3) silt coating on some faces of peds; thin continuous clay films on faces of peds and bridging sand grains; neutral; gradual smooth boundary.

C—46 to 80 inches; yellowish red (5YR 5/6) very fine sandy loam; massive; very friable; neutral.

Solum thickness ranges from 40 to 60 inches.

The A horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), brown or dark brown (10YR 3/3, 4/3, 5/3; 7.5YR 3/2, 4/2, 4/4, 5/4), or yellowish brown (10YR 5/4). Reaction is medium acid to neutral.

The B2t horizon is yellowish red (5YR 4/6, 5/6), reddish brown (5YR 4/4, 5/4), or red (2.5YR 4/6). Texture is clay loam or sandy clay loam. Reaction is medium acid to neutral.

The C horizon is yellowish red (5YR 4/6, 5/6) or reddish brown (5YR 4/4, 5/4). Texture is very fine sandy loam, loam, or clay loam. Some profiles have stratification of sandier textures. Reaction is slightly acid to mildly alkaline.

Kaufman series

The Kaufman series consists of deep, somewhat poorly drained, very slowly permeable soils that formed in clayey alluvial sediments. These nearly level soils are on forested flood plains along Boggy Creek and smaller creeks and drains. They have an apparent water table within a depth of 3 1/2 feet in winter and spring. The slope is dominantly less than 1 percent.

Kaufman soils are associated with Hopco, Trinity, and Tuscumbia soils. They contain more clay than Hopco soils. In contrast with Trinity soils, they are not calcareous in the upper 24 inches. They have a darker A horizon than Tuscumbia soils.

Typical pedon of Kaufman clay, depressional, 600 feet east and 10 feet north of the southwest corner sec. 34, T. 6 S., R. 20 E.

A1—0 to 26 inches; black (10YR 2/1) clay; strong medium and fine subangular blocky structure; firm; few shiny pressure faces on faces of peds; neutral; gradual smooth boundary.

AC1g—26 to 44 inches; very dark gray (10YR 3/1) clay; few coarse distinct brown (10YR 5/3) mottles; strong medium subangular blocky structure; common intersecting slickensides; firm; many fine pebbles and few fine black concretions; slightly acid; gradual wavy boundary.

AC2g—44 to 60 inches; dark gray (10YR 4/1) silty clay; many coarse distinct yellowish brown (10YR 5/8) mottles; massive; firm; about 30 percent sand and gravel; moderately alkaline.

Cracks more than 0.4 inch wide extend from the surface to a depth of more than 20 inches in some seasons in most years. Depth to lime is more than 24 inches.

The A1 horizon is black (10YR 2/1; 5Y 2/1) or very dark gray (10YR 3/1; 5Y 3/1). It has yellow, brown, or olive mottles. It ranges from slightly acid to mildly alkaline.

The ACg horizon is very dark gray (10YR 3/1; 5Y 3/1), dark gray (10YR 4/1; 5Y 4/1), or gray (10YR 5/1; 5Y 5/1). It has mottles in shades of brown, olive, and gray. It is clay in the upper part and is clay or silty clay in the lower part. It ranges from slightly acid to moderately alkaline.

Kiomatia series

The Kiomatia series consists of deep, well drained, rapidly permeable soils that formed in mostly sandy alluvium. These nearly level soils are on forested flood plains along the Red River. They have an apparent water table at a depth of 3 to 5 feet in winter and spring. The slope is dominantly less than 1 percent.

Kiomatia soils are associated with Karma, Oklared, Severn, and Redlake soils. They contain less clay than those soils.

Typical pedon of Kiomatia loamy fine sand, 1,800 feet south and 1,400 feet east of the northwest corner sec. 19, T. 7 S., R. 20 E.

A1—0 to 6 inches; reddish brown (5YR 4/4) loamy fine sand; weak fine granular structure; friable; few fine strata of fine sandy loam and loam; calcareous, mildly alkaline; gradual smooth boundary.

C1—6 to 18 inches; yellowish red (5YR 5/6) loamy fine sand; weak fine granular structure; friable; few fine strata of fine sandy loam and loam; calcareous, mildly alkaline; gradual smooth boundary.

C2—18 to 62 inches; light reddish brown (5YR 6/3) fine sand; single grained; loose; strata of pink (5YR 7/4) very fine sand and loamy fine sand; calcareous, moderately alkaline.

The soil is slightly acid to moderately alkaline and noncalcareous to calcareous.

The A horizon is dark brown (7.5YR 4/4), strong brown (7.5YR 5/6), or reddish brown (5YR 4/4, 5/4). It is loamy fine sand stratified with fine sandy loam, very fine sandy loam, loam, or silty clay loam.

The C horizon is strong brown (7.5YR 5/6), light brown (7.5YR 6/4), brown (7.5YR 4/4, 5/4), pink (5YR 7/3, 8/3; 7.5YR 7/4), reddish brown (5YR 5/4), yellowish red (5YR 5/6), or light reddish brown (5YR 6/3). It is loamy fine sand or fine sand stratified with very fine sand or finer textures.

Kirvin series

The Kirvin series consists of deep, well drained, moderately slowly permeable soils that formed in loamy and clayey marine sediments. These moderately steep soils are on forested uplands. Slopes are 12 to 20 percent.

Kirvin soils are mapped in association with Ruston, Smithdale, and Tenaha soils. They contain more clay than those soils.

Typical pedon of Kirvin fine sandy loam in an area of Tenaha-Kirvin association, moderately steep, 1,200 feet south and 100 feet east of the northwest corner sec. 14, T. 5 S., R. 20 E.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam; moderate fine granular structure; very friable; few ironstone pebbles; strongly acid; clear wavy boundary.

A2—3 to 8 inches; pale brown (10YR 6/3) fine sandy loam; weak fine granular structure; very friable; strongly acid; clear wavy boundary.

B21t—8 to 23 inches; red (2.5YR 4/6) sandy clay; strong medium and coarse subangular blocky structure; firm; shiny surfaces on faces of peds; strongly acid; gradual smooth boundary.

B22t—23 to 45 inches; yellowish red (5YR 5/8) sandy clay; common medium and fine distinct strong brown (7.5YR 5/6) and few fine distinct light gray mottles in the lower part; moderate medium angular blocky structure; firm; shiny surface on faces of peds; few soft brown and few brown concretions; very strongly acid; gradual wavy boundary.

B23t—45 to 52 inches; mottled yellowish red (5YR 5/8), strong brown (7.5YR 5/6), and gray (10YR 6/1) sandy clay loam; weak medium subangular blocky structure; friable; streaks and pockets of yellowish brown (10YR 5/6) loam; thin clay films on the faces of peds; a few bands of weakly cemented sandstone; very strongly acid; abrupt wavy boundary.

Cr—52 to 65 inches; yellowish red and light gray weakly cemented sandstone that has thin alternating seams of medium platy red and gray clayey shale; very strongly acid.

Solum thickness is 40 to 60 inches.

The A1 horizon is dark grayish brown (10YR 4/2), brown (10YR 5/3, 4/3), or dark brown (7.5YR 3/2) fine sandy loam less than 6 inches thick. It is medium acid or strongly acid.

The A2 horizon is pale brown (10YR 6/3), yellowish brown (10YR 5/4), light yellowish brown (10YR 6/4), or strong brown (7.5YR 5/6). It is medium acid or strongly acid.

The B21t horizon or B22t horizon is red (2.5YR 4/6, 4/8), yellowish red (5YR 4/6, 4/8, 5/6, 5/8), or reddish brown (5YR 4/4, 5/4). It is sandy clay, clay, or clay loam. This horizon is very strongly acid or strongly acid.

The B23t horizon is mottled in shades of red, brown, and gray. It is sandy clay loam, clay loam, or sandy loam. In some pedons it has thin streaks of iron rich fragments of weakly cemented sandstone or hard ironstone, commonly less than 2 inches thick. This horizon is strongly acid or very strongly acid.

The C horizon has colors in shades of red, gray, or brown. In some profiles it is weakly cemented sandstone stratified with lenses of clayey shale. In others it has alternating layers of weakly cemented sandstone and clay shale. Thin lenses of ironstone are common in some pedons. This horizon is strongly acid or very strongly acid.

Larue series

The Larue series consists of deep, well drained, moderately permeable soils that formed in unconsolidated sandy and loamy marine and fluvial sediments. These gently sloping soils are on forested uplands. Slopes are 2 to 5 percent.

Larue soils are associated with Bernow and Bosville soils. Larue soils have a thicker sandy surface layer than those soils. They contain less clay in the argillic horizon than Bosville soils.

Typical pedon of Larue loamy fine sand, 2 to 5 percent slopes, 800 feet north and 1,600 feet west of the southeast corner sec. 5, T. 5 S., R. 16 E.

A1—0 to 10 inches; brown (10YR 4/3) loamy fine sand; weak fine granular structure; very friable; medium acid; clear smooth boundary.

A2—10 to 28 inches; light yellowish brown (10YR 6/4) loamy fine sand; single grained; very friable; medium acid; clear smooth boundary.

B21t—28 to 42 inches; yellowish red (5YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable; thin continuous clay films on faces of peds; many fine and medium pores; medium acid; gradual smooth boundary.

B22t—42 to 68 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; few fine pores; medium acid; gradual wavy boundary.

B23t—68 to 80 inches; yellowish red (5YR 5/8) sandy clay loam; common medium distinct red (2.5YR 4/6) mottles; few streaks of pale brown (10YR 6/3) loamy sand; weak coarse blocky structure; firm; medium acid.

Solum thickness is 60 to more than 80 inches.

The A1 or Ap horizon is brown (7.5YR 4/4; 10YR 4/3) to pale brown (10YR 6/3). The A2 horizon is brown (7.5YR 4/4, 5/4), strong brown (7.5YR 5/6), or light yellowish brown (10YR 6/4). The A horizon is slightly acid or medium acid.

The upper part of the B2t horizon is red (2.5YR 4/6, 5/6), yellowish red (5YR 4/6, 4/8, 5/6, 5/8), or strong brown (7.5YR 5/6). The upper 20 inches is sandy clay loam that has an average clay content of 20 to 30 percent.

The lower part of the B2t horizon is red (2.5YR 5/6), yellowish red (5YR 4/6, 4/8, 5/6, 5/8), reddish yellow (5YR 6/6, 6/8), or strong brown (7.5YR 5/6). In some pedons it has mottles in shades of brown, yellow, or red. This horizon is loam, sandy clay loam, or clay loam with a few pockets of uncoated sand grains in the lower part. The B2t horizon ranges from slightly acid to strongly acid.

Latanier series

The Latanier series consists of deep, somewhat poorly drained, very slowly permeable soils that formed in clayey and loamy alluvial sediments. These nearly level soils are on forested plains along the Red River. They have an apparent water table at a depth of 1 to 3 feet in winter and spring. The slope is dominantly less than 1 percent.

Latanier soils are closely associated with Coushatta and Redlake soils. Coushatta soils contain less clay than Latanier soils. Latanier soils have a darker A horizon than Redlake soils.

Typical pedon of Latanier clay, 2,500 feet south and 1,400 feet east of the northwest corner sec. 36, T. 7 S., R. 17 E.

A1—0 to 12 inches; dark reddish brown (5YR 3/2) clay; moderate fine blocky structure and moderate medium subangular blocky structure; firm; common fine roots; moderately alkaline; clear smooth boundary.

B—12 to 23 inches; dark reddish brown (5YR 3/4) clay; moderate fine blocky structure; firm; common shiny surfaces on faces of peds; few vertical streaks of A1 material; moderately alkaline; clear smooth boundary.

IIC1—23 to 32 inches; reddish brown (5YR 4/4) loam; weak fine and medium subangular blocky structure; friable; a few thin lenses of yellowish red (5YR 5/6) fine sandy loam; calcareous; moderately alkaline; clear smooth boundary.

IIC2—32 to 66 inches; reddish brown (5YR 5/4) very fine sandy loam; massive; very friable; common thin strata of variable textures; calcareous; moderately alkaline.

Solum thickness is 20 to 36 inches. The A horizon cracks during dry seasons. Calcareous horizons are at depths of 10 to 36 inches.

In most profiles the A horizon is dark reddish brown (5YR 3/2, 3/3). In some it is dark brown (7.5YR 3/2). It is mildly alkaline or moderately alkaline.

The B horizon is dark reddish brown (5YR 3/3, 3/4; 2.5YR 3/4) or reddish brown (2.5YR 4/4; 5YR 4/3, 4/4). It is silty clay or clay, moderately alkaline, and calcareous in some parts.

The IIC horizon is yellowish red (5YR 4/6, 5/6), reddish brown (5YR 4/3, 4/4, 5/4), and reddish yellow (5YR 6/6). It is stratified with very fine sandy loam, silt loam, or silty clay loam. It is calcareous and moderately alkaline.

Lula series

The Lula series consists of deep, well drained, moderately permeable soils that formed in material weathered

from limestone. These very gently sloping soils are on broad prairie uplands. Slopes are 1 to 3 percent.

Lula soils are associated with Hollywood, Newtonia, and Swink soils. Hollywood soils have a higher content of clay. Newtonia soils are deeper. Swink soils are shallow and very shallow.

Typical pedon of Lula silt loam, 1 to 3 percent slopes, 600 feet east and 50 feet south of the northwest corner sec. 11, T. 6 S., R. 17 E.

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; slightly acid; clear smooth boundary.
B1—6 to 12 inches; dark reddish brown (5YR 3/3) clay loam; moderate fine blocky structure; firm; medium acid; gradual smooth boundary.
B21t—12 to 24 inches; red (2.5YR 4/6) silty clay loam; moderate medium subangular blocky structure; very firm; common clay films on faces of peds; few fine black concretions; medium acid; gradual smooth boundary.
B22t—24 to 34 inches; red (2.5YR 4/6) silty clay loam, few fine faint pale brown mottles; moderate medium subangular blocky structure; firm; common clay films on faces of peds; medium acid; gradual smooth boundary.
B23t—34 to 56 inches; red (2.5YR 4/6) silty clay loam, few fine faint pale brown mottles; moderate medium subangular blocky structure; common clay films on faces of peds; about 8 percent medium and very fine concretions of calcium carbonate; neutral; gradual smooth boundary.
R—56 inches; hard fractured limestone bedrock.

Solum thickness and depth to limestone range from 40 to 60 inches.

The A horizon is dark brown (7.5YR 3/2; 10YR 3/3), very dark brown (10YR 2/2), very dark grayish brown (10YR 3/2), or dark reddish brown (5YR 3/2, 3/3). It is slightly acid or medium acid.

The B1 horizon is dark reddish brown (5YR 3/3, 3/4), reddish brown 5YR 4/3, 4/4), brown (7.5YR 4/4), or dark yellowish brown (10YR 4/4). It is clay loam or silty clay loam and slightly acid or medium acid.

The B2t horizon is red (2.5YR 4/6), yellowish red (5YR 4/6), reddish brown (2.5YR 4/4; 5YR 4/4), dark reddish brown (2.5YR 3/4; 5YR 3/4), or dark brown (7.5YR 4/4). It is clay loam or silty clay loam. The B2t horizon is slightly acid to strongly acid in the upper part and neutral to medium acid in the lower part.

Muskogee series

The Muskogee series consists of deep, moderately well drained, slowly permeable soils that formed in loamy and clayey sediments. These very gently sloping soils are on forested uplands. They have a perched water table at a depth of 1 to 2 feet in winter and spring. Slopes are 1 to 3 percent.

Muskogee soils are associated with Alusa, Bernow, Bosville, Newtonia, and Whakana soils. They are better drained than Alusa soils. They have a higher content of silt than Bernow, Bosville, and Whakana soils. In contrast with Newtonia soils, Muskogee soils do not have a mollic epipedon.

Typical pedon of Muskogee silt loam, 1 to 3 percent slopes, 125 feet north and 2,500 feet east of the southwest corner sec. 4, T. 6 S., R. 19 E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; common fine black concretions; medium acid; clear smooth boundary.
A2—5 to 10 inches; light yellowish brown (10YR 6/4) silt loam; common fine faint brown and yellowish brown mottles; massive; friable; medium acid; gradual smooth boundary.
B1—10 to 17 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium subangular blocky structure; firm; few fine concretions; strongly acid; gradual smooth boundary.
B21t—17 to 26 inches; yellowish brown (10YR 5/6) silty clay loam; common fine distinct yellowish red mottles and few fine distinct gray mottles; moderate medium subangular blocky structure; firm; thin continuous clay films on faces of peds; few fine black concretions; strongly acid; gradual smooth boundary.
B22t—26 to 42 inches; light gray (10YR 6/1) clay; common fine distinct yellowish brown and common fine and medium prominent red (2.5YR 4/6) mottles; weak fine blocky structure; very firm; thin continuous clay films on faces of peds; few peds with clean silt grains on the faces; few nonintersecting slickensides; few fine black concretions; strongly acid; gradual smooth boundary.
B23t—42 to 72 inches; light gray (10YR 6/1) clay; common fine distinct yellowish brown and many coarse and medium prominent red (2.5YR 4/6) mottles; weak fine blocky structure; shiny faces on peds; a few nonintersecting slickensides; patches of black films; strongly acid.

Solum thickness is more than 60 inches.

The A1 or Ap horizon is brown (10YR 4/3) or dark grayish brown (10YR 4/2). The A2 horizon is yellowish brown (10YR 5/4), light yellowish brown (10YR 6/4), light brownish gray (10YR 6/2), pale brown (10YR 6/3), or brown (10YR 5/3). The A horizon is medium acid or strongly acid.

The B1 horizon is yellowish brown (10YR 5/4, 5/6), brownish yellow (10YR 6/6), or light yellowish brown (10YR 6/4). It is silt loam or silty clay loam. It is medium acid or strongly acid.

The B21t horizon is yellowish brown (10YR 5/4, 5/6) or strong brown (7.5YR 5/6). It has mottles in shades of gray. It is silty clay loam or silt loam.

In some profiles the B22t horizon or B23t horizon is light gray (10YR 6/1, 7/1, 7/2) or light brownish gray (10YR 6/2). In some it is coarsely mottled in shades of red or brown. It is silty clay or clay. The B2t horizon is medium acid or strongly acid.

Newtonia series

The Newtonia series consists of deep, well drained, moderately permeable soils that formed in loamy or clayey sediments or in material weathered from limestone. These very gently sloping soils are on prairie uplands. Slopes are 1 to 3 percent.

Newtonia soils are associated with Lula and Muskogee soils. In Lula soils the solum thickness and depth to limestone are 40 to 60 inches. Muskogee soils do not have a mollic epipedon.

Typical pedon of Newtonia silt loam, 1 to 3 percent slopes, 2,500 feet east and 1,600 feet north of the southeast corner sec. 23, T. 6 S., R. 20 E.

A1—0 to 6 inches; very dark brown (10YR 2/2) silt loam; moderate medium granular structure; friable; few very fine black concretions; slightly acid; clear smooth boundary.

B1—6 to 10 inches; dark brown (7.5YR 3/2) silt loam; moderate medium and fine granular structure; very friable; few very fine black concretions; slightly acid; clear smooth boundary.

B21t—10 to 16 inches; dark reddish brown (5YR 3/3) silty clay loam; strong medium and fine blocky structure; friable; thin discontinuous clay films on faces of peds; many worm casts; many fine black concretions; slightly acid; gradual smooth boundary.

B22t—16 to 32 inches; yellowish red (5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable; thick continuous clay films on faces of peds; few worm casts; many fine black concretions; slightly acid; gradual smooth boundary.

B23t—32 to 54 inches; red (2.5YR 4/6) silty clay loam; strong medium subangular blocky structure; firm; thick continuous clay films on faces of peds; many fine black concretions; medium acid; gradual smooth boundary.

B3—54 to 68 inches; red (2.5YR 4/6) silty clay; many coarse distinct reddish yellow (7.5YR 6/6) mottles; weak medium blocky structure; firm; few fine black concretions; few small fragments of limestone in lower part; slightly acid.

Solum thickness is more than 60 inches.

The A1 or Ap horizon is very dark brown (10YR 2/2) or dark brown (7.5YR 3/2). It is slightly acid or medium acid.

The B1 horizon is reddish brown (5YR 4/3, 4/4), dark reddish brown (5YR 3/3), or dark brown (7.5YR 3/2). It is silt loam or silty clay loam. It ranges from strongly acid to slightly acid.

The B2t horizon is yellowish red (5YR 4/6, 4/8), reddish brown (2.5YR 4/4; 5YR 4/3, 4/4), red (2.5YR 4/6, 4/8), or dark reddish brown (2.5YR 3/4; 5YR 3/3, 3/4). It is silty clay loam in the upper part and silty clay or silty clay loam in the lower part. This horizon ranges from medium acid to strongly acid.

The B3 horizon is red (2.5YR 4/6, 4/8) or yellowish red (5YR 4/6, 4/8). Mottles are in shades of brown or yellow. This horizon is clay or silty clay. It ranges from medium acid to neutral.

Oklared series

The Oklared series consists of deep, well drained, moderately rapidly permeable alluvial soils that formed in mainly loamy alkaline sediments. These nearly level soils are on flood plains under a cover of mixed hardwood forest. They have an apparent water table at a depth of 3 to 4 feet in spring. The slope is dominantly less than 1 percent.

Oklared soils differ from the associated Idabel soils in having stratification throughout the pedon and in not having a cambic horizon. They have less sand than Kiomatia soils and less silt than Severn soils.

Typical pedon of Oklared very fine sandy loam, 2,800 feet south and 1,600 feet west of the northeast corner sec. 10, T. 8 S., R. 18 E.

A1—0 to 10 inches; yellowish red (5YR 5/6) very fine sandy loam; weak fine granular structure; very friable; calcareous, moderately alkaline; clear smooth boundary.

C1—10 to 24 inches; reddish yellow (5YR 6/6) fine sandy loam; weak fine granular structure; very friable; few discontinuous bedding planes; calcareous, moderately alkaline; gradual wavy boundary.

C2—24 to 44 inches; yellowish red (5YR 5/6) loamy very fine sand; massive; very friable; common bedding planes; thin strata of sandy loam and loamy fine sand; calcareous, moderately alkaline; gradual smooth boundary.

IIC3—44 to 50 inches; reddish brown (5YR 5/4) silt loam; massive; very friable; calcareous, moderately alkaline; gradual smooth boundary.

IIIC4—50 to 72 inches; reddish yellow (5YR 6/6) fine sandy loam; massive; very friable; common bedding planes; thin strata of very fine sandy loam and loamy fine sand; calcareous, moderately alkaline.

The A1 or Ap horizon is brown (7.5YR 4/2, 5/2), strong brown (7.5YR 5/6), dark reddish brown (5YR 3/4), reddish brown (5YR 4/4), or yellowish red (5YR 5/6).

The C horizon is yellowish red (5YR 5/6), strong brown (7.5YR 5/6), reddish brown (5YR 5/4), light reddish brown (5YR 6/4), reddish yellow (5YR 6/6), or light red (2.5YR 6/6). It is stratified with fine sandy loam, loam, or very fine sandy loam. It has strata of finer or coarser textures below a depth of 40 inches.

Panola series

The Panola series consists of deep, somewhat poorly drained, very slowly permeable soils that formed in mainly clayey sediments. These nearly level to very gently sloping soils are on prairie uplands. They have a perched water table at a depth of 1/2 to 1 foot in winter and spring. Slopes are 0 to 2 percent.

Panola soils are associated with Burleson, Hollywood, and Swink soils. Burleson and Hollywood soils have intersecting slickensides within a depth of 40 inches. Swink soils are very shallow and shallow over limestone.

Typical pedon of Panola silt loam, 0 to 2 percent slopes, 2,000 feet south and 1,000 feet east of the northwest corner sec. 14, T. 6 S., R. 16 E.

A1—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; medium acid; clear smooth boundary.

B21t—9 to 18 inches; brown (10YR 4/3) silty clay loam; many medium and coarse distinct red (2.5YR 4/6) and yellowish brown (10YR 5/6), and few medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky and moderate fine blocky structure; firm; thin gray (10YR 5/1) silt coating on faces of peds; few clean sand grains in voids; few clay films on faces of peds; medium acid; gradual wavy boundary.

B22t—18 to 39 inches; dark grayish brown (2.5Y 4/2) clay; many medium to coarse distinct yellowish brown (10YR 5/6) and few medium distinct strong brown (7.5YR 5/6) and dark gray (10YR 4/1) mottles; moderate medium and fine blocky structure; very firm; common brown and black concretions; few thin clay films on faces of peds; few nonintersecting slickensides in lower part; slightly acid; gradual wavy boundary.

B23tg—39 to 55 inches; mottled dark gray (10YR 4/1) and olive brown (2.5Y 4/4) clay; few medium distinct dark grayish brown (2.5Y 4/2) and yellowish brown (10YR 5/4) mottles; moderate medium and fine blocky structure; extremely firm; common brown and black concretions; shiny faces on peds; many slickensides; few to common intersecting in lower part; few crystals of gypsum; mildly alkaline; gradual wavy boundary.

B3g—55 to 72 inches; olive brown (2.5Y 4/4) clay; many medium distinct dark gray (10YR 4/1) mottles; moderate fine blocky structure; extremely firm; common brown and black concretions and stains; few crystals of gypsum; few concretions of calcium carbonate; many intersecting slickensides; moderately alkaline.

Solum thickness is more than 70 inches.

The A1 horizon is very dark grayish brown (10YR 3/2) or dark brown (10YR 3/3). It ranges from strongly acid to slightly acid.

The B21t horizon is brown (10YR 4/3), dark grayish brown (10YR 4/2; 2.5Y 4/2), gray (10YR 5/1), or dark gray (10YR 4/1). Mottles are in shades of red, brown, or gray.

The B22t horizon has the same colors and mottles as the B21t horizon but also has grayish brown (10YR 5/2). The B21t and B22t horizons are clay loam, silty clay loam, clay, or silty clay. Both are medium acid to neutral.

The B23tg horizon is grayish brown (10YR 5/2), dark gray (10YR 4/1), gray (10YR 5/1), olive brown (2.5Y 4/4), light olive brown (2.5Y 5/4), or dark grayish brown (10YR 4/2; 2.5Y 4/2). Mottles are in shades of brown, gray, or red. The B23tg horizon is clay or silty clay. It is medium acid to mildly alkaline.

The B3g horizon is olive brown (2.5Y 4/4) or grayish brown (10YR 5/2; 2.5Y 5/2). Some profiles have a mottled matrix of gray, red, or brown. The B3g horizon is mildly alkaline or moderately alkaline.

Pledger series

The Pledger series consists of deep, somewhat poorly drained, very slowly permeable soils that formed in mainly clayey alluvial sediments. These nearly level soils are on forested flood plains along the Red River and at the mouth of Boggy Creek. They have an apparent water table within a depth of 2 1/2 feet in winter. The slope is less than 1 percent.

Pledger soils are associated with Garton, Redlake, and Roebuck soils. Garton soils have an argillic horizon. Redlake soils do not have a mollic epipedon. Roebuck soils have an A horizon 6 to 20 inches thick.

Typical pedon of Pledger clay, 800 feet north and 400 feet west of the southeast corner sec. 23, T. 7 S., R. 19 E.

Ap—0 to 6 inches; very dark brown (10YR 2/2) clay; fine subangular blocky structure breaking to moderate fine granular; firm; neutral; abrupt smooth boundary.

A12—6 to 30 inches; black (10YR 2/1) clay; moderate medium subangular blocky structure; very firm; shiny pressure faces below a depth of 20 inches; neutral; gradual wavy boundary.

B21—30 to 36 inches; dark brown (7.5YR 3/2) clay; moderate medium subangular blocky structure; very firm; many ped faces with black (10YR 2/1) coating; shiny pressure faces; mildly alkaline; gradual wavy boundary.

B22—36 to 56 inches; reddish brown (5YR 4/3) clay; common medium distinct dark gray (10YR 4/1) and

light gray (10YR 7/2) mottles; moderate medium blocky structure; very firm; shiny pressure faces; few soft masses and common fine calcium carbonate, pitted concretions; calcareous; moderately alkaline; gradual smooth boundary.

C—56 to 72 inches; reddish brown (5YR 5/4) clay; common medium distinct dark gray (10YR 4/1) and light gray (10YR 7/2) mottles; massive; firm; thin strata of clay loam and silt loam; common soft bodies and common fine concretions of calcium carbonate; calcareous; moderately alkaline.

Solum thickness is more than 40 inches. The 10- to 40-inch control section is clay or silty clay. Wide cracks are common during dry periods.

The A horizon is black (10YR 2/1; N 2/0), very dark brown (10YR 2/2; 7.5YR 2/2), or very dark grayish brown (10YR 3/2). It is 24 to 40 inches thick. It ranges from slightly acid to mildly alkaline.

The B horizon is dark reddish brown (5YR 3/3, 3/4), reddish brown (5YR 4/3, 4/4, 5/3, 5/4), or dark brown (7.5YR 3/2, 4/2, 4/4). Mottles in the lower part are in shades of gray. The B horizon is mildly alkaline or moderately alkaline.

The C horizon is reddish brown (5YR 4/3, 4/4, 5/3, 5/4) or brown (7.5YR 4/4, 5/4). Most pedons have strata of clay loam, silty clay loam, and silt loam. This horizon is mildly alkaline or moderately alkaline.

Redlake series

The Redlake series consists of deep, moderately well drained, very slowly permeable soils that formed in mainly clayey alluvial sediments. These nearly level soils are on forested flood plains along the Red River. The slope is 0 to 1 percent.

Redlake soils are associated with Kiomatia, Latanier, Pledger, and Roebuck soils. They differ from Pledger and Roebuck soils in not having a mollic epipedon. They have a higher content of clay within a depth of 40 inches than Latanier soils. Kiomatia soils have a sandy control section.

Typical pedon of Redlake clay, 600 feet south and 800 feet east of the northwest corner sec. 3, T. 8 S., R. 19 E.

Ap—0 to 8 inches; dark reddish brown (5YR 3/3) clay; moderate medium subangular blocky structure; firm; few worm casts; moderately alkaline; abrupt smooth boundary.

B—8 to 42 inches; reddish brown (5YR 4/4) clay; strong fine blocky structure; firm; common shiny faces on peds; few worm casts; calcareous, moderately alkaline; clear wavy boundary.

C—42 to 72 inches; yellowish red (5YR 5/6) clay loam; massive; firm; stratified with lenses of friable silt loam; calcareous, moderately alkaline.

Solum thickness ranges from 30 to 60 inches. The soil cracks when dry.

The A1 or Ap horizon is dusky red (2.5YR 3/2), weak red (2.5YR 4/2), dark reddish brown (5YR 3/3), or reddish brown (5YR 4/4). It is mildly alkaline or moderately alkaline and calcareous in some pedons.

The B horizon is dark reddish brown (2.5YR 3/4; 5YR 3/4), reddish brown (2.5YR 4/4; 5YR 4/3, 4/4), red (2.5YR 4/6), or yellowish red (5YR 4/6, 5/6). It is silty clay or clay.

The C horizon is similar to the B horizon in color. It is mostly clay loam stratified with silt loam, loam, or clay.

Roebuck series

The Roebuck series consists of deep, somewhat poorly to poorly drained, very slowly permeable soils that formed in mainly clayey sediments. These nearly level soils are on forested flood plains along the Red River. The slope is 0 to 1 percent.

Roebuck soils are associated with Pledger and Redlake soils. They have a thinner A horizon than Pledger soils. They are more poorly drained than Redlake soils and have a mollic epipedon.

Typical pedon of Roebuck clay, 2,000 feet east and 50 feet south of the northwest corner sec. 13, T. 7 S., R. 19 E.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) clay; weak fine blocky structure; firm; neutral; abrupt smooth boundary.

A1—5 to 15 inches; very dark brown (10YR 2/2) clay; weak fine and medium blocky structure; firm; neutral; clear wavy boundary.

B—15 to 42 inches; reddish brown (5YR 4/3) clay; common fine and medium distinct grayish brown (10YR 5/2) mottles; strong medium blocky structure; firm; shiny pressure faces on most peds; few fine pitted concretions of calcium carbonate in lower part; mildly alkaline; clear wavy boundary.

C—42 to 70 inches; reddish brown (5YR 5/4) clay; many fine and medium distinct light gray (10YR 7/2) and dark brown (7.5YR 4/4) mottles and few coarse distinct gray (10YR 5/1) mottles; weak medium blocky structure; very firm; few slickensides; pressure faces on faces of most peds; common fine concretions of calcium carbonate in the lower part; calcareous, moderately alkaline.

The 10- to 40-inch control section is clay or silty clay.

The A horizon is very dark brown (10YR 2/2), very dark grayish brown (10YR 3/2), or dark brown (7.5YR 3/2). It is 6 to 20 inches thick. It ranges from slightly acid to mildly alkaline.

The B horizon is yellowish red (5YR 4/6), red (2.5YR 4/6), reddish brown (5YR 4/3, 4/4), or dark reddish brown (2.5YR 3/4; 5YR 3/4). Mottles are few to common in shades of gray and brown. The B horizon is

mildly alkaline or moderately alkaline and is calcareous below 20 inches.

The C horizon is reddish brown (5YR 5/4) or yellowish red (5YR 5/6). It is clay, clay loam, or silt loam and is mildly alkaline or moderately alkaline.

Romia series

The Romia series consists of deep, well drained, moderately permeable soils that formed in material weathered from sandstone of marine deposits. These gently sloping to strongly sloping soils are on slightly convex side slopes and crests of ridges on uplands. Slopes range from 3 to 12 percent.

Romia soils are associated with Bernow and Bosville soils. Bernow and Bosville soils do not have sandstone within a depth of 60 inches.

Typical pedon of Romia fine sandy loam, in an area of Bernow- Romia complex, 2 to 8 percent slopes, eroded, 700 feet east and 1,700 feet south of the northwest corner sec. 12, T. 5 S., R. 16 E.

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

A2—4 to 10 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; very friable; strongly acid; clear smooth boundary.

B21t—10 to 30 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; firm; strongly acid; gradual smooth boundary.

B22t—30 to 41 inches; yellowish red (5YR 5/8) sandy clay loam; common medium distinct red (2.5YR 4/6) and brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; very strongly acid; clear wavy boundary.

Cr—41 to 56 inches; weakly cemented sandstone.

Solum thickness and depth to sandstone range from 40 to 60 inches.

The A1 horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), brown (10YR 4/3, 5/3; 7.5YR 4/2, 4/4, 5/2, 5/4), or dark brown (10YR 3/3; 7.5YR 3/2). It ranges from slightly acid to strongly acid.

The A2 horizon is reddish brown (5YR 5/3, 5/4), light brown (7.5YR 6/4), light yellowish brown (10YR 6/4), yellowish brown (10YR 5/4), brown (10YR 5/3; 7.5YR 5/2, 5/4), or pale brown (10YR 6/3). It ranges from slightly acid to strongly acid.

The B2t horizon is reddish brown (5YR 4/4, 5/4; 2.5YR 4/4, 5/4), yellowish red (5YR 4/6, 4/8, 5/6, 5/8), or red (2.5YR 4/6, 4/8, 5/6, 5/8). The lower part of the B2t horizon has reddish, yellowish, or brownish mottles in most pedons. Grayish mottles occur below a depth of 30 inches in some pedons. The B2t horizon is sandy clay loam or clay loam. It ranges from medium acid to very strongly acid.

The underlying weakly cemented sandstone is rippable. It is laminated with bands of ironstone in some areas.

Ruston series

The Ruston series consists of deep, well drained, moderately permeable soils that formed in loamy sediments. These very gently sloping to gently sloping soils are on broad forested uplands. Slopes are 1 to 5 percent.

The Ruston soils are associated with Kirvin, Smithdale, and Tenaha soils. Kirvin soils have a clayey control section. Smithdale soils are steeper and have a significant decrease in clay at a depth of 60 inches. Tenaha soils have a solum thickness of 40 to 60 inches.

Typical pedon of Ruston fine sandy loam, 1 to 3 percent slopes, 2,200 feet west, 2,300 feet south of the northeast corner sec. 10, T. 6 S., R. 19 E.

A1—0 to 6 inches; dark brown (10YR 4/3) fine sandy loam, weak fine granular structure; friable; slightly acid; clear smooth boundary.

A2—6 to 16 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; friable; medium acid; clear smooth boundary.

B21t—16 to 32 inches; red (2.5YR 4/6) clay loam; moderate fine subangular blocky structure; firm; thick continuous clay films on faces of peds; strongly acid; clear wavy boundary.

B22t—32 to 41 inches; yellowish red (5YR 5/8) sandy clay loam; moderate medium blocky structure; friable; strongly acid; gradual wavy boundary.

B23t—41 to 58 inches; yellowish red (5YR 5/8) sandy clay loam; weak medium blocky structure; friable; strongly acid; gradual smooth boundary.

B&A'2—58 to 80 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium subangular blocky structure; firm; clay films on faces of peds (B part); pinkish gray (7.5YR 6/2) fine sandy loam; weak fine granular structure; friable (A'2 part); strongly acid.

Solum thickness is more than 60 inches.

The A1 horizon is dark grayish brown (10YR 4/2), very dark brown (10YR 3/3), or dark brown (10YR 4/3). The A1 horizon ranges from strongly acid to slightly acid, but in limed areas it ranges to neutral.

The A2 horizon is brown (7.5YR 4/3, 4/4; 10YR 5/3), light yellowish brown (10YR 6/4), grayish brown (10YR 5/2), or yellowish brown (10YR 5/4). It ranges from strongly acid to slightly acid.

Some pedons have a B1 horizon of strong brown (7.5YR 5/6, 5/8), dark brown (7.5YR 4/4), or yellowish red (5YR 5/6). This horizon is medium acid or strongly acid.

The B21t or B22t horizon is red (2.5YR 4/6, 4/8) or yellowish red (5YR 4/6, 4/8, 5/6, 5/8). It is loam, clay loam, or sandy clay loam. It is strongly acid or very strongly acid.

The B23t horizon has colors and reaction similar to those in the upper B21t horizon. It is loam or sandy clay loam. Some pedons have a few pockets of clean sand grains.

The B part of the B&A'2 horizon is the same color as the B2t horizon, or it is coarsely mottled in shades of red, yellow, brown, or gray. The A'2 part of the B&A'2 horizon is light gray (10YR 6/1, 7/1, 7/2), pinkish gray (7.5YR 6/2, 7/2), light brownish gray (10YR 6/2), or white (10YR 8/1, 8/2). The B&A'2 horizon is strongly acid or very strongly acid. It is 5 to 15 percent pockets of clean sand and silt grains.

The Ruston soils in Choctaw County, in the western drier part of the series range, receive less rainfall than is typical of Ruston soils in other parts of the country. Base saturation increases gradually from east to west.

Saffell series

The Saffell series consists of deep, well drained, moderately permeable soils that formed in loamy and gravelly marine sediments. These gently sloping to sloping soils are on forested uplands. Slopes range from 3 to 8 percent.

Saffell soils are associated with Bernow and Bosville soils. In contrast with Saffell soils, Bernow soils are not gravelly. Bosville soils are clayey and are not gravelly.

Typical pedon of Saffell gravelly fine sandy loam, 3 to 8 percent slopes, 2,000 feet north and 150 feet west of the southeast corner sec. 24, T. 5 S., R. 17 E.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) gravelly fine sandy loam; weak fine granular structure; very friable; about 25 percent by volume quartz gravel; strongly acid, clear smooth boundary.

A2—4 to 11 inches; yellowish brown (10YR 5/4) gravelly fine sandy loam; weak fine granular structure; very friable; about 30 percent by volume quartz gravel; strongly acid; clear smooth boundary.

B2t—11 to 48 inches; yellowish red (5YR 5/6) very gravelly sandy clay loam; moderate medium subangular blocky structure; friable; about 60 percent by volume quartz gravel; thin patchy clay films on faces of peds; sand grains bridged and coated with clay; strongly acid; gradual smooth boundary.

B3—48 to 58 inches; strong brown (7.5YR 5/6) very gravelly loam; many medium and coarse distinct yellowish red (5YR 5/6) and yellowish brown (10YR 5/4) mottles; weak fine subangular blocky structure; friable; about 60 percent by volume quartz gravel; sand grains coated and bridged with clay films; strongly acid; gradual wavy boundary.

C—58 to 65 inches; yellowish brown (10YR 5/4) very gravelly sandy loam and loamy sand; massive; friable; about 75 percent by volume quartz gravel; strongly acid.

Solum thickness ranges from 35 to 60 inches.

The A1 horizon is dark grayish brown (10YR 4/2), brown (10YR 4/3), and dark brown (7.5YR 4/2, 4/4). The A2 horizon is yellowish brown (10YR 5/6, 5/4), light yellowish brown (10YR 6/4), and brown (7.5YR 5/4). The A horizon is strongly acid or very strongly acid, but in limed areas it ranges to neutral. Gravel content ranges from 5 to 35 percent.

The B2t horizon is yellowish red (5YR 5/6, 5/8), red (2.5YR 4/6), or strong brown (7.5YR 5/6). It is gravelly or very gravelly and has fine earth textures of sandy clay loam or loam. Gravel content of the B horizon ranges from 35 to 65 percent by volume, but in some pedons the upper few inches of the B2t horizon is less than 35 percent gravel.

In some pedons the B3 horizon has colors similar to those of the B2t horizon. In others it is coarsely mottled in shades of red, brown, and gray. It is gravelly or very gravelly and has fine earth textures of sandy clay loam, loam, and fine sandy loam. The B horizon is strongly acid or very strongly acid.

The C horizon is gravelly or very gravelly. It has fine earth textures of sandy loam, fine sandy loam, and loamy sand. It is 40 to 80 percent gravel by volume.

Severn series

The Severn series consists of deep, well drained, moderately rapidly permeable soils that formed in mainly loamy alluvial sediments. These nearly level soils are on broad flood plains of hardwood forest along the Red River. Slope is dominantly less than 1 percent.

Severn soils are associated with Coushatta, Idabel, Kiomatia, and Oklared soils. Coushatta soils have more clay. Kiomatia soils have more sand. Severn soils differ from Oklared soils in having more silt and less sand. In contrast with Idabel soils, they do not have a cambic horizon. They have a thinner solum than Idabel soils. They also have more silt and less sand.

Typical pedon of Severn very fine sandy loam, 1,600 feet north and 250 feet east of the southwest corner sec. 3, T. 8 S., R. 19 E.

A1—0 to 10 inches; reddish brown (5YR 4/3) very fine sandy loam; weak medium and fine granular structure; very friable; calcareous, moderately alkaline; gradual smooth boundary.

C1—10 to 27 inches; reddish brown (5YR 4/4) very fine sandy loam; fine and medium granular structure; common bedding planes; calcareous, moderately alkaline; clear smooth boundary.

C2—27 to 40 inches; reddish brown (5YR 5/4) very fine sandy loam; structureless; very friable; common bed-

ding planes; calcareous, moderately alkaline; clear smooth boundary.

C3—40 to 72 inches; reddish brown (5YR 4/4) very fine sandy loam; structureless; very friable; few thin strata of loam and loamy fine sand; calcareous, moderately alkaline.

The Ap or A1 horizon is dark brown (7.5YR 3/2, 4/4), dark reddish brown (5YR 3/2, 3/3, 3/4), or reddish brown (5YR 4/3).

The C horizon is strong brown (7.5YR 5/6), reddish brown (5YR 4/4, 5/4), light reddish brown (5YR 6/4), yellowish red (5YR 4/6, 5/6), or reddish yellow (5YR 6/6; 7/5YR 6/6). Texture is very fine sandy loam and loamy very fine sand with thin strata of fine sandy loam, silt loam, very fine sand, and loam.

Smithdale series

The Smithdale series consists of deep, well drained, moderately permeable soils that formed in loamy marine sediments. These very gently sloping to strongly sloping soils are on forested uplands. Slopes range from 2 to 12 percent.

Smithdale soils are associated with Clebit, Kirvin, Ruston, Tenaha, and Tuskahoma soils. They are deeper than Clebit soils and have less clay than Kirvin soils. Ruston soils either do not have a significant decrease in clay content within a depth of 60 inches or are bisequal in nature. In contrast with Tenaha soils, Smithdale soils do not have a sandy A horizon. They are deeper and have less clay than Tuskahoma soils.

Typical pedon of Smithdale fine sandy loam, 5 to 12 percent slopes, 2,500 feet west and 300 feet south of the northeast corner sec. 11, T. 6 S., R. 19 E.

A1—0 to 5 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; friable; medium acid; clear smooth boundary.

A2—5 to 16 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; friable; medium acid; gradual wavy boundary.

B21t—16 to 38 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; firm; strongly acid; gradual wavy boundary.

B22t—38 to 50 inches; yellowish red (5YR 5/8) sandy loam; weak medium subangular blocky structure; friable; few small and medium red mottles; few fine and medium black concretions; strongly acid; gradual smooth boundary.

B23t—50 to 66 inches; yellowish red (5YR 5/8) sandy loam; weak medium subangular blocky structure; friable (B part); about 10 percent pinkish white (7.5YR 8/2) fine sandy loam; single grained; friable (A'2 part); few soft red sandstone fragments; few fine bodies of plinthite; strongly acid.

Solum thickness is more than 60 inches.

The A1 horizon is dark grayish brown (10YR 4/2), very dark brown (10YR 3/3), or dark brown (10YR 4/3). The A horizon is strongly acid or very strongly acid, but in limed areas it ranges to neutral.

The A2 horizon is brown (7.5YR 4/4; 10YR 5/3), light yellowish brown (10YR 6/4), grayish brown (10YR 5/2), or yellowish brown (10YR 5/4).

Some pedons have a B1 horizon of strong brown (7.5YR 5/6, 5/8), brown (7.5YR 4/4), or yellowish red (5YR 5/6).

The B21t or B22t horizon is red (2.5YR 4/6, 4/8) or yellowish red (5YR 4/6, 4/8, 5/6, 5/8). It is loam, clay loam, or sandy clay loam and is strongly acid or very strongly acid.

The B23t horizon has colors similar to those in the upper part of the B2t horizon. It is loam or sandy clay loam. This horizon is 5 to 15 percent pockets of clean sand grains. It is strongly acid or very strongly acid.

The Smithdale soils in Choctaw County, in the western drier part of the series range, receive less rainfall than is typical of Smithdale soils in other parts of the country. Base saturation increases gradually from east to west.

Speer series

The Speer series consists of deep, well drained, moderately permeable soils that formed in loamy sediments. These nearly level soils are on low terraces under a cover of trees. The slope is dominantly less than 1 percent.

Speer soils are associated with Bernow, Dela, and Whakana soils. They have a lower base saturation than Bernow soils. They are not so sandy as Dela soils. They do not have the glossic properties typical of Whakana soils.

Typical pedon of Speer fine sandy loam, 1,320 feet north and 400 feet west of the southeast corner sec. 13, T. 5 S., R. 17 E.

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

B1—5 to 12 inches; brown (10YR 5/3) fine sandy loam; weak fine and medium granular structure; friable; strongly acid; gradual smooth boundary.

B21t—12 to 28 inches; strong brown (7.5YR 5/6) loam; weak fine subangular blocky structure; friable; thin patchy clay films on faces of peds and bridging sand grains; strongly acid; gradual smooth boundary.

B22t—28 to 38 inches; strong brown (7.5YR 5/8) loam; few fine distinct brown mottles; weak fine and medium subangular blocky structure; friable; patchy clay films on faces of peds and bridging sand grains; strongly acid; gradual smooth boundary.

B23t—38 to 44 inches; yellowish brown (10YR 5/6) loam; few fine distinct pale brown mottles; weak fine granular structure; friable; patchy clay films in pores

and bridging sand grains; strongly acid; gradual smooth boundary.

B3—44 to 72 inches; pale brown (10YR 6/3) sandy loam; common medium faint grayish brown (10YR 5/2) mottles; massive; friable; strongly acid.

Thickness of the solum ranges from 50 to more than 60 inches.

The A1 or Ap horizon is dark grayish brown (10YR 4/2) or brown (10YR 5/3, 4/3). It is strongly acid or medium acid.

The B1 horizon is brown (10YR 4/3, 5/3) or yellowish brown (10YR 5/4, 5/6, 5/8). It is fine sandy loam or loam. It is strongly acid or medium acid.

The B2t horizon is yellowish red (5YR 4/6, 5/6, 5/8), brown (7.5YR 4/4), yellowish brown (10YR 5/4, 5/6), reddish yellow (7.5YR 6/6; 5YR 6/6), or strong brown (7.5YR 5/6, 5/8). It is loam, clay loam, or sandy clay loam. It ranges from medium acid to very strongly acid.

The B3 horizon is yellowish red (5YR 4/6, 5/6), strong brown (7.5YR 5/6, 5/8), pale brown (10YR 6/3), or yellowish brown (10YR 5/4, 5/6). It is a fine sandy loam or loam. It ranges from very strongly acid to medium acid.

Swink series

The Swink series consists of very shallow and shallow, well drained, slowly permeable soils that formed in material weathered from limestone. These gently sloping to moderately steep soils are on prairie uplands. Slopes are 2 to 20 percent.

Swink soils are associated with Ferris, Hollywood, Lula, and Panola soils. They are not so deep as those soils.

Typical pedon of Swink stony clay in an area of Swink-Hollywood complex, 5 to 20 percent slopes, 200 feet east and 300 feet south of the northwest corner sec. 36, T. 6 S., R. 20 E.

A11—0 to 5 inches; black (10YR 2/1) stony clay; moderate fine subangular blocky structure parting to moderate fine granular; firm; about 25 percent by volume fragments of limestone more than 10 inches in diameter; calcareous in spots, moderately alkaline; clear wavy boundary.

A12—5 to 14 inches; very dark grayish brown (10YR 3/2) stony clay; moderate fine subangular blocky structure parting to moderate fine granular; firm; few nonintersecting slickensides; about 35 percent by volume fragments of limestone more than 10 inches in diameter; 25 percent fragments of limestone 3 to 10 inches in diameter; calcareous, moderately alkaline; abrupt irregular boundary.

R—14 inches; fractured limestone bedrock and thin strata of calcareous shale; fractures are 1 to 4 inches wide and are at regular intervals of about 10 feet.

Solum thickness is 6 to 20 inches. The content of coarse fragments ranges from 10 to 60 percent in the A11 horizon and from 55 to 85 percent in the A12 horizon. The pedon is neutral to moderately alkaline and is moderately alkaline and calcareous in at least the lower part.

The A horizon is black (10YR 2/1), very dark grayish brown (10YR 3/2), very dark gray (10YR 3/1), very dark brown (10YR 2/2), or dark brown (7.5YR 3/2; 10YR 3/3). It is dominantly clay but ranges to silty clay loam.

The underlying limestone bedrock consists of ledges that range from a few feet to several feet thick and have thin intervening layers of calcareous clayey shale.

Tenaha series

The Tenaha series consists of deep, well drained, moderately permeable soils that formed in loamy and sandy sediments. These very gently sloping to moderately steep soils are on forested uplands. Slopes range from 1 to 15 percent.

Tenaha soils are associated with Kirvin, Ruston, and Smithdale soils. Kirvin soils have more clay. Ruston and Smithdale soils have less sand in the A horizon and have a solum more than 60 inches thick.

Typical pedon of Tenaha loamy fine sand, 1 to 5 percent slopes, 1,000 feet north and 100 feet west of the southeast corner sec. 15, T. 5 S., R. 17 E.

A1—0 to 6 inches; brown (10YR 4/3) loamy fine sand; weak fine granular structure; loose; medium acid; clear smooth boundary.

A21—6 to 18 inches; yellowish brown (10YR 5/4) loamy fine sand; single grained; loose; medium acid; clear smooth boundary.

A22—18 to 28 inches; brownish yellow (10YR 6/6) loamy fine sand; single grained; loose; strongly acid; clear wavy boundary.

B21t—28 to 42 inches; yellowish red (5YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable; many fine and medium pores; thin continuous clay films on faces of peds; very strongly acid; gradual smooth boundary.

B22t—42 to 56 inches; yellowish red (5YR 5/6) loam; moderate medium subangular blocky structure; friable; few fine pores; thin discontinuous clay films on faces of peds; few fine to coarse fragments of soft sandstone; very strongly acid; gradual wavy boundary.

Cr—56 to 72 inches; yellowish red (5YR 5/8) soft sandstone; very strongly acid.

Thickness of the A horizon ranges from about 22 to 40 inches. Solum thickness is 40 to 60 inches.

The A1 horizon is dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or brown (10YR 4/3, 5/3). The A2 horizon is yellowish brown (10YR 5/4, 5/6), light yellowish brown (10YR 6/4), pale brown (10YR 6/3), or

brownish yellow (10YR 6/6). The A horizon is medium acid or strongly acid, but in limed areas it ranges to neutral.

The B2t horizon is yellowish red (5YR 5/6, 5/8) or red (2.5YR 4/6, 4/8) but ranges to strong brown (7.5YR 5/6) or reddish yellow (7.5YR 6/8). The lower part of the B2t horizon is mottled in shades of red, gray, or brown in some pedons. The B2t horizon is very strongly acid or strongly acid.

Trinity series

The Trinity series consists of deep, somewhat poorly drained, very slowly permeable soils that formed in clayey alluvial sediments. These nearly level soils are on forested flood plains. They have an apparent water table within a depth of 3 feet in winter and spring.

Trinity soils are associated with Hopco, Kaufman, and Tuscumbia soils. They have more clay than Hopco soils. Kaufman soils are not calcareous in the A1 horizon. Trinity soils are darker than Tuscumbia soils.

Typical pedon of a Trinity clay, 2,200 feet west and 100 feet north of the southeast corner sec. 33, T. 5 S., R. 16 E.

A11—0 to 14 inches; black (5Y 2/1) clay; moderate fine granular structure; firm; calcareous, mildly alkaline; clear smooth boundary.

A12—14 to 26 inches; very dark gray (5Y 3/1) clay; moderate fine blocky structure; very firm; shiny pressure faces on peds; few intersecting slickensides in lower part; calcareous, mildly alkaline; diffuse wavy boundary.

A13—26 to 40 inches; dark gray (5Y 4/1) clay; weak coarse blocky structure; very firm; shiny pressure faces on peds; common intersecting slickensides; calcareous, moderately alkaline; diffuse wavy boundary.

C—40 to 62 inches; olive gray (5Y 5/2) clay; many medium distinct yellowish brown (10YR 5/4) mottles; massive; very firm; calcareous, moderately alkaline.

The A horizon ranges from black (10YR 2/1; 5Y 2/1) to very dark gray (10YR 3/1; 5Y 3/1). The moist value is less than 3.5 to a depth of 24 inches. This horizon is mildly alkaline or moderately alkaline.

The C horizon ranges from very dark gray (10YR 3/1; 5Y 3/1) to olive gray (5Y 4/2, 5/2). Mottles are few to common, distinct, yellowish brown, or olive yellow.

Tuscumbia series

The Tuscumbia series consists of deep, poorly drained, very slowly permeable soils that formed in mainly clayey alluvial sediments. These nearly level soils are on forested flood plains along the Red River, Boggy Creek, and other major streams in the county. They have an apparent water table at a depth of 1/2 foot to 1 1/2 feet in winter and spring. The slope is dominantly less than 1 percent.

Tuscumbia soils are associated with Hopco, Kaufman, and Trinity soils. They have more clay and are grayer throughout than Hopco soils. Kaufman and Trinity soils have a thicker A horizon than Tuscumbia soils. In addition, Trinity soils are calcareous.

Typical pedon of Tuscumbia clay, 1,200 feet west and 2,300 feet south of the northeast corner sec. 29, T. 7 S., R. 18 E.

A1—0 to 8 inches; very dark gray (10YR 3/1) clay; strong fine granular structure; very firm; slightly acid; clear smooth boundary.

B21g—8 to 20 inches; dark gray (10YR 4/1) clay; strong medium blocky structure; very firm; few fine black concretions; mildly alkaline; gradual wavy boundary.

B22g—20 to 64 inches; gray (5Y 5/1) silty clay; few fine distinct yellowish brown (10YR 5/4) mottles; moderate medium blocky structure; very firm; few slickensides that do not intersect; mildly alkaline.

Thickness of the solum is more than 50 inches.

The A horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), or very dark gray (10YR 3/1; 5Y 3/1). It ranges from medium acid to mildly alkaline.

The B2g horizon is dark gray (10YR 4/1; N 4/; 5Y 4/1), gray (10YR 5/1, 6/1; 5Y 5/1, 6/1), or light gray (10YR 7/1, 7/2; 5Y 7/1, 7/2). It is silty clay loam, clay, or silty clay. It ranges from medium acid to mildly alkaline.

Tuskahoma series

The Tuskahoma series consists of shallow, moderately well drained, very slowly permeable soils that formed in material weathered from shales of the Pennsylvanian age. These strongly sloping soils are on side slopes of forested uplands. Slopes are dominantly 8 to 12 percent but range to 20 percent in some areas. The soils have a perched water table at a depth of 1/2 foot to 1 1/2 feet in winter and spring.

Tuskahoma soils are associated with Clebit and Smithdale soils. Clebit soils do not have an argillic horizon. Smithdale soils have a thicker solum than Tuskahoma soils.

Typical pedon of Tuskahoma loam in an area of Clebit-Tuskahoma association, strongly sloping, 2,200 feet north and 300 feet east of the southwest corner sec. 14, T. 5 S., R. 18 E.

A1—0 to 4 inches; dark brown (10YR 3/3) loam; weak fine granular structure; friable; 10 percent sandstone pebbles by volume; medium acid; clear smooth boundary.

B2t—4 to 12 inches; yellowish red (5YR 4/6) clay; strong medium blocky structure; firm; thin continuous clay

films on faces of peds; few fragments of shale and sandstone; medium acid; gradual wavy boundary.

B3—12 to 18 inches; coarsely mottled yellowish red (5YR 4/6) and gray (10YR 5/1) shaly silty clay; weak medium blocky structure; firm; thin discontinuous clay films on faces of peds; about 30 percent fragments of shale; medium acid; gradual wavy boundary.

Cr—18 to 30 inches; gray shale bedrock with a few fine layers of shaly clay; slightly acid; tilted 30 degrees from the horizontal.

The solum is 10 to 20 inches thick. It is 10 to 20 percent stones and gravel.

The A horizon is dark grayish brown (10YR 4/2) or dark brown (10YR 3/3). It is loam or silt loam. It is strongly acid to neutral.

The B2t horizon is strong brown (7.5YR 5/6), brown (7.5YR 4/4, 5/4; 10YR 4/3, 5/3), or yellowish red (5YR 4/6, 5/6) with few to many mottles in shades of red, gray, yellow, or brown. It is clay or silty clay that is 0 to 30 percent by volume fragments of shale. This horizon ranges from strongly acid to neutral.

The B3 horizon is gray (10YR 5/1), dark gray (10YR 4/1), grayish brown (10YR 5/2), or dark grayish brown (10YR 4/2) with few to many mottles in shades of brown, red, or gray. It is 20 to 50 percent by volume fragments of shale less than 3 inches in diameter. This horizon ranges from medium acid to moderately alkaline.

The Tuskahoma soils in Choctaw County have redder hues in the B horizon than is typical of the Tuskahoma series. They are considered taxadjuncts to the series. In use, behavior, and management, however, they are similar to Tuskahoma soils.

Whakana series

The Whakana series consists of deep, well drained, moderately permeable soils that formed in loamy sediments. These very gently sloping to sloping soils are on forested high terraces. Slopes range from 1 to 8 percent.

Whakana soils are associated with Muskogee, Speer, and Wrightsville soils. Muskogee soils have a fine-silty control section and gray mottles within a depth of 30 inches. Speer soils decrease in clay content by more than 20 percent at a depth of 60 inches. Wrightsville soils have a fine control section.

Typical pedon of Whakana very fine sandy loam, 1 to 4 percent slopes, 400 feet east and 150 feet south of the northwest corner sec. 2, T. 8 S., R. 18 E.

A1—0 to 6 inches; brown (10YR 4/3) very fine sandy loam; weak medium granular structure; friable; many fine roots; medium acid; clear smooth boundary.

A2—6 to 12 inches; light yellowish brown (10YR 6/4) very fine sandy loam; weak fine granular structure; very friable; many fine roots; medium acid; clear smooth boundary.

B21t—12 to 37 inches; red (2.5YR 4/6) clay loam; moderate medium subangular blocky structure; firm; few fine pores; thick clay films on faces of some peds; few silt coatings on faces of some peds in the lower part; medium acid; gradual wavy boundary.

B22t&A'2—37 to 72 inches; red (2.5YR 4/6) sandy clay loam; weak fine subangular blocky structure; friable; many fine pores; thin discontinuous clay films on faces of some peds; common silt coatings on faces of many peds; about 25 percent pink (5YR 8/4) and white (10YR 8/1) streaks and tongues of loamy fine sand; A'2 tongues are 4 to 8 inches apart and 1/4 to 1 1/2 inches wide; medium acid.

Solum thickness is more than 60 inches.

The A1 horizon is brown (10YR 4/3; 7.5YR 4/4), dark brown (7.5YR 3/2), dark grayish brown (10YR 4/2), or reddish brown (5YR 4/4). It is less than 6 inches thick in pedons with chroma of 3 or less. Reaction is medium acid or slightly acid.

The A2 horizon is brown (7.5YR 4/4, 5/4), light yellowish brown (10YR 6/4), light brown (7.5YR 6/4), or strong brown (7.5YR 5/6). It is loam, fine sandy loam, or very fine sandy loam and is strongly acid to slightly acid.

The B21t horizon is red (2.5YR 5/8, 4/8, 4/6), yellowish red (5YR 4/6, 4/8, 5/6), reddish brown (5YR 4/4), or dark red (2.5YR 3/6). A few to common mottles of these same colors occur in some pedons. This horizon is clay loam or loam and is strongly acid to slightly acid.

The B22t part of the B22t&A'2 horizon is red (2.5YR 4/6, 4/8), dark red (2.5YR 3/6), reddish brown (5YR 5/4), or yellowish red (5YR 4/6, 4/8). It is loam or sandy clay loam. From 10 to 30 percent is silt coats, pockets, and tongues of the A'2 horizon. Colors are pink (5YR 8/4), very pale brown (10YR 7/3), white (10YR 8/1), light gray (10YR 7/1), or light brown (7.5YR 6/4). The B22t&A'2 horizon ranges from very strongly acid to medium acid.

Wrightsville series

The Wrightsville series consists of deep, poorly drained, very slowly permeable soils that formed in clayey and loamy alluvial sediments. These nearly level soils are on forested terraces. They have a perched water table at a depth of 1/2 foot to 1 1/2 feet in winter and spring. Slopes are dominantly less than 1 percent.

Wrightsville soils are associated with Alusa, Elysian, Guyton, and Whakana soils. Alusa soils do not have tonguing of the A2 horizon into the B2t horizon. Elysian soils have a coarse-loamy control section. Guyton soils have a fine-silty control section. Whakana soils have a fine-loamy control section.

Typical pedon of Wrightsville silt loam in an area of Wrightsville-Elysian complex, undulating, 800 feet north and 75 feet west of the southeast corner sec. 6, T. 6 S., R. 18 E.

A1—0 to 4 inches; grayish brown (10YR 5/2) silt loam; few fine faint dark brown mottles; weak fine granular structure; friable; strongly acid; clear smooth boundary.

A2g—4 to 12 inches; light brownish gray (10YR 6/2) silt loam; many medium distinct yellowish brown (10YR 5/4) mottles; weak medium granular structure; friable; few fine pores; strongly acid; abrupt irregular boundary; tongues into horizon below.

Bg&Ag—12 to 26 inches; gray (10YR 6/1) silty clay; many medium distinct yellowish brown mottles; moderate medium angular and subangular blocky structure; firm; common fine pores; clay films are continuous on faces of peds (Bg part); 15 percent tongues 1/4 to 1 1/2 inches wide of light gray (10YR 7/2) silt loam; silt coatings are common on faces of peds (Ag part); very strongly acid; gradual wavy boundary.

B2tg—26 to 56 inches; gray (10YR 5/1) silty clay, many coarse prominent light brownish gray (10YR 6/2) and yellowish brown (10YR 5/4) mottles; weak coarse blocky and moderate fine subangular blocky structure; firm; continuous clay films on faces of peds; thick light gray silt coatings on structural planes and filling fine voids; strongly acid; gradual wavy boundary.

B3g—56 to 70 inches; gray (10YR 5/1) silty clay, many medium distinct yellowish brown (10YR 5/6) mottles; weak coarse blocky structure; firm; few silt pockets or voids filled with light gray material; strongly acid.

Solum thickness is 50 to 70 inches. Reaction in the A and B horizons ranges from very strongly acid to strongly acid.

The A1 horizon is grayish brown (10YR 5/2), dark grayish brown (10YR 4/2), or very dark grayish brown (10YR 3/2). The A2 horizon is light brownish gray (10YR 6/2), light gray (10YR 7/1, 6/1), or gray (10YR 5/1).

The B horizon is gray (10YR 6/1, 5/1), light gray (10YR 7/1, 7/2), or light brownish gray (10YR 6/2). It has common or many, fine or coarse, distinct or prominent mottles in shades of brown. This horizon is silty clay, clay, or silty clay loam. Tongues of silt loam extend in or through the upper part of the B2tg horizon.

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(4) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus.

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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
Low	Less than 4
Medium	4 to 6
High	More than 6

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.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

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

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

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

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 map 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.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave. Unstable walls of cuts made by earth-moving equipment. The soil sloughs easily.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. A delay in grazing until range plants have reached a specified stage of growth. Grazing is deferred in order to increase the vigor of forage and to allow desirable plants to produce seed. Contrasts with continuous grazing and rotation grazing.

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

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically 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.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by 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 alkali. Excess exchangeable sodium. The resulting poor physical properties restrict the growth of plants.

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.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake. The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained

away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

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.

Forb. Any herbaceous plant not a grass or a sedge.

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.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

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.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. 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 materi-

al 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.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered, but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants are those that follow disturbance of the surface.

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.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous areas. Areas that have little or no natural soil, are too nearly inaccessible for orderly examination, or cannot otherwise be feasibly classified.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three 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 characteristic 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 forms subsurface tunnels or pipelike cavities in the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents that commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on exposure to repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade, whereas ironstone cannot be cut but can be broken or shattered with a spade. Plinthite is one form of the material that has been called laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range (or rangeland). Land that, for the most part, produces native plants suitable for grazing by livestock; includes land supporting some forest trees.

Range condition. The health or productivity of forage plants on a given range, in terms of the potential productivity under normal climate and the best practical management. Condition classes generally recognized are—*excellent, good, fair,* and *poor*. The classification is based on the percentage of original, or assumed climax vegetation on a site, as compared to what has been observed to grow on it when well managed.

Range site. An area of range where climate, soil, and relief are sufficiently uniform to produce a distinct kind and amount of native vegetation.

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

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.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

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.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

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.

Slick spot. Locally, a small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake. The slow movement of water into the soil.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na@ to Ca-- plus Mg--. The degrees of sodicity are)

	SAR
Slight	Less than 13:1
Moderate	13-30:1
Strong	More than 30:1

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*

(0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life 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.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates 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).

Stubble mulch. Stubble or other crop residue left on the soil, or partly worked into the soil, to provide protection from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

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.

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. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or " very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Unstable fill. Risk of caving or sloughing in banks of fill material.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.
Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.
Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.
Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

ILLUSTRATIONS

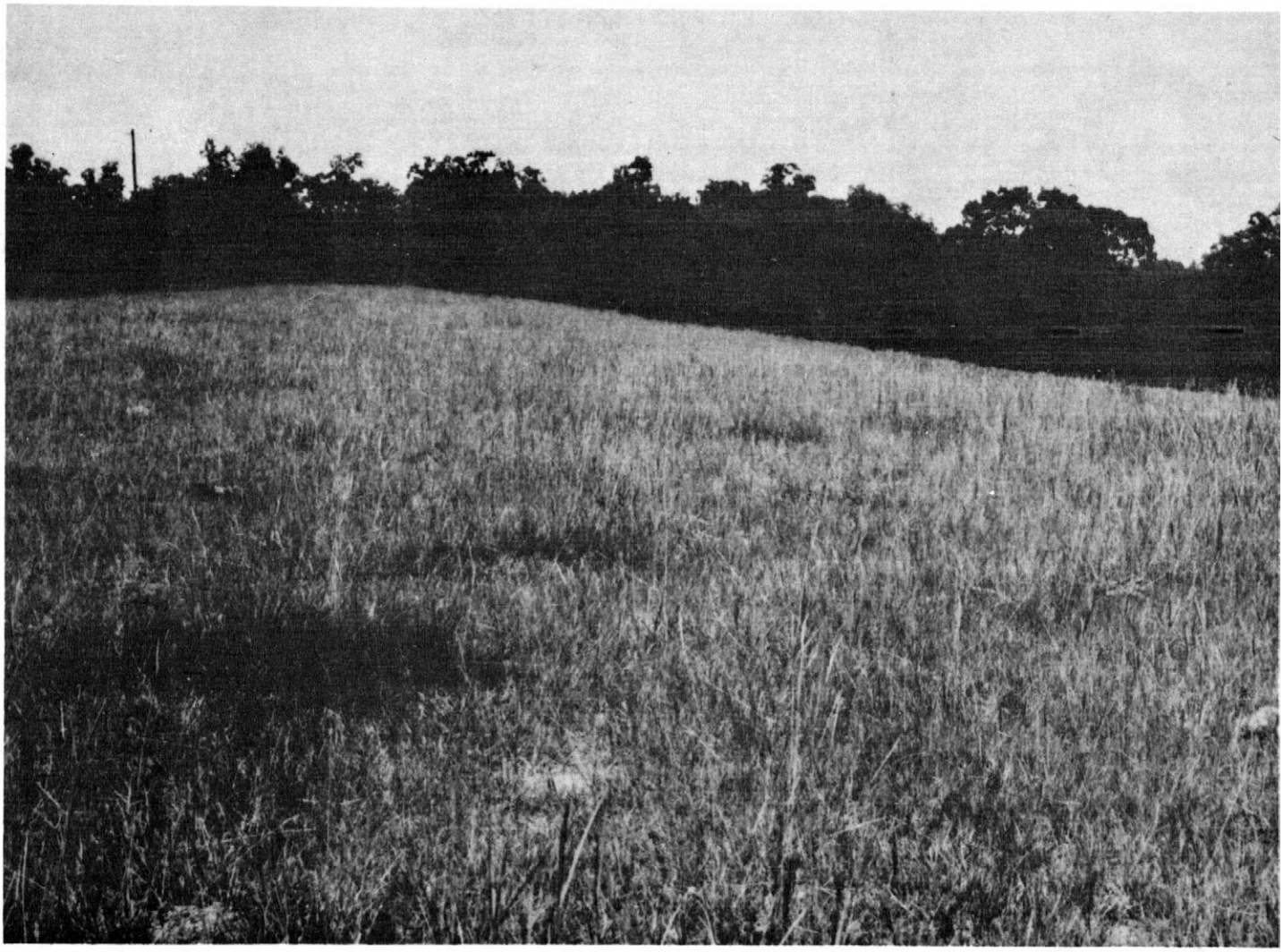

Figure 1.—Area of Bernow fine sandy loam, 3 to 6 percent slopes. Bermudagrass is in the foreground and woodland in the background.

Figure 2.—Areas of Bernow, Bosville and Romia soils, 2 to 8 percent slopes, gullied. Unless protected, these soils are subject to gully erosion.

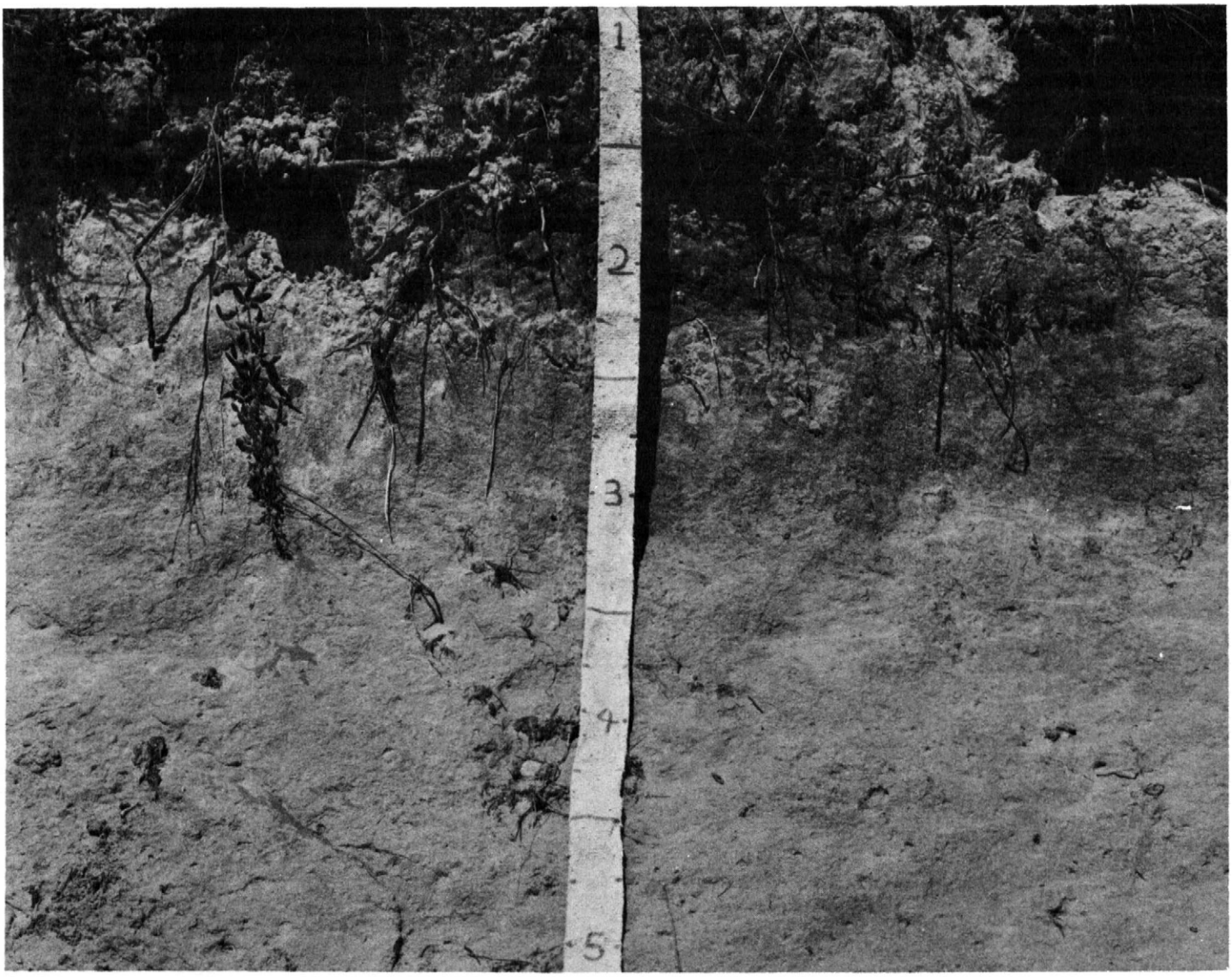

Figure 3.—Profile of Ruston fine sandy loam showing thin A1 and A2 horizons.

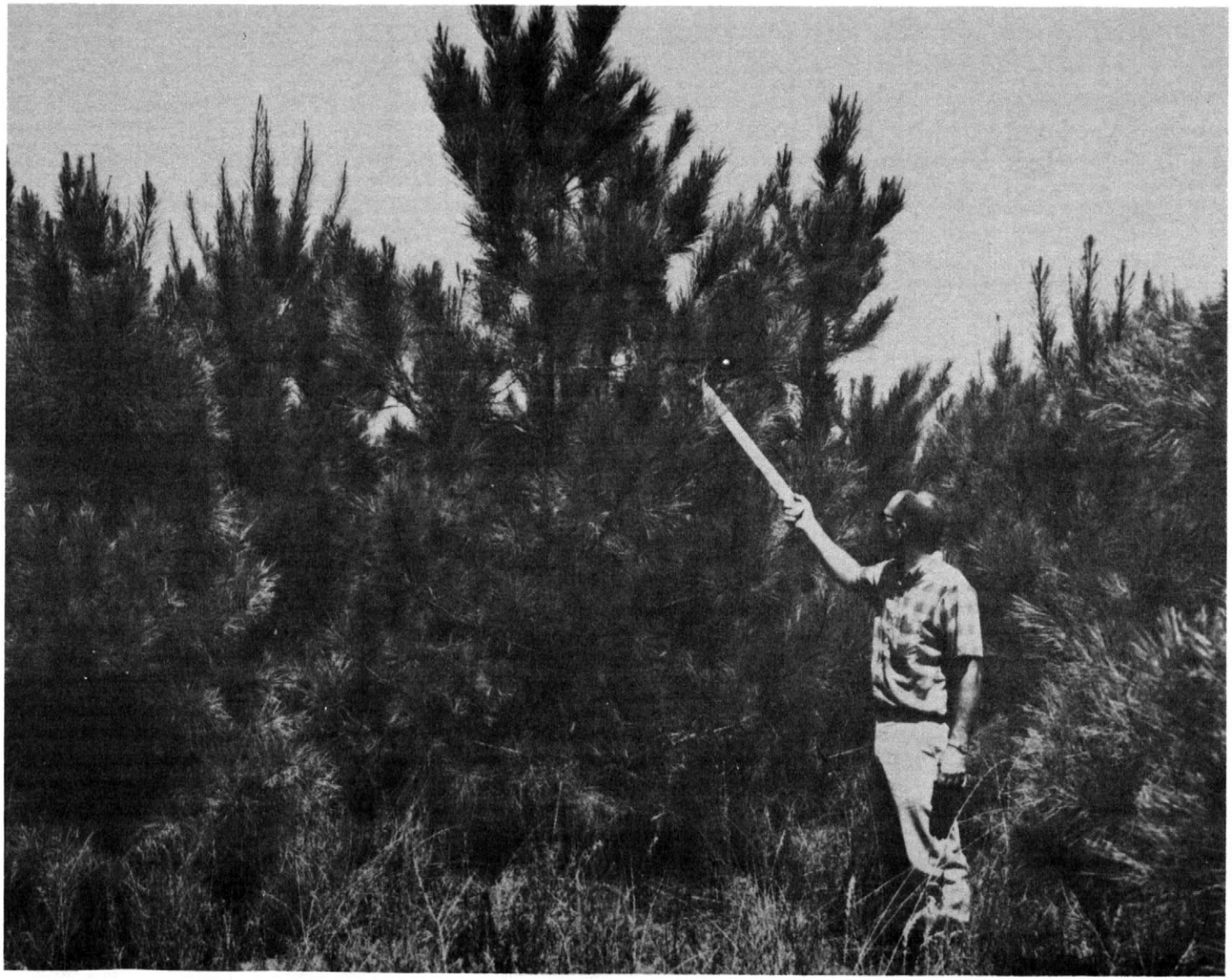

Figure 4.—A 4-year-old planting of loblolly pine on Ruston fine sandy loam, 1 to 3 percent slopes.

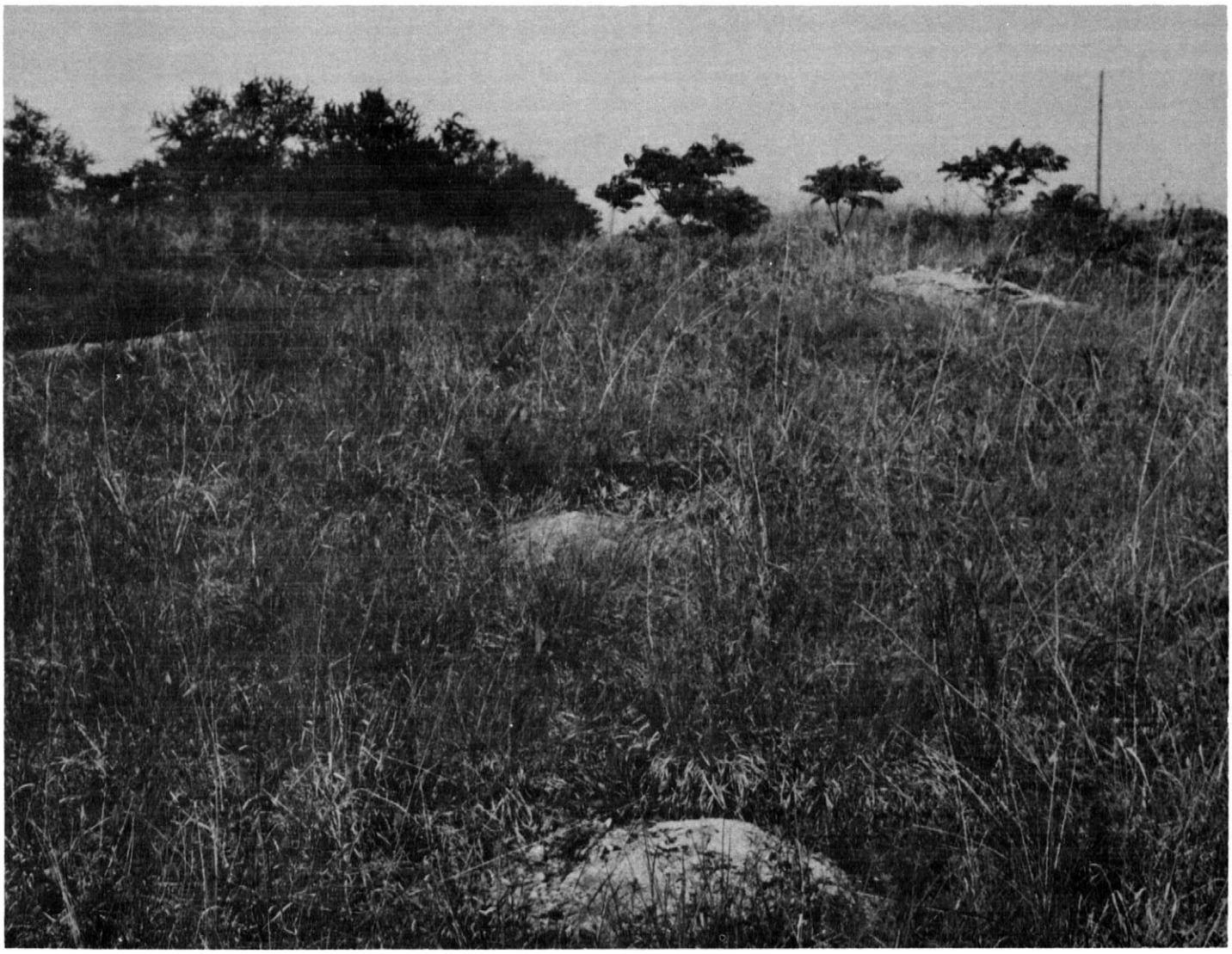

Figure 5.—Native grass in an area of Swink-Hollywood complex, 5 to 20 percent slopes. The soils are in the Shallow Prairie and Blackclay Prairie range sites.

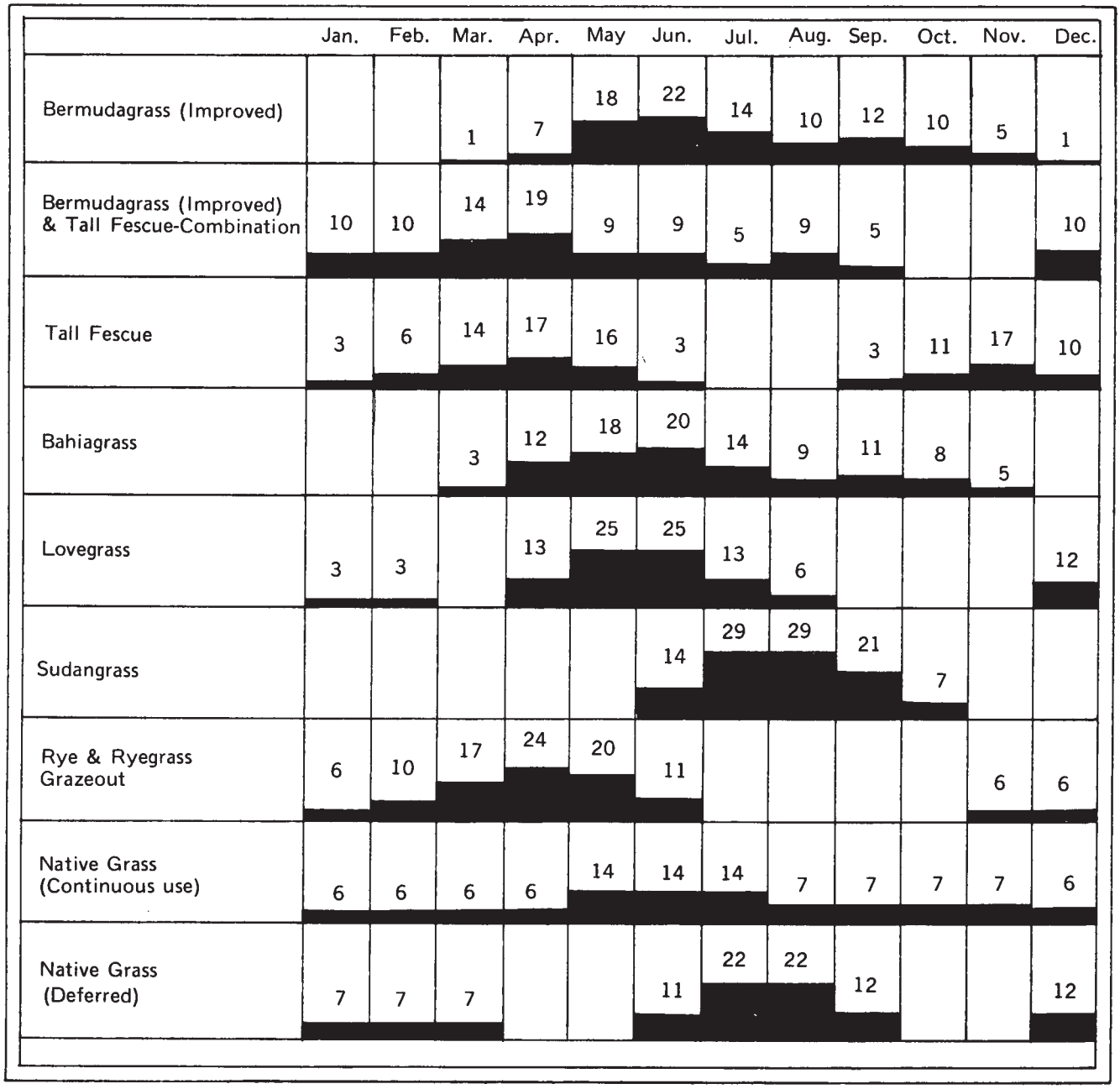

Figure 6.—Forage calendar showing monthly growth as a percentage of the forage produced annually.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION

Month	Temperature[1]						Precipitation[1]				
	Average daily maximum	Average daily minimum	Average daily	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	53.6	29.2	41.4	78	5	21	2.16	.96	3.13	4	..6
February	58.3	33.0	45.6	80	11	52	2.77	1.38	3.90	5	.7
March	66.0	40.2	53.1	87	18	194	3.36	1.78	4.64	6	.1
April	75.2	50.7	63.0	89	28	390	5.37	2.55	7.67	7	.0
May	81.8	58.1	70.0	93	39	620	5.99	3.11	8.34	7	.0
June	89.1	66.2	77.7	99	50	831	4.16	1.71	6.14	5	.0
July	94.3	69.6	82.0	104	57	992	3.43	.72	5.54	5	.0
August	94.2	68.0	81.1	105	55	964	3.52	1.44	5.20	5	.0
September	87.0	61.7	74.4	101	42	732	5.72	2.47	8.42	6	.0
October	77.8	50.3	64.1	93	30	437	4.22	1.15	6.68	4	.0
November	65.2	39.0	52.1	84	17	129	3.23	1.35	4.75	4	.2
December	56.1	31.9	44.0	77	10	40	3.11	1.19	4.65	5	.4
Year	74.0	49.8	62.4	106	2	5,402	47.04	38.36	55.29	63	3.0

[1]Recorded in the period 1951-74 at Antlers, Okla.

[2]Growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

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 26	April 3	April 20
2 years in 10 later than--	March 19	March 29	April 15
5 years in 10 later than--	March 7	March 20	April 6
First freezing temperature in fall:			
1 year in 10 earlier than--	October 31	October 26	October 19
2 years in 10 earlier than--	November 8	October 30	October 23
5 years in 10 earlier than--	November 23	November 8	October 31

[1]Recorded in the period 1951-74 at Antlers, Okla.

TABLE 3.--GROWING SEASON

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	236	211	190
8 years in 10	244	218	196
5 years in 10	260	233	207
2 years in 10	276	247	219
1 year in 10	285	254	225

[1]Recorded in the period 1951-74 at Antlers, Okla.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Alusa loam	4,934	1.0
2	Bernow fine sandy loam, 1 to 3 percent slopes	15,213	3.0
3	Bernow fine sandy loam, 3 to 6 percent slopes	7,442	1.5
4	Bernow-Romia complex, 6 to 12 percent slopes	19,891	3.9
5	Bernow-Romia complex, 2 to 8 percent slopes, eroded	9,739	1.9
6	Bernow, Bosville and Romia soils, 2 to 8 percent slopes, gullied	3,976	0.8
7	Boggy fine sandy loam	11,887	2.3
8	Bosville fine sandy loam, 1 to 4 percent slopes	12,427	2.4
9	Bosville fine sandy loam, 4 to 8 percent slopes	13,056	2.6
10	Bosville fine sandy loam, 3 to 8 percent slopes, eroded	3,288	0.6
11	Bosville fine sandy loam, 8 to 15 percent slopes	30,950	6.1
12	Burleson clay, 1 to 3 percent slopes	1,669	0.3
13	Caspiana silt loam	1,840	0.4
14	Clebit-Tuskahoma association, strongly sloping	3,079	0.6
15	Coushatta silty clay loam	1,559	0.3
16	Dela fine sandy loam	1,107	0.2
17	Durant silt loam, 1 to 3 percent slopes	9,918	1.9
18	Ferris clay, 3 to 5 percent slopes	781	0.2
19	Ferris clay, 2 to 5 percent slopes, eroded	7,461	1.5
20	Ferris clay, 5 to 12 percent slopes	1,299	0.3
21	Garton silty clay loam	1,802	0.4
22	Guyton silt loam	6,837	1.3
23	Heiden clay, 2 to 5 percent slopes	1,544	0.3
24	Hollywood silty clay, 1 to 3 percent slopes	11,600	2.3
25	Hollywood silty clay, 3 to 5 percent slopes	4,823	0.9
26	Hollywood-Swink complex, 2 to 8 percent slopes	23,308	4.6
27	Hopco silty clay loam	17,209	3.4
28	Idabel silt loam	3,846	0.8
29	Karma fine sandy loam, 0 to 1 percent slopes	3,445	0.7
30	Kaufman clay	1,547	0.3
31	Kaufman clay, depressional	5,157	1.0
32	Kiomatia loamy fine sand	2,390	0.5
33	Larue loamy fine sand, 2 to 5 percent slopes	6,358	1.2
34	Latanier clay	1,528	0.3
35	Lula silt loam, 1 to 3 percent slopes	1,785	0.4
36	Muskogee silt loam, 1 to 3 percent slopes	35,869	7.1
37	Newtonia silt loam, 1 to 3 percent slopes	7,162	1.4
38	Oklared very fine sandy loam	2,129	0.4
39	Panola silt loam, 0 to 2 percent slopes	10,180	2.0
40	Pledger clay	4,775	0.9
41	Redlake clay	2,345	0.5
42	Roebuck clay	7,125	1.4
43	Ruston fine sandy loam, 1 to 3 percent slopes	5,656	1.1
44	Ruston fine sandy loam, 3 to 5 percent slopes	3,649	0.7
45	Saffell gravelly fine sandy loam, 3 to 8 percent slopes	727	0.1
46	Severn very fine sandy loam	3,051	0.6
47	Smithdale fine sandy loam, 5 to 12 percent slopes	6,717	1.3
48	Smithdale fine sandy loam, 2 to 8 percent slopes, eroded	3,624	0.7
49	Speer fine sandy loam	4,043	0.8
50	Swink-Hollywood complex, 5 to 20 percent slopes	30,007	5.9
51	Tenaha loamy fine sand, 1 to 5 percent slopes	12,555	2.5
52	Tenaha loamy fine sand, 5 to 8 percent slopes	8,729	1.7
53	Tenaha-Kirvin association, moderately steep	36,881	7.2
54	Tenaha and Smithdale soils, 2 to 12 percent slopes, gullied	5,206	1.0
55	Trinity clay	11,523	2.3
56	Tuscumbia clay	2,178	0.4
57	Udorthents	1,439	0.3
58	Whakana very fine sandy loam, 1 to 4 percent slopes	986	0.2
59	Whakana very fine sandy loam, 4 to 8 percent slopes	4,400	0.9
60	Wrightsville-Elysian complex, undulating	19,019	3.7
	Water	24,130	4.7
	Total	508,800	100.0

TABLE 5.--YIELDS PER ACRE OF PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield figure indicates the pasture grass is seldom grown or is not suited]

Soil name and map symbol	Bermudagrass improved	Bermudagrass improved and tall fescue combination	Tall fescue	Bahiagrass	Weeping lovegrass	Sudangrass	Rye and ryegrass grazeout
	AUM*	AUM	AUM	AUM	AUM	AUM	AUM
1---- Alusa	5.5	5.5	5.5	5.0	---	---	---
2---- Bernow	7.5	---	---	6.5	7.5	3.5	4.5
3---- Bernow	7.0	---	---	6.0	7.0	3.0	4.0
4**---- Bernow	5.0	---	---	4.5	5.0	---	4.0
5**---- Bernow	5.0	---	---	4.5	5.0	---	---
6**---- Bernow	4.5	---	---	4.0	4.0	---	---
7---- Boggy	12.0	11.5	11.0	---	---	---	---
8---- Bosville	6.5	---	---	6.0	6.0	3.0	3.0
9---- Bosville	6.0	---	---	5.5	6.0	---	3.0
10---- Bosville	6.0	---	---	5.5	6.0	---	3.0
11---- Bosville	6.0	---	---	5.5	6.0	---	---
12---- Burleson	6.5	6.5	6.0	5.0	---	3.5	4.0
13---- Caspiana	8.5	7.5	6.0	7.5	8.5	4.0	5.5
14**---- Clebit	---	---	---	---	---	---	---
15---- Coushatta	8.5	7.5	7.0	7.0	8.5	4.0	5.5
16---- Dela	8.0	7.5	7.0	7.0	8.0	4.0	5.5
17---- Durant	6.5	---	---	6.0	7.0	4.0	4.5
18---- Ferris	5.5	5.0	4.5	5.0	---	3.5	3.5
19---- Ferris	5.0	4.5	5.0	4.5	---	---	3.0
20---- Ferris	4.5	---	---	4.5	---	---	---
21---- Garton	8.0	7.5	7.0	6.5	8.0	4.0	5.0

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF PASTURE--Continued

Soil name and map symbol	Bermudagrass improved	Bermudagrass improved and tall fescue combination	Tall fescue	Bahiagrass	Weeping lovegrass	Sudangrass	Rye and ryegrass grazeout
	AUM*	AUM	AUM	AUM	AUM	AUM	AUM
22---- Guyton	6.5	7.0	7.5	6.0	---	---	4.0
23---- Heiden	6.0	5.5	4.5	5.0	---	3.5	3.5
24---- Hollywood	5.5	5.5	5.0	5.0	---	3.5	4.0
25---- Hollywood	5.0	5.0	4.5	4.5	---	3.5	3.5
26**---- Hollywood	5.5	---	---	5.5	---	---	---
27---- Hopco	9.0	9.0	9.0	---	---	4.0	5.5
28---- Idabel	8.5	8.0	7.5	7.0	8.5	4.0	5.5
29---- Karma	8.0	7.0	6.5	7.0	8.5	4.0	4.5
30---- Kaufman	7.5	7.0	6.5	6.5	---	3.5	4.0
31---- Kaufman	7.0	7.0	7.0	---	---	---	---
32---- Kiomatia	6.5	---	---	6.5	7.0	3.0	4.5
33---- Larue	6.0	---	---	6.0	6.5	4.0	4.5
34---- Latanier	7.0	7.0	7.0	6.0	---	3.0	3.5
35---- Lula	6.5	5.5	4.0	5.5	---	3.0	3.5
36---- Muskogee	7.0	6.5	6.0	---	7.5	3.5	4.0
37---- Newtonia	7.5	6.0	4.5	6.5	---	3.0	3.5
38---- Oklared	7.5	6.5	5.5	7.0	7.5	4.0	4.5
39---- Panola	6.0	6.0	6.0	5.0	---	3.0	3.5
40---- Pledger	7.5	7.5	7.5	---	---	3.5	4.0
41---- Redlake	7.0	7.0	7.0	---	---	3.0	3.5
42---- Roebuck	7.0	7.0	7.0	---	---	3.0	3.5
43---- Ruston	8.0	---	---	8.0	7.5	4.0	4.5
44---- Ruston	7.5	---	---	5.5	7.5	3.5	4.0

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF PASTURE--Continued

Soil name and map symbol	Bermudagrass improved	Bermudagrass improved and tall fescue combination	Tall fescue	Bahiagrass	Weeping lovegrass	Sudangrass	Rye and ryegrass grazeout
	AUM*	AUM	AUM	AUM	AUM	AUM	AUM
45---------- Saffell	5.5	---	---	5.5	5.5	---	---
46---------- Severn	8.5	8.0	7.5	---	9.0	4.0	5.5
47---------- Smithdale	5.5	---	---	5.0	5.5	---	---
48---------- Smithdale	5.5	---	---	5.0	5.5	---	---
49---------- Speer	8.0	6.0	5.0	7.0	8.0	4.0	4.5
50**---------- Swink	---	---	---	---	---	---	---
51---------- Tenaha	7.0	---	---	7.0	7.5	---	---
52---------- Tenaha	6.0	---	---	6.0	6.5	---	---
53**:							
Tenaha----------	6.0	---	---	6.0	6.5	---	---
Kirvin----------	6.5	---	---	6.0	6.5	---	---
54**---------- Tenaha	5.0	---	---	5.0	5.5	---	---
55---------- Trinity	7.5	7.5	7.5	6.5	---	4.0	4.0
56---------- Tuscumbia	7.5	7.0	6.5	6.5	---	4.0	4.0
57---------- Udorthents	---	---	---	---	---	---	---
58---------- Whakana	7.0	---	---	6.0	---	3.0	3.5
59---------- Whakana	7.0	---	---	6.0	---	3.0	3.5
60**---------- Wrightsville	7.5	7.0	7.0	7.0	---	3.0	4.0

*An animal-unit-month is 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.

**This map unit is made up of two or more dominant kinds of soil. See map unit description for the behavior characteristics and composition of the map unit.

TABLE 6.--YIELDS PER ACRE OF CROPS

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Wheat	Grain sorghum	Soybeans	Peanuts	Cotton lint	Alfalfa hay
	Bu	Bu	Bu	Lb	Lb	Ton
1---------- Alusa	25	30	20	---	---	---
2---------- Bernow	30	55	30	1,400	550	---
3---------- Bernow	25	50	20	1,300	450	---
4---------- Bernow	---	---	---	---	---	---
5---------- Bernow	20	---	---	---	---	---
6---------- Bernow	---	---	---	---	---	---
7---------- Boggy	---	---	---	---	---	---
8---------- Bosville	25	55	30	1,450	---	---
9, 10---------- Bosville	20	---	---	---	---	---
11---------- Bosville	---	---	---	---	---	---
12---------- Burleson	30	60	25	---	450	---
13---------- Caspiana	45	70	40	1,850	875	4.0
14*:						
Clebit----------	---	---	---	---	---	---
Tuskahoma----------	---	---	---	---	---	---
15---------- Coushatta	40	65	40	---	850	3.5
16---------- Dela	30	60	30	1,500	500	3.5
17---------- Durant	35	50	28	1,200	400	---
18---------- Ferris	25	45	---	---	300	---
19---------- Ferris	25	35	---	---	250	---
20---------- Ferris	---	---	---	---	---	---
21---------- Garton	40	65	35	---	700	5.0

See footnotes at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Wheat	Grain sorghum	Soybeans	Peanuts	Cotton lint	Alfalfa hay
	Bu	Bu	Bu	Lb	Lb	Ton
22--Guyton	25	40	20	---	---	---
23--Heiden	30	55	---	---	350	---
24--Hollywood	30	55	---	---	---	---
25--Hollywood	30	55	---	---	---	---
26--Hollywood	---	---	---	---	---	---
27--Hopco	30	55	---	---	550	---
28**--Idabel	45	70	40	1,800	700	5.5
29--Karma	40	60	40	1,700	500	4.5
30--Kaufman	35	70	35	---	500	3.5
31--Kaufman	---	---	---	---	---	---
32--Kiomatia	30	40	25	1,600	400	3.5
33--Larue	20	35	20	1,200	---	---
34--Latanier	30	60	35	---	450	4.0
35--Lula	35	55	30	1,300	400	---
36--Muskogee	35	55	30	1,300	400	---
37--Newtonia	40	65	30	1,600	450	---
38**--Oklared	40	65	35	1,800	650	5.0
39--Panola	30	50	30	---	400	---
40--Pledger	35	70	30	---	500	5.0
41--Redlake	35	70	35	---	550	5.5
42--Roebuck	30	60	30	---	500	5.0
43--Ruston	30	55	30	1,400	---	---
44--Ruston	25	50	25	1,300	---	---

See footnotes at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Wheat	Grain sorghum	Soybeans	Peanuts	Cotton lint	Alfalfa hay
	Bu	Bu	Bu	Lb	Lb	Ton
45--- Saffell	30	---	---	---	---	---
46**--- Severn	45	75	40	2,000	800	5.5
47--- Smithdale	20	35	20	1,100	---	---
48--- Smithdale	20	35	25	1,000	---	---
49--- Speer	30	65	25	1,400	550	---
50--- Swink	---	---	---	---	---	---
51--- Tenaha	20	30	---	1,100	---	---
52--- Tenaha	20	30	---	1,000	---	---
53*:						
Tenaha---	---	---	---	---	---	---
Kirvin---	---	---	---	---	---	---
54--- Tenaha	---	---	---	---	---	---
55--- Trinity	---	---	---	---	---	---
56--- Tuscumbia	30	60	30	---	500	5.0
57*. Udorthents						
58--- Whakana	30	60	30	---	400	---
59--- Whakana	25	55	30	---	350	---
60--- Wrightsville	25	35	25	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.
** Yields are for areas protected from flooding.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

[Only the soils that support rangeland vegetation suitable for grazing are listed]

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
2, 3---------- Bernow	Sandy Savannah----------	Favorable	4,200	Little bluestem----------	25
		Normal	3,000	Big bluestem----------	15
		Unfavorable	2,200	Indiangrass----------	10
				Switchgrass----------	5
4*, 5*:					
Bernow----------	Sandy Savannah----------	Favorable	4,200	Little bluestem----------	25
		Normal	3,000	Big bluestem----------	15
		Unfavorable	2,200	Indiangrass----------	10
				Switchgrass----------	5
Romia----------	Sandy Savannah----------	Favorable	4,200	Little bluestem----------	25
		Normal	3,000	Big bluestem----------	20
		Unfavorable	2,200	Indiangrass----------	5
				Switchgrass----------	5
6*:					
Bernow----------	Eroded Sandy Savannah---------	Favorable	2,800	Little bluestem----------	30
		Normal	2,100	Indiangrass----------	20
		Unfavorable	1,600		
Bosville----------	Eroded Sandy Savannah---------	Favorable	2,800	Little bluestem----------	25
		Normal	2,100	Big bluestem----------	15
		Unfavorable	1,600	Indiangrass----------	20
				Switchgrass----------	5
Romia----------	Eroded Sandy Savannah---------	Favorable	2,800	Little bluestem----------	30
		Normal	2,100	Indiangrass----------	20
		Unfavorable	1,600		
8, 9, 10, 11------- Bosville	Sandy Savannah----------	Favorable	4,200	Little bluestem----------	25
		Normal	3,000	Big bluestem----------	15
		Unfavorable	2,200	Indiangrass----------	10
				Switchgrass----------	5
12---------- Burleson	Blackclay Prairie----------	Favorable	7,000	Little bluestem----------	40
		Normal	5,500	Indiangrass----------	15
		Unfavorable	4,000	Big bluestem----------	15
				Sideoats grama----------	5
				Silver bluestem----------	5
				Tall dropseed----------	5
14*:					
Clebit----------	Shallow Savannah----------	Favorable	3,200	Little bluestem----------	35
		Normal	2,400	Big bluestem----------	5
		Unfavorable	1,800	Indiangrass----------	5
Tuskahoma---------	Shallow Savannah----------	Favorable	4,000	Little bluestem----------	30
		Normal	2,800	Big bluestem----------	20
		Unfavorable	2,000	Indiangrass----------	5
				Switchgrass----------	5
17---------- Durant	Loamy Prairie----------	Favorable	6,500	Little bluestem----------	25
		Normal	4,550	Big bluestem----------	20
		Unfavorable	3,250	Indiangrass----------	10
				Switchgrass----------	10
				Canada wildrye----------	5
				Sideoats grama----------	5
				Tall dropseed----------	5
				Lespedeza----------	5
				Dotted gayfeather----------	5

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
18, 19, 20--------- Ferris	Blackclay Prairie----------	Favorable Normal Unfavorable	7,000 5,500 4,000	Little bluestem---------- Indiangrass---------- Big bluestem---------- Switchgrass---------- Florida paspalum---------- Eastern gamagrass---------- Virginia wildrye---------- Sideoats grama---------- Meadow dropseed----------	30 15 15 5 5 5 5 5 5
23---------- Heiden	Blackclay Prairie----------	Favorable Normal Unfavorable	7,000 6,000 3,500	Little bluestem---------- Big bluestem---------- Indiangrass----------	50 15 10
24, 25---------- Hollywood	Blackclay Prairie----------	Favorable Normal Unfavorable	7,000 4,900 3,500	Little bluestem---------- Indiangrass---------- Big bluestem---------- Sideoats grama---------- Silver bluestem---------- Tall dropseed----------	40 15 15 5 5 5
26*: Hollywood---------	Blackclay Prairie----------	Favorable Normal Unfavorable	7,000 4,900 3,500	Little bluestem---------- Indiangrass---------- Big bluestem---------- Sideoats grama---------- Silver bluestem---------- Tall dropseed----------	40 15 15 5 5 5
Swink----------	Shallow Prairie----------	Favorable Normal Unfavorable	3,600 2,500 1,800	Little bluestem---------- Big bluestem---------- Indiangrass---------- Switchgrass---------- Tall dropseed---------- Scribner panicum---------- Sideoats grama----------	30 15 10 10 5 5 5
33---------- Larue	Deep Sand Savannah----------	Favorable Normal Unfavorable	4,500 3,000 2,000	Little bluestem---------- Indiangrass---------- Longleaf uniola---------- Switchgrass---------- Brownseed paspalum----------	20 10 10 10 5
35---------- Lula	Loamy Prairie----------	Favorable Normal Unfavorable	7,000 5,500 4,500	Big bluestem---------- Switchgrass---------- Little bluestem---------- Indiangrass---------- Scribner panicum---------- Purpletop---------- Tall dropseed---------- Catclaw sensitivebrier--------- Goldenrod----------	35 15 10 10 5 5 5 5 5
37---------- Newtonia	Loamy Prairie----------	Favorable Normal Unfavorable	7,000 4,500 3,200	Big bluestem---------- Indiangrass---------- Little bluestem---------- Switchgrass---------- Scribner panicum----------	35 15 10 10 5
39---------- Panola	Loamy Prairie----------	Favorable Normal Unfavorable	6,500 4,700 3,500	Big bluestem---------- Little bluestem---------- Eastern gamagrass---------- Indiangrass---------- Switchgrass----------	25 20 20 15 10

See footnote at end of table.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
50*:					
Swink	Shallow Prairie	Favorable	3,600	Little bluestem	30
		Normal	2,500	Big bluestem	15
		Unfavorable	1,800	Indiangrass	10
				Switchgrass	10
				Tall dropseed	5
				Scribner panicum	5
				Sideoats grama	5
Hollywood	Blackclay Prairie	Favorable	7,000	Little bluestem	40
		Normal	4,900	Indiangrass	15
		Unfavorable	3,500	Big bluestem	15
				Sideoats grama	5
				Silver bluestem	5
				Tall dropseed	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
1---------- Alusa	3w	Slight	Severe	Severe	Water oak---------- Sweetgum----------	80 ---	Loblolly pine.
2, 3---------- Bernow	4o	Slight	Slight	Slight	Southern red oak----	60	Loblolly pine, shortleaf pine.
4*, 5*: Bernow----------	4o	Slight	Slight	Slight	Southern red oak----	60	Loblolly pine, shortleaf pine.
Romia----------	4o	Slight	Slight	Slight	Southern red oak----	60	Shortleaf pine, loblolly pine.
6*: Bernow----------	5c	Severe	Moderate	Moderate	Southern red oak----	50	Loblolly pine, shortleaf pine.
Bosville----------	5c	Severe	Moderate	Moderate	Southern red oak----	50	Shortleaf pine, loblolly pine.
Romia----------	5c	Severe	Moderate	Moderate	Southern red oak----	50	Shortleaf pine, loblolly pine.
7---------- Boggy	2w	Slight	Moderate	Slight	Shortleaf pine------ Southern red oak---- Sweetgum---------- Red maple----------	80 80 90 ---	Loblolly pine, sweetgum, shortleaf pine.
8, 9, 10, 11------- Bosville	4c	Slight	Moderate	Moderate	Southern red oak---- Black oak----------	60 60	Shortleaf pine, loblolly pine.
13---------- Caspiana	2o	Slight	Slight	Slight	Green ash---------- Eastern cottonwood-- Pecan---------- Sweetgum---------- American sycamore---	75 105 --- 90 ---	Eastern cottonwood, sweetgum, American sycamore.
14*: Clebit----------	5x	Moderate	Moderate	Moderate	Shortleaf pine------ Eastern redcedar----	40 30	Shortleaf pine, eastern redcedar.
Tuskahoma---------	5d	Moderate	Moderate	Moderate	Shortleaf pine------ Eastern redcedar----	50 30	Shortleaf pine, eastern redcedar.
15---------- Coushatta	2o	Slight	Slight	Slight	Eastern cottonwood-- Pecan---------- Sweetgum---------- American sycamore--- Cherrybark oak------ Water oak----------	100 --- 90 --- --- ---	Eastern cottonwood, American sycamore.
16---------- Dela	2o	Slight	Slight	Slight	Southern red oak---- Sweetgum---------- Eastern cottonwood-- Shortleaf pine------	80 90 100 80	Loblolly pine, shortleaf pine, black walnut, southern red oak.
21---------- Garton	2o	Slight	Slight	Slight	Eastern cottonwood-- American sycamore--- Sweetgum---------- Black walnut-------- Common hackberry---- Pecan----------	100 --- --- --- --- ---	Eastern cottonwood, American sycamore, sweetgum, black walnut, green ash, pecan.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
22---------- Guyton	2w	Slight	Severe	Moderate	Sweetgum---------- Green ash---------- Southern red oak---- Water oak----------	90 --- --- ---	Loblolly pine, sweetgum.
27---------- Hopco	2w	Slight	Moderate	Slight	Pecan---------- Eastern cottonwood-- Water oak---------- Willow oak----------	--- 100 90 ---	Eastern cottonwood, water oak, green ash.
28---------- Idabel	2o	Slight	Slight	Slight	Eastern cottonwood-- Pecan---------- Common hackberry----	100 75 75	Eastern cottonwood, pecan, American sycamore, black walnut, sweetgum.
29---------- Karma	3o	Slight	Slight	Slight	Eastern cottonwood-- Pecan---------- Green ash---------- Black walnut--------	90 --- --- ---	Eastern cottonwood, black walnut, Shumard oak, pecan, green ash, American sycamore.
30, 31---------- Kaufman	2w	Slight	Moderate	Moderate	Eastern cottonwood-- Sweetgum---------- Water oak---------- Green ash----------	100 90 --- ---	Eastern cottonwood, green ash, pecan, sweetgum.
32---------- Kiomatia	2w	Slight	Moderate	Moderate	Eastern cottonwood-- Sweetgum----------	100 95	Eastern cottonwood, sweetgum, black walnut, American sycamore.
33---------- Larue	4s	Slight	Moderate	Moderate	Shortleaf pine------ Southern red oak---- Sweetgum----------	70 --- ---	Loblolly pine, shortleaf pine.
34---------- Latanier	2w	Slight	Moderate	Moderate	Green ash---------- Water oak---------- Pecan---------- Sweetgum---------- Eastern cottonwood-- American sycamore---	80 90 --- 90 100 ---	Eastern cottonwood, American sycamore.
36---------- Muskogee	3o	Slight	Slight	Slight	Shortleaf pine------ Sweetgum---------- Southern red oak----	70 80 ---	Loblolly pine, shortleaf pine, Shumard oak, sweetgum.
38---------- Oklared	2o	Slight	Slight	Slight	Eastern cottonwood-- Pecan---------- Common hackberry----	100 75 75	Eastern cottonwood, American sycamore, pecan, black walnut,
40---------- Pledger	3c	Slight	Moderate	Severe	Pecan---------- Eastern cottonwood-- Green ash----------	--- 90 ---	Pecan, eastern cottonwood.
41---------- Redlake	3w	Slight	Severe	Moderate	Eastern cottonwood-- Pecan---------- Black walnut-------- Green ash----------	90 --- --- ---	Eastern cottonwood, pecan, American sycamore, green ash.
42---------- Roebuck	3w	Slight	Moderate	Moderate	Eastern cottonwood-- Green ash---------- Pecan----------	90 --- ---	Eastern cottonwood, green ash, pecan, bur oak.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
43, 44---------- Ruston	3o	Slight	Slight	Slight	Shortleaf pine------	75	Loblolly pine.
45---------- Saffell	4f	Slight	Slight	Moderate	Shortleaf pine------ Eastern redcedar----	60 ---	Loblolly pine, shortleaf pine, eastern redcedar.
46---------- Severn	2o	Slight	Slight	Slight	Eastern cottonwood-- Pecan---------- Common hackberry----	100 76 76	Eastern cottonwood, American sycamore, pecan, black walnut, sweetgum.
47, 48---------- Smithdale	3o	Slight	Slight	Slight	Shortleaf pine------	69	Loblolly pine.
49---------- Speer	2o	Slight	Slight	Slight	Southern red oak---- Sweetgum---------- Shortleaf pine------	80 90 80	Loblolly pine, shortleaf pine, black walnut, southern red oak.
51, 52---------- Tenaha	3s	Slight	Slight	Moderate	Shortleaf pine------	70	Shortleaf pine, loblolly pine.
53*: Tenaha----------	3s	Slight	Slight	Moderate	Shortleaf pine------	70	Shortleaf pine, loblolly pine.
Kirvin----------	3o	Slight	Slight	Slight	Shortleaf pine------	70	Loblolly pine, shortleaf pine.
54*: Tenaha.							
Smithdale---------	3o	Slight	Slight	Slight	Shortleaf pine------	69	Loblolly pine.
55---------- Trinity	2w	Slight	Severe	Moderate	Eastern cottonwood-- Pin oak---------- Green ash----------	100 --- ---	Eastern cottonwood, green ash.
56---------- Tuscumbia	2w	Slight	Moderate	Severe	Eastern cottonwood-- Green ash---------- Sweetgum----------	100 95 85	Eastern cottonwood, green ash, sweetgum.
58, 59---------- Whakana	3o	Slight	Slight	Slight	Shortleaf pine------ Sweetgum---------- Southern red oak----	70 80 70	Loblolly pine, sweetgum, southern red oak.
60*: Wrightsville------	3w	Slight	Severe	Moderate	Sweetgum---------- Water oak----------	80 80	Loblolly pine, sweetgum, water oak, willow oak.
Elysian----------	2o	Slight	Slight	Slight	Shortleaf pine------ Sweetgum---------- Southern red oak----	80 --- ---	Loblolly pine, sweetgum, cherrybark oak, black walnut, American sycamore.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION

[Only the soils suitable for production of commercial trees are listed]

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
1----------	Favorable	1,300	Panicum----------	15
Alusa	Normal	1,000	Sedge----------	15
	Unfavorable	600	Broadleaf uniola----------	10
			Little bluestem----------	5
2, 3----------	Favorable	2,100	Little bluestem----------	15
Bernow	Normal	1,500	Big bluestem----------	10
	Unfavorable	1,100	Indiangrass----------	5
			Switchgrass----------	5
4*, 5*:				
Bernow----------	Favorable	2,100	Little bluestem----------	15
	Normal	1,500	Big bluestem----------	10
	Unfavorable	1,100	Indiangrass----------	5
			Switchgrass----------	5
Romia----------	Favorable	2,100	Little bluestem----------	15
	Normal	1,500	Big bluestem----------	10
	Unfavorable	1,100	Indiangrass----------	5
			Switchgrass----------	5
6*:				
Bernow----------	Favorable	1,600	Little bluestem----------	25
	Normal	1,200	Indiangrass----------	5
	Unfavorable	900	Switchgrass----------	5
Bosville----------	Favorable	1,600	Little bluestem----------	25
	Normal	1,200	Indiangrass----------	5
	Unfavorable	900	Switchgrass----------	5
Romia----------	Favorable	1,600	Little bluestem----------	25
	Normal	1,200	Indiangrass----------	5
	Unfavorable	900	Switchgrass----------	5
7----------	Favorable	3,000	Little bluestem----------	10
Boggy	Normal	2,100	Wildrye----------	10
	Unfavorable	1,600	Uniola----------	10
			Giant cane----------	10
			Switchgrass----------	5
			Sedge----------	5
8, 9, 10, 11-------	Favorable	2,300	Little bluestem----------	15
Bosville	Normal	1,700	Big bluestem----------	10
	Unfavorable	1,300	Indiangrass----------	5
			Switchgrass----------	5
13----------	Favorable	4,500	Big bluestem----------	20
Caspiana	Normal	3,000	Indiangrass----------	20
	Unfavorable	2,000	Little bluestem----------	10
14*:				
Clebit----------	Favorable	1,200	Little bluestem----------	20
	Normal	800	Big bluestem----------	10
	Unfavorable	500	Muhly----------	5
Tuskahoma---------	Favorable	1,400	Little bluestem----------	20
	Normal	900	Big bluestem----------	10
	Unfavorable	600	Indiangrass----------	5
			Switchgrass----------	5

See footnote at end of table.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
15---------- Coushatta	Favorable	4,300	Little bluestem----------	15
	Normal	3,000	Big bluestem----------	10
	Unfavorable	2,000	Canada wildrye----------	10
16---------- Dela	Favorable	4,000	Big bluestem----------	5
	Normal	3,100	Little bluestem----------	15
	Unfavorable	2,500	Panicum----------	10
21---------- Garton	Favorable	2,800	Canada wildrye----------	15
	Normal	1,800	Sedge----------	10
	Unfavorable	1,200	Beaked panicum----------	10
			Little bluestem----------	10
			Broadleaf uniola----------	10
22---------- Guyton	Favorable	2,400	Little bluestem----------	20
	Normal	1,800	Virginia wildrye----------	10
	Unfavorable	1,400	Broadleaf uniola----------	10
27---------- Hopco	Favorable	4,500	Longleaf uniola----------	15
	Normal	3,000	Virginia wildrye----------	10
	Unfavorable	2,000	Beaked panicum----------	10
			Little bluestem----------	10
			Sedge----------	10
			Giant cane----------	5
28---------- Idabel	Favorable	4,500	Little bluestem----------	15
	Normal	3,000	Wildrye----------	10
	Unfavorable	2,000	Uniola----------	10
			Giant cane----------	10
			Switchgrass----------	5
29---------- Karma	Favorable	2,800	Big bluestem----------	25
	Normal	2,000	Indiangrass----------	15
	Unfavorable	1,500	Little bluestem----------	10
			Switchgrass----------	5
			Beaked panicum----------	5
30---------- Kaufman	Favorable	2,700	Little bluestem----------	10
	Normal	2,000	Wildrye----------	15
	Unfavorable	1,500	Sedge----------	15
31---------- Kaufman	Favorable	2,400	Sedge----------	20
	Normal	1,600	Longleaf uniola----------	10
	Unfavorable	1,000	Wildrye----------	10
32---------- Kiomatia	Favorable	5,000	Beaked panicum----------	20
	Normal	4,000	Giant cane----------	20
	Unfavorable	2,500	Sedge----------	10
			Virginia wildrye----------	10
			Longleaf uniola----------	5
33---------- Larue	Favorable	3,000	Little bluestem----------	20
	Normal	2,500	Indiangrass----------	10
	Unfavorable	2,000	Longleaf uniola----------	10
			Switchgrass----------	10
			Purpletop----------	5
			Purple lovegrass----------	5
34---------- Latanier	Favorable	3,000	Switchgrass----------	10
	Normal	2,100	Indiangrass----------	5
	Unfavorable	1,500	Prairie cordgrass----------	20

See footnote at end of table.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
36---------- Muskogee	Favorable	2,500	Beaked panicum----------	12
	Normal	1,700	Lespedeza----------	10
	Unfavorable	1,000	Virginia wildrye----------	8
			Panicum----------	5
			Sedge----------	5
38---------- Oklared	Favorable	4,300	Little bluestem----------	15
	Normal	3,000	Canada wildrye----------	10
	Unfavorable	2,000	Broadleaf uniola----------	10
			Giant cane----------	10
			Switchgrass----------	5
			Big bluestem----------	5
			Beaked panicum----------	5
			Sedge----------	5
40---------- Pledger	Favorable	3,000	Virginia wildrye----------	20
	Normal	2,100	Panicum----------	20
	Unfavorable	1,500	Sedge----------	15
			Eastern gamagrass----------	10
			Switchgrass----------	5
			Longleaf uniola----------	5
			Giant cane----------	5
			Little bluestem----------	5
41---------- Redlake	Favorable	3,200	Giant cane----------	15
	Normal	2,400	Canada wildrye----------	10
	Unfavorable	1,800	Sedge----------	10
			Switchgrass----------	10
			Indiangrass----------	10
			Broadleaf uniola----------	5
			Eastern gamagrass----------	5
42---------- Roebuck	Favorable	3,000	Sedge----------	15
	Normal	2,100	Switchgrass----------	10
	Unfavorable	1,500	Big bluestem----------	10
			Scribner panicum----------	10
43, 44---------- Ruston	Favorable	1,800	Longleaf uniola----------	50
	Normal	1,200	Little bluestem----------	15
	Unfavorable	900	Beaked panicum----------	10
			Panicum----------	10
45---------- Saffell	Favorable	1,500	Bluestem----------	20
	Normal	1,000	Uniola----------	15
	Unfavorable	500	Virginia wildrye----------	10
			Beaked panicum----------	10
			Indiangrass----------	5
			Panicum----------	5
			Sedge----------	5
46---------- Severn	Favorable	4,500	Little bluestem----------	15
	Normal	3,000	Big bluestem----------	10
	Unfavorable	2,000	Canada wildrye----------	10
			Panicum----------	10
			Indiangrass----------	5
			Switchgrass----------	5
			Sedge----------	5
			Scribner panicum----------	5
47, 48---------- Smithdale	Favorable	1,700	Longleaf uniola----------	15
	Normal	1,200	Little bluestem----------	17
	Unfavorable	700	Beaked panicum----------	12
			Panicum----------	12

See footnote at end of table.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
49---------- Speer	Favorable	4,000	Little bluestem----------	15
	Normal	3,100	Sedge----------	10
	Unfavorable	2,500	Panicum----------	10
			Big bluestem----------	5
			Indiangrass----------	5
			Post oak----------	5
			Southern red oak----------	5
			Shortleaf pine----------	5
			White oak----------	5
			Sweetgum----------	5
51, 52---------- Tenaha	Favorable	2,500	Little bluestem----------	20
	Normal	2,000	Big bluestem----------	15
	Unfavorable	1,250	Longleaf uniola----------	15
			Switchgrass----------	10
			Indiangrass----------	5
			Purpletop----------	5
53*:				
Tenaha----------	Favorable	2,500	Little bluestem----------	20
	Normal	2,000	Big bluestem----------	15
	Unfavorable	1,250	Longleaf uniola----------	15
			Switchgrass----------	10
			Indiangrass----------	5
			Purpletop----------	5
Kirvin----------	Favorable	2,500	Longleaf uniola----------	15
	Normal	1,750	Pinehill bluestem----------	10
	Unfavorable	1,250	Beaked panicum----------	10
			Purpletop----------	10
			Giant cane----------	10
			Brownseed paspalum----------	10
			Big bluestem----------	5
			Indiangrass----------	5
54*:				
Tenaha----------	Favorable	2,000	Little bluestem----------	15
	Normal	1,400	Longleaf uniola----------	10
	Unfavorable	1,000	Muhly----------	10
Smithdale---------	Favorable	1,500	Longleaf uniola----------	30
	Normal	1,200	Little bluestem----------	17
	Unfavorable	700	Beaked panicum----------	12
			Panicum----------	12
55---------- Trinity	Favorable	2,700	Virginia wildrye----------	15
	Normal	2,000	Sedge----------	15
	Unfavorable	1,500	Eastern gamagrass----------	10
			Switchgrass----------	10
			Indiangrass----------	10
			Giant cane----------	5
			Beaked panicum----------	5
			Panicum----------	5
56----------	Favorable	3,000	Virginia wildrye----------	20
	Normal	2,100	Panicum----------	20
	Unfavorable	1,500	Sedge----------	15
58, 59---------- Whakana	Favorable	2,500	Longleaf uniola----------	20
	Normal	1,900	Little bluestem----------	10
	Unfavorable	1,500	Panicum----------	10
			Beaked panicum----------	5
			Purpletop----------	5
			Gayfeather----------	5
			Sedge----------	5

See footnote at end of table.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
60*:				
Wrightsville	Favorable	3,000	Plumegrass	15
	Normal	2,000	Switchgrass	10
	Unfavorable	1,250	Beaked panicum	10
			Uniola	10
			Paspalum	5
			Panicum	5
			Velvet panicum	5
			Sedge	5
			Blueberry	5
Elysian	Favorable	3,450	Little bluestem	15
	Normal	2,600	Panicum	10
	Unfavorable	2,000	Big bluestem	5
			Indiangrass	5
			Broadleaf uniola	5
			Sedge	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
1 Alusa	Severe: wetness, too clayey.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, low strength, shrink-swell.
2 Bernow	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.
3 Bernow	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.
4*: Bernow	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: low strength, shrink-swell, slope.
Romia	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.
5*: Bernow	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, slope.
Romia	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
6*: Bernow	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.
Bosville	Severe: too clayey, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: low strength, wetness, shrink-swell.	Severe: low strength, shrink-swell.
Romia	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
7 Boggy	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
8, 9, 10 Bosville	Severe: too clayey, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: low strength, wetness, shrink-swell.	Severe: low strength, shrink-swell.
11 Bosville	Severe: too clayey, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, slope, wetness.	Severe: low strength, shrink-swell.
12 Burleson	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, corrosive.	Severe: shrink-swell.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
13---------- Caspiana	Slight----------	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.
14*: Clebit----------	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, large stones.
Tuskahoma--------	Severe: wetness, too clayey.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: slope, wetness, shrink-swell.	Severe: low strength, shrink-swell.
15---------- Coushatta	Slight----------	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: low strength, shrink-swell.
16---------- Dela	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
17---------- Durant	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
18, 19, 20-------- Ferris	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
21---------- Garton	Severe: wetness, too clayey.	Severe: floods, shrink-swell, low strength.	Severe: wetness, floods, shrink-swell.	Severe: floods, shrink-swell, low strength.	Severe: low strength, shrink-swell.
22---------- Guyton	Severe: floods, wetness, cutbanks cave.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
23---------- Heiden	Severe: cutbanks cave, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.
24, 25---------- Hollywood	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
26*: Hollywood--------	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Swink----------	Severe: too clayey, depth to rock.	Severe: low strength, shrink-swell, depth to rock.	Severe: shrink-swell, low strength, depth to rock.	Severe: low strength, shrink-swell, depth to rock.	Severe: depth to rock, low strength, shrink-swell.
27---------- Hopco	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
28---------- Idabel	Slight----------	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: low strength.
29---------- Karma	Slight----------	Slight----------	Slight----------	Slight----------	Moderate: low strength.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
30--Kaufman	Severe: too clayey, wetness.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.
31--Kaufman	Severe: too clayey, wetness.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.
32--Kiomatia	Severe: too sandy.	Severe: floods.	Severe: floods.	Severe: floods.	Slight.
33--Larue	Slight	Slight	Slight	Slight	Slight.
34--Latanier	Severe: floods, wetness, too clayey.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: shrink-swell, low strength.
35--Lula	Moderate: too clayey, depth to rock.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength, shrink-swell.
36--Muskogee	Severe: too clayey, wetness.	Severe: low strength, shrink-swell, wetness.	Severe: low strength, shrink-swell, wetness.	Severe: low strength, shrink-swell, wetness.	Severe: low strength, shrink-swell.
37--Newtonia	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: low strength, shrink-swell.
38--Oklared	Moderate: wetness.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: low strength.
39--Panola	Severe: wetness, too clayey.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: low strength, shrink-swell, wetness.
40--Pledger	Severe: too clayey, wetness.	Severe: wetness, shrink-swell, floods.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: low strength, shrink-swell.
41--Redlake	Severe: floods, too clayey.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: low strength, shrink-swell.
42--Roebuck	Severe: floods, too clayey.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.
43--Ruston	Slight	Slight	Slight	Slight	Moderate: low strength.
44--Ruston	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
45--Saffell	Severe: small stones.	Slight	Slight	Moderate: slope.	Slight.
46--Severn	Slight	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: low strength.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
47---------- Smithdale	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
48---------- Smithdale	Slight----------	Slight----------	Slight----------	Moderate: slope.	Slight.
49---------- Speer	Moderate: too clayey, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: low strength, floods.
50*: Swink----------	Severe: too clayey, depth to rock.	Severe: low strength, shrink-swell, depth to rock.	Severe: shrink-swell, low strength, depth to rock.	Severe: low strength, shrink-swell, depth to rock.	Severe: depth to rock, low strength, shrink-swell.
Hollywood--------	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
51---------- Tenaha	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
52---------- Tenaha	Slight----------	Slight----------	Slight----------	Moderate: slope.	Slight.
53*: Tenaha----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Kirvin----------	Moderate: too clayey, slope, depth to rock.	Moderate: slope, low strength, shrink-swell.	Moderate: low strength, slope, shrink-swell.	Severe: slope.	Severe: low strength.
54*: Tenaha----------	Slight----------	Slight----------	Slight----------	Moderate: slope.	Slight.
Smithdale--------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
55---------- Trinity	Severe: wetness, floods, too clayey.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell.
56---------- Tuscumbia	Severe: wetness, floods.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.
57*. Udorthents					
58---------- Whakana	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
59---------- Whakana	Slight----------	Slight----------	Slight----------	Moderate: slope.	Moderate: slope.
60*: Wrightsville-----	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.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
60*: Elysian	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Moderate: low strength.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1 Alusa	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey, hard to pack.
2, 3 Bernow	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
4*: Bernow	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Fair: slope.
Romia	Moderate: percs slowly, depth to rock, slope.	Severe: slope.	Moderate: depth to rock.	Moderate: slope.	Fair: too clayey, slope.
5*: Bernow	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
Romia	Moderate: percs slowly, depth to rock.	Moderate: seepage, slope.	Moderate: depth to rock.	Slight	Fair: too clayey, thin layer, area reclaim.
6*: Bernow	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
Bosville	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
Romia	Moderate: percs slowly, depth to rock.	Moderate: seepage, slope.	Moderate: depth to rock.	Slight	Fair: too clayey, thin layer, area reclaim.
7 Boggy	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
8, 9, 10 Bosville	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
11 Bosville	Severe: percs slowly, wetness.	Severe: wetness, slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
12 Burleson	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
13 Caspiana	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

TABLE 11.--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
14*:					
Clebit	Severe: depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: seepage, depth to rock, large stones.	Severe: seepage.	Poor: thin layer, small stones, large stones.
Tuskahoma	Severe: percs slowly, wetness.	Severe: wetness, depth to rock, slope.	Severe: too clayey.	Severe: wetness.	Poor: too clayey, thin layer.
15--- Coushatta	Moderate: percs slowly, floods.	Moderate: seepage.	Moderate: too clayey, floods.	Moderate: floods.	Fair: too clayey.
16--- Dela	Severe: wetness, floods.	Severe: seepage, floods.	Severe: wetness, floods, seepage.	Severe: floods, seepage.	Good.
17--- Durant	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
18, 19--- Ferris	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
20--- Ferris	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
21--- Garton	Severe: percs slowly, wetness.	Severe: wetness, floods.	Severe: too clayey.	Severe: wetness.	Poor: too clayey.
22--- Guyton	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
23--- Heiden	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
24--- Hollywood	Severe: percs slowly.	Slight	Severe: too clayey, depth to rock.	Slight	Poor: too clayey.
25--- Hollywood	Severe: percs slowly.	Moderate: slope.	Severe: too clayey, depth to rock.	Slight	Poor: too clayey.
26*:					
Hollywood	Severe: percs slowly.	Moderate: slope.	Severe: too clayey, depth to rock.	Slight	Poor: too clayey.
Swink	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: too clayey, depth to rock.	Slight	Poor: too clayey, thin layer.
27--- Hopco	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Fair: too clayey.
28--- Idabel	Moderate: floods.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
29--- Karma	Slight	Severe: seepage.	Severe: seepage.	Slight	Slight.

See footnote at end of table.

TABLE 11.--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
30--Kaufman	Severe: percs slowly, floods.	Slight	Severe: floods, too clayey, wetness.	Severe: floods.	Poor: too clayey, wetness.
31--Kaufman	Severe: percs slowly, floods.	Slight	Severe: floods, too clayey, wetness.	Severe: floods.	Poor: too clayey, wetness.
32--Kiomatia	Moderate: floods.	Severe: floods, seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
33--Larue	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Fair: too sandy.
34--Latanier	Severe: floods, percs slowly, wetness.	Severe: floods.	Severe: floods, wetness, too clayey.	Severe: floods, wetness.	Poor: too clayey.
35--Lula	Moderate: depth to rock.	Moderate: seepage, depth to rock.	Severe: depth to rock.	Slight	Fair: too clayey.
36--Muskogee	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Fair: thin layer, too clayey.
37--Newtonia	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Fair: too clayey.
38--Oklared	Severe: wetness.	Severe: wetness, seepage.	Severe: seepage.	Severe: seepage.	Good.
39--Panola	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, wetness.	Severe: wetness.	Poor: thin layer, too clayey, wetness.
40--Pledger	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
41--Redlake	Severe: percs slowly, floods.	Severe: floods.	Severe: floods, too clayey.	Severe: floods.	Poor: hard to pack, too clayey.
42--Roebuck	Severe: percs slowly, floods.	Severe: floods.	Severe: floods, too clayey.	Severe: floods.	Poor: too clayey.
43, 44--Ruston	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
45--Saffell	Slight	Moderate: slope, seepage.	Slight	Slight	Poor: small stones.
46--Severn	Moderate: floods.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.

See footnote at end of table.

TABLE 11.--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
47--Smithdale	Moderate: slope.	Severe: seepage, slope.	Slight	Moderate: slope.	Fair: slope.
48--Smithdale	Slight	Severe: seepage, slope.	Slight	Slight	Good.
49--Speer	Moderate: floods, percs slowly.	Severe: floods.	Moderate: floods, too clayey.	Moderate: floods.	Fair: too clayey.
50*:					
Swink	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: too clayey, depth to rock.	Slight	Poor: too clayey, thin layer.
Hollywood	Severe: percs slowly.	Severe: slope.	Severe: too clayey, depth to rock.	Slight	Poor: too clayey.
51, 52--Tenaha	Moderate: depth to rock.	Moderate: seepage.	Moderate: depth to rock.	Slight	Fair: too sandy.
53*:					
Tenaha	Moderate: depth to rock, slope.	Severe: slope.	Moderate: depth to rock.	Moderate: slope.	Fair: too sandy.
Kirvin	Severe: percs slowly.	Severe: slope.	Moderate: too clayey, depth to rock.	Moderate: slope.	Fair: too clayey.
54*:					
Tenaha	Moderate: depth to rock.	Moderate: seepage.	Moderate: depth to rock.	Slight	Fair: too sandy.
Smithdale	Moderate: slope.	Severe: seepage, slope.	Slight	Moderate: slope.	Fair: slope.
55--Trinity	Severe: wetness, floods, percs slowly.	Severe: wetness, floods.	Severe: floods, too clayey, wetness.	Severe: floods, wetness.	Poor: too clayey.
56--Tuscumbia	Severe: percs slowly, floods.	Severe: wetness, floods.	Severe: wetness, too clayey, floods.	Severe: wetness, floods.	Poor: wetness, too clayey.
57*. Udorthents					
58, 59--Whakana	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
60*:					
Wrightsville	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
Elysian	Severe: wetness.	Moderate: seepage.	Slight	Moderate: wetness.	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1---------- Alusa	Poor: low strength, shrink-swell, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
2, 3---------- Bernow	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
4*:				
Bernow----------	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
Romia----------	Fair: low strength, thin layer, area reclaim.	Poor: excess fines.	Poor: excess fines.	Fair: slope.
5*:				
Bernow----------	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Romia----------	Fair: low strength, thin layer, area reclaim.	Poor: excess fines.	Poor: excess fines.	Fair: slope, thin layer.
6*:				
Bernow----------	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Bosville----------	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Romia----------	Fair: low strength, thin layer, area reclaim.	Poor: excess fines.	Poor: excess fines.	Fair: thin layer.
7---------- Boggy	Severe: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
8, 9, 10, 11---------- Bosville	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
12---------- Burleson	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
13---------- Caspiana	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
14*:				
Clebit----------	Poor: thin layer, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones, large stones.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
14*: Tuskahoma	Poor: shrink-swell, low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
15--- Coushatta	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
16--- Dela	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
17--- Durant	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
18, 19, 20--- Ferris	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
21--- Garton	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
22--- Guyton	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
23--- Heiden	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
24, 25--- Hollywood	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
26*: Hollywood	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Swink	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
27--- Hopco	Fair: shrink-swell, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
28--- Idabel	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
29--- Karma	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
30, 31--- Kaufman	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
32--- Kiomatia	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
33--- Larue	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: too sandy.
34--- Latanier	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
35--Lula	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
36--Muskogee	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
37--Newtonia	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
38--Oklared	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
39--Panola	Poor: thin layer, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
40--Pledger	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
41--Redlake	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
42--Roebuck	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
43, 44--Ruston	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
45--Saffell	Good	Poor: excess fines.	Fair: excess fines.	Poor: small stones.
46--Severn	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
47--Smithdale	Good	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
48--Smithdale	Good	Unsuited: excess fines.	Unsuited: excess fines.	Good.
49--Speer	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
50*:				
Swink	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Hollywood	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
51, 52--Tenaha	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
53*:				
Tenaha	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Kirvin	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
54*:				
Tenaha	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Smithdale	Good	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
55--- Trinity	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
56--- Tuscumbia	Poor: shrink-swell, low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, too clayey.
57*. Udorthents				
58, 59--- Whakana	Good	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
60*:				
Wrightsville	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Elysian	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
1---------- Alusa	Slight---------	Moderate: compressible, unstable fill.	Severe: slow refill.	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
2, 3---------- Bernow	Moderate: seepage.	Slight---------	Severe: deep to water.	Not needed-----	Favorable------	Favorable.
4*: Bernow----------	Moderate: seepage.	Slight---------	Severe: deep to water.	Not needed-----	Slope----------	Slope.
Romia----------	Moderate: seepage, depth to rock.	Moderate: thin layer.	Severe: no water.	Not needed-----	Favorable------	Slope.
5*: Bernow----------	Moderate: seepage.	Slight---------	Severe: deep to water.	Not needed-----	Favorable------	Favorable.
Romia----------	Moderate: seepage, depth to rock.	Moderate: thin layer.	Severe: no water.	Not needed-----	Favorable------	Favorable.
6*: Bernow----------	Moderate: seepage.	Slight---------	Severe: deep to water.	Not needed-----	Favorable------	Favorable.
Bosville---------	Slight---------	Moderate: unstable fill, compressible, shrink-swell.	Severe: deep to water, slow refill.	Percs slowly, slope, wetness.	Percs slowly, slope, wetness.	Percs slowly, slope, wetness.
Romia----------	Moderate: seepage, depth to rock.	Moderate: thin layer.	Severe: no water.	Not needed-----	Favorable------	Favorable.
7---------- Boggy	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Floods---------	Not needed-----	Wetness.
8, 9, 10, 11------ Bosville	Slight---------	Moderate: unstable fill, compressible, shrink-swell.	Severe: deep to water, slow refill.	Percs slowly, slope, wetness.	Percs slowly, slope, wetness.	Percs slowly, slope, wetness.
12---------- Burleson	Slight---------	Moderate: unstable fill, hard to pack.	Severe: deep to water.	Percs slowly---	Percs slowly---	Percs slowly.
13---------- Caspiana	Moderate: seepage.	Slight---------	Severe: no water.	Favorable------	Not needed-----	Favorable.
14*: Clebit----------	Severe: depth to rock, seepage.	Severe: thin layer, large stones.	Severe: no water, large stones.	Not needed-----	Large stones, slope, depth to rock.	Large stones, depth to rock, droughty.
Tuskahoma--------	Severe: depth to rock.	Severe: thin layer.	Depth to rock, slow refill.	Percs slowly, depth to rock, slope.	Depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
15---------- Coushatta	Moderate: seepage.	Slight---------	Severe: no water.	Favorable------	Not needed-----	Favorable.
16---------- Dela	Severe: seepage.	Moderate: unstable fill, seepage.	Moderate: deep to water.	Floods---------	Not needed-----	Not needed.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
17---- Durant	Slight	Severe: piping, compressible.	Severe: no water.	Not needed	Percs slowly	Percs slowly.
18, 19, 20---- Ferris	Slight	Moderate: unstable fill.	Severe: no water.	Not needed	Percs slowly, erodes easily.	Percs slowly, erodes easily.
21---- Garton	Moderate: seepage.	Moderate: unstable fill, piping.	Severe: slow refill.	Percs slowly	Percs slowly	Percs slowly.
22---- Guyton	Slight	Moderate: erodes easily, low strength, compressible.	Severe: no water.	Cutbanks cave, floods, percs slowly.	Not needed	Wetness.
23---- Heiden	Slight	Moderate: unstable fill, shrink-swell.	Severe: no water.	Not needed	Percs slowly	Percs slowly.
24, 25---- Hollywood	Moderate: depth to rock.	Moderate: hard to pack.	Severe: no water, slow refill.	Percs slowly	Percs slowly, erodes easily.	Percs slowly, erodes easily.
26*: Hollywood----	Moderate: depth to rock.	Moderate: hard to pack.	Severe: no water, slow refill.	Percs slowly	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Swink----	Severe: depth to rock.	Severe: thin layer.	Severe: deep to water.	Not needed	Depth to rock, percs slowly.	Rooting depth, large stones.
27---- Hopco	Moderate: seepage.	Moderate: compressible.	Severe: deep to water.	Floods	Not needed	Not needed.
28---- Idabel	Severe: seepage.	Moderate: unstable fill, piping.	Severe: deep to water.	Not needed	Not needed	Not needed.
29---- Karma	Severe: seepage.	Severe: piping.	Severe: no water.	Not needed	Not needed	Erodes easily, slope.
30, 31---- Kaufman	Slight	Moderate: low strength.	Severe: deep to water.	Floods, percs slowly, wetness.	Percs slowly	Percs slowly.
32---- Kiomatia	Severe: seepage.	Severe: piping.	Severe: deep to water.	Cutbanks cave	Too sandy	Favorable.
33---- Larue	Moderate: seepage.	Slight	Severe: no water.	Not needed	Too sandy	Slope, droughty.
34---- Latanier	Slight	Moderate: shrink-swell, low strength, compressible.	Severe: no water.	Floods	Not needed	Favorable.
35---- Lula	Moderate: thin layer, seepage.	Moderate: thin layer, piping.	Severe: no water.	Not needed	Favorable	Favorable.
36---- Muskogee	Slight	Moderate: hard to pack, wetness.	Severe: slow refill.	Percs slowly, slope.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
37---- Newtonia	Moderate: seepage.	Moderate: compressible, unstable fill.	Severe: no water.	Not needed	Favorable	Favorable.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
38--Oklared	Severe: seepage.	Moderate: unstable fill, piping.	Moderate: deep to water.	Not needed	Not needed	Not needed.
39--Panola	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly, wetness.	Percs slowly, erodes easily, wetness.	Wetness, erodes easily, percs slowly.
40--Pledger	Slight	Moderate: low strength.	Severe: deep to water.	Percs slowly, wetness.	Slow intake, wetness.	Wetness.
41--Redlake	Slight	Moderate: unstable fill, compressible.	Severe: deep to water.	Floods, percs slowly.	Percs slowly	Percs slowly.
42--Roebuck	Slight	Moderate: hard to pack.	Severe: no water, slow refill.	Not needed	Not needed	Percs slowly.
43, 44--Ruston	Moderate: seepage.	Slight	Severe: no water.	Not needed	Favorable	Favorable.
45--Saffell	Moderate: seepage.	Moderate: seepage, piping, thin layer.	Severe: no water.	Not needed	Erodes easily, slope, small stones.	Droughty, erodes easily, slope.
46--Severn	Severe: seepage.	Moderate: unstable fill, piping, compressible.	Severe: deep to water.	Not needed	Favorable	Favorable.
47--Smithdale	Severe: seepage.	Moderate: piping, unstable fill.	Severe: no water.	Not needed, slope.	Slope, erodes easily.	Slope, erodes easily.
48--Smithdale	Severe: seepage.	Moderate: piping, unstable fill.	Severe: no water.	Not needed, slope.	Favorable	Favorable.
49--Speer	Moderate: seepage.	Slight	Severe: no water.	Not needed	Favorable	Favorable.
50*:						
Swink	Severe: depth to rock.	Severe: thin layer.	Severe: deep to water.	Not needed	Depth to rock, percs slowly.	Rooting depth, large stones.
Hollywood	Moderate: depth to rock.	Moderate: hard to pack.	Severe: no water, slow refill.	Percs slowly	Percs slowly, erodes easily.	Percs slowly, erodes easily.
51, 52--Tenaha	Moderate: seepage.	Moderate: piping.	Severe: no water.	Not needed	Erodes easily, slope.	Droughty, slope.
53*:						
Tenaha	Moderate: seepage.	Moderate: piping.	Severe: no water.	Not needed	Erodes easily, slope.	Droughty, slope.
Kirvin	Moderate: seepage.	Moderate: unstable fill, low strength.	Severe: no water.	Not needed	Complex slope, erodes easily.	Favorable.
54*:						
Tenaha	Moderate: seepage.	Moderate: piping.	Severe: no water.	Not needed	Erodes easily, slope.	Droughty, slope.
Smithdale	Severe: seepage.	Moderate: piping, unstable fill.	Severe: no water.	Not needed, slope.	Slope, erodes easily.	Slope, erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
55---------- Trinity	Slight---------	Moderate: compressible, unstable fill.	Severe: deep to water.	Percs slowly, floods.	Floods, wetness, percs slowly.	Floods, wetness, percs slowly.
56---------- Tuscumbia	Slight---------	Moderate: unstable fill.	Severe: deep to water, slow refill.	Floods, percs slowly.	Not needed-----	Percs slowly, wetness.
57*. Udorthents						
58, 59---------- Whakana	Moderate: seepage.	Moderate: piping.	Severe: no water.	Not needed-----	Favorable------	Favorable.
60*: Wrightsville-----	Slight---------	Severe: unstable fill, compressible.	Severe: no water.	Favorable, wetness, percs slowly.	Not needed-----	Not needed.
Elysian----------	Moderate: seepage.	Moderate: unstable fill, compressible, piping.	Severe: deep to water.	Wetness--------	Complex slope	Complex slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
1---------- Alusa	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
2, 3---------- Bernow	Slight----------	Slight----------	Moderate: slope.	Slight.
4*: Bernow----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Romia----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
5*: Bernow----------	Slight----------	Slight----------	Moderate: slope.	Slight.
Romia----------	Slight----------	Slight----------	Moderate: slope.	Slight.
6*: Bernow----------	Slight----------	Slight----------	Moderate: slope.	Slight.
Bosville----------	Severe: percs slowly.	Moderate: wetness.	Severe: percs slowly.	Slight.
Romia----------	Slight----------	Slight----------	Moderate: slope.	Slight.
7---------- Boggy	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
8---------- Bosville	Severe: percs slowly.	Moderate: wetness.	Severe: percs slowly.	Slight.
9---------- Bosville	Severe: percs slowly.	Moderate: wetness.	Severe: percs slowly, slope.	Slight.
10---------- Bosville	Severe: percs slowly.	Moderate: wetness.	Severe: percs slowly.	Slight.
11---------- Bosville	Severe: percs slowly.	Moderate: wetness.	Severe: percs slowly, slope.	Slight.
12---------- Burleson	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
13---------- Caspiana	Slight----------	Slight----------	Slight----------	Slight.
14*: Clebit----------	Severe: large stones.	Severe: large stones.	Severe: slope, small stones, large stones.	Severe: large stones.

See footnote at end of table.

TABLE 14.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
14*: Tuskahoma	Severe: percs slowly, wetness.	Moderate: wetness, slope.	Severe: slope, percs slowly, depth to rock.	Moderate: wetness.
15--- Coushatta	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
16--- Dela	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
17--- Durant	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight.
18, 19--- Ferris	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey.
20--- Ferris	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly, slope.	Severe: too clayey.
21--- Garton	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
22--- Guyton	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
23--- Heiden	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey.
24, 25--- Hollywood	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
26*: Hollywood	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
Swink	Severe: too clayey, large stones.	Severe: too clayey, large stones.	Severe: too clayey, depth to rock.	Severe: too clayey, large stones.
27--- Hopco	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
28--- Idabel	Slight	Slight	Slight	Slight.
29--- Karma	Slight	Slight	Slight	Slight.
30--- Kaufman	Severe: floods, too clayey.	Severe: floods, too clayey.	Severe: floods, too clayey.	Severe: too clayey.
31--- Kaufman	Severe: floods, too clayey.	Severe: floods, too clayey.	Severe: floods, too clayey.	Severe: too clayey.
32--- Kiomatia	Severe: floods.	Moderate: floods, too sandy.	Moderate: floods, too sandy.	Moderate: too sandy.

See footnote at end of table.

TABLE 14.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
33--Larue	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.
34--Latanier	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
35--Lula	Slight	Slight	Moderate: slope.	Slight.
36--Muskogee	Moderate: percs slowly, wetness.	Slight	Moderate: slope, percs slowly, wetness.	Slight.
37--Newtonia	Slight	Slight	Moderate: slope.	Slight.
38--Oklared	Slight	Slight	Slight	Slight.
39--Panola	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.
40--Pledger	Severe: percs slowly, too clayey, wetness.	Severe: too clayey.	Severe: percs slowly, too clayey, wetness.	Severe: too clayey.
41--Redlake	Severe: floods, percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
42--Roebuck	Severe: floods, percs slowly.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
43, 44--Ruston	Slight	Slight	Moderate: slope.	Slight.
45--Saffell	Severe: small stones.	Moderate: small stones.	Severe: small stones, slope.	Moderate: small stones.
46--Severn	Slight	Slight	Slight	Slight.
47--Smithdale	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
48--Smithdale	Slight	Slight	Moderate: slope.	Slight.
49--Speer	Severe: floods.	Slight	Slight	Slight.
50*:				
Swink	Severe: too clayey, large stones.	Severe: too clayey, large stones.	Severe: slope, too clayey, depth to rock.	Severe: too clayey, large stones.
Hollywood	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey, slope.	Severe: too clayey.

See footnote at end of table.

TABLE 14.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
51--- Tenaha	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
52--- Tenaha	Moderate: too sandy.	Moderate: too sandy.	Severe: slope.	Moderate: too sandy.
53*:				
Tenaha---	Moderate: too sandy.	Moderate: too sandy.	Severe: slope.	Moderate: too sandy.
Kirvin---	Moderate: percs slowly.	Moderate: slope.	Severe: slope.	Slight.
54*:				
Tenaha---	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
Smithdale---	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
55--- Trinity	Severe: wetness, floods, percs slowly.	Severe: floods, too clayey.	Severe: wetness, floods, percs slowly.	Severe: floods, too clayey.
56--- Tuscumbia	Severe: wetness, floods, percs slowly.	Severe: wetness, floods.	Severe: wetness, floods, percs slowly.	Severe: wetness, floods.
57*. Udorthents				
58--- Whakana	Slight---	Slight---	Moderate: slope.	Slight.
59--- Whakana	Slight---	Slight---	Severe: slope.	Slight.
60*:				
Wrightsville---	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
Elysian---	Slight---	Slight---	Slight---	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--WILDLIFE HABITAT POTENTIALS

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

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1---------- Alusa	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
2, 3---------- Bernow	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
4*: Bernow----------	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Romia----------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
5*: Bernow----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Romia----------	Fair	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
6*: Bernow----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Bosville----------	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Romia----------	Fair	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
7---------- Boggy	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
8---------- Bosville	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
9, 10, 11---------- Bosville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
12---------- Burleson	Good	Good	Poor	---	---	Very poor.	Very poor.	Fair	---	Very poor.
13---------- Caspiana	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor.
14*: Clebit----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Tuskahoma----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
15---------- Coushatta	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Poor.
16---------- Dela	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
17---------- Durant	Good	Good	Good	---	---	Poor	Poor	Good	---	Poor.

See footnote at end of table.

TABLE 15.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
18, 19---------- Ferris	Fair	Good	Fair	---	---	Very poor.	Very poor.	Fair	---	Very poor.
20---------- Ferris	Poor	Fair	Fair	---	---	Very poor.	Very poor.	Fair	---	Very poor.
21---------- Garton	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
22---------- Guyton	Fair	Fair	Fair	Fair	---	Good	Good	Fair	Fair	Good.
23---------- Heiden	Fair	Good	Fair	---	---	Poor	Very poor.	Fair	---	Very poor.
24---------- Hollywood	Fair	Fair	Fair	---	---	Poor	Poor	Fair	---	Poor.
25---------- Hollywood	Fair	Fair	Fair	---	---	Poor	Very poor.	Fair	---	Very poor.
26*:										
Hollywood---------	Fair	Fair	Fair	---	---	Poor	Very poor.	Fair	---	Very poor.
Swink----------	Very poor.	Poor	Poor	---	---	Poor	Very poor.	Poor	---	Very poor.
27---------- Hopco	Fair	Fair	Good	Good	---	Fair	Fair	Fair	Good	Fair.
28---------- Idabel	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
29---------- Karma	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
30---------- Kaufman	Fair	Fair	Poor	Good	---	Poor	Good	Fair	Good	Fair.
31---------- Kaufman	Poor	Poor	Fair	Good	---	Poor	Good	Poor	Good	Fair.
32---------- Kiomatia	Poor	Fair	Fair	Fair	---	Poor	Very poor.	Fair	Fair	Very poor.
33---------- Larue	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
34---------- Latanier	Fair	Fair	Fair	Good	---	Good	Good	Fair	Good	Good.
35---------- Lula	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
36---------- Muskogee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
37---------- Newtonia	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
38---------- Oklared	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
39---------- Panola	Fair	Good	Good	---	---	Fair	Fair	Good	---	Fair.

See footnote at end of table.

TABLE 15.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
40---- Pledger	Fair	Fair	Fair	Good	Good	Poor	Good	Fair	Good	Fair.
41---- Redlake	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
42---- Roebuck	Fair	Fair	Poor	Good	Good	Poor	Fair	Poor	Fair	Poor.
43, 44---- Ruston	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
45---- Saffell	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
46---- Severn	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
47, 48---- Smithdale	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
49---- Speer	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
50*: Swink----	Very poor.	Poor	Poor	---	---	Poor	Very poor.	Poor	---	Very poor.
Hollywood----	Fair	Fair	Fair	---	---	Poor	Very poor.	Fair	---	Very poor.
51, 52---- Tenaha	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
53*: Tenaha----	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Kirvin----	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
54*: Tenaha----	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Smithdale----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
55---- Trinity	Poor	Fair	Fair	Good	---	Poor	Fair	Fair	Fair	Poor.
56---- Tuscumbia	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
57*. Udorthents										
58---- Whakana	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
59---- Whakana	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
60*: Wrightsville----	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Elysian----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1---------- Alusa	0-8	Loam----------	ML, CL, CL-ML	A-4	0	98-100	98-100	94-100	65-97	<31	NP-10
	8-54	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	98-100	98-100	94-100	80-98	46-70	25-44
	54-72	Clay----------	CH	A-7	0	80-100	80-100	75-95	70-95	56-70	33-44
2, 3---------- Bernow	0-23	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4	0	100	98-100	94-100	36-60	<26	NP-7
	23-34	Loam, clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	100	100	90-100	36-90	25-40	7-18
	34-72	Clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	100	100	90-100	36-90	25-40	7-18
4*, 5*: Bernow----------	0-9	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4	0	100	98-100	94-100	36-60	<26	NP-7
	9-56	Loam, clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	100	100	90-100	36-90	25-40	7-18
	56-72	Clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	100	100	90-100	36-90	25-40	7-18
Romia----------	0-10	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4	0	100	98-100	94-100	36-60	<26	NP-7
	10-41	Sandy clay loam, clay loam, gravelly sandy clay loam.	SC, CL	A-2, A-4, A-6	0	50-100	50-100	50-95	20-90	25-40	7-18
	41-56	Weathered bedrock.	---	---	---	---	---	---	---	---	---
6*: Bernow----------	0-8	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4	0	100	98-100	94-100	36-60	<26	NP-7
	8-30	Loam, clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	100	100	90-100	36-90	25-40	7-18
	30-62	Clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	100	100	90-100	36-90	25-40	7-18
Bosville----------	0-6	Fine sandy loam	SM, ML, CL, SC	A-4	0	100	98-100	94-100	36-60	<30	NP-10
	6-70	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	100	100	96-100	80-99	37-65	15-35
Romia----------	0-14	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4	0	100	98-100	94-100	36-60	<26	NP-7
	14-44	Sandy clay loam, clay loam, gravelly sandy clay loam.	SC, CL	A-2, A-4, A-6	0	50-100	50-100	50-95	20-90	25-40	7-18
	44-58	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--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	
7---------- Boggy	0-20	Fine sandy loam	ML, SM, CL-ML, SM-SC	A-4	0	100	98-100	94-100	36-85	<29	NP-7
	20-68	Fine sandy loam, loam.	ML, SM, CL-ML, SM-SC	A-4	0	100	98-100	94-100	36-85	<29	NP-7
8, 9, 10, 11------- Bosville	0-12	Fine sandy loam	SM, ML, CL, SC	A-4	0	100	98-100	94-100	36-60	<30	NP-10
	12-64	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	100	100	96-100	80-99	37-65	15-35
12---------- Burleson	0-48	Clay----------	CH, MH	A-7-6, A-7-5	0-2	83-100	80-100	80-100	80-95	51-80	27-55
	48-64	Clay, silty clay	CH, MH	A-7-6, A-7-5	0-1	95-100	80-100	75-95	70-95	51-80	30-55
13---------- Caspiana	0-18	Silt loam-------	CL-ML, ML	A-4	0	100	100	100	85-100	<27	NP-7
	18-48	Silty clay loam, silt loam.	CL	A-6, A-7-6	0	100	100	100	85-100	32-43	11-20
	48-72	Silt loam, very fine sandy loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	100	80-100	23-37	4-15
14*:											
Clebit----------	0-4	Stony loam------	GM, GC, GM-GC	A-4, A-2, A-1	10-30	45-60	45-60	30-55	15-45	<31	NP-10
	4-16	Gravelly very fine sandy loam, gravelly loam, gravelly fine sandy loam.	GM, GC, GM-GC	A-4, A-2, A-1	30-40	40-60	40-60	30-55	15-50	<31	NP-10
	16-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Tuskahoma---------	0-4	Loam----------	ML, CL, CL-ML	A-4	0	85-100	80-100	75-100	55-97	22-31	2-10
	4-12	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	60-100	55-100	50-100	50-99	37-60	15-34
	12-18	Shaly silty clay, shaly clay, shaly silty clay loam.	CH, CL, GC, SC	A-7	0	45-70	45-70	40-70	30-70	37-60	15-34
	18-30	Weathered bedrock.	---	---	---	---	---	---	---	---	---
15---------- Coushatta	0-8	Silty clay loam	CL	A-6	0	100	100	100	90-100	34-40	15-20
	8-31	Silt loam, silty clay loam.	CL	A-6	0	100	100	100	90-100	28-40	12-20
	31-72	Silt loam, silty clay loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	100	70-100	<40	NP-20
16---------- Dela	0-11	Fine sandy loam	ML, CL, SM, SC	A-4	0	100	98-100	94-100	36-60	<30	NP-10
	11-26	Fine sandy loam, sandy loam, loam.	ML, CL, SM, SC	A-4	0	100	98-100	94-100	36-70	<30	NP-10
	26-72	Fine sandy loam, sandy loam, loamy fine sand.	ML, CL, SM, SC	A-2, A-4	0	100	98-100	90-100	15-60	<30	NP-10

See footnote at end of table.

TABLE 16.--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	
17---------- Durant	0-8	Silt loam-------	CL	A-4, A-6	0	100	100	96-100	65-97	28-40	8-17
	8-11	Clay loam, silty clay loam, clay.	CL, CH	A-6, A-7	0	100	100	96-100	80-98	37-70	15-39
	11-64	Clay----------	CL, CH	A-7	0	100	100	96-100	90-95	45-70	21-39
18, 19, 20--------- Ferris	0-62	Clay----------	CH	A-7-6	0	95-100	95-100	75-100	75-98	51-70	35-50
21---------- Garton	0-6	Silty clay loam	CL, ML	A-4, A-6	0	100	100	96-100	75-98	30-40	8-17
	6-46	Silty clay loam, clay, silty clay.	CL, CH	A-6, A-7	0	100	100	96-100	80-99	37-60	15-33
	46-75	Loam, clay loam	CL	A-4, A-6, A-7	0	98-100	98-100	96-100	75-90	30-45	9-21
22---------- Guyton	0-18	Silt loam-------	ML, CL-ML	A-4	0	100	100	95-100	65-90	<27	NP-7
	18-72	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-6, A-4	0	100	100	95-100	75-95	26-40	6-18
23---------- Heiden	0-18	Clay----------	CH	A-7-6	0	95-100	90-100	80-100	75-99	54-80	35-55
	18-64	Clay, silty clay	CH	A-7-6	0	90-100	90-100	75-100	70-99	52-80	35-55
24, 25---------- Hollywood	0-19	Silty clay------	CL	A-6, A-7	0	98-100	98-100	95-100	75-95	25-45	11-25
	19-72	Silty clay, clay	CH	A-7	0	98-100	98-100	95-100	75-95	51-75	25-45
26*: Hollywood---------	0-8	Silty clay------	CL	A-6, A-7	0	98-100	98-100	95-100	75-95	25-45	11-25
	8-60	Silty clay, clay	CH	A-7	0	98-100	98-100	95-100	75-95	51-75	25-45
	60-70	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Swink----------	0-14	Stony clay------	CL, CH	A-7	10-85	90-95	90-95	90-95	85-95	45-65	25-40
	14-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
27---------- Hopco	0-40	Silty clay loam	CL	A-4, A-6, A-7	0	100	100	95-100	80-95	28-43	9-22
	40-60	Clay loam, silty clay loam, loam.	CL, ML	A-4, A-6, A-7	0	100	100	90-100	70-85	28-43	8-20
28---------- Idabel	0-8	Silt loam-------	ML, CL, CL-ML	A-4	0	100	100	94-100	65-90	<30	NP-10
	8-72	Silt loam, very fine sandy loam, fine sandy loam.	SM, SC, ML, CL	A-4	0	100	98-100	94-100	36-85	<31	NP-10
29---------- Karma	0-18	Fine sandy loam	ML, CL, SM, SC	A-4	0	100	98-100	94-100	36-85	<31	NP-10
	18-46	Sandy clay loam, clay loam.	CL, SC	A-4, A-6	0	100	100	90-100	36-90	25-40	7-18
	46-80	Fine sandy loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	100	98-100	90-100	36-85	<37	NP-16
30, 31---------- Kaufman	0-26	Clay----------	CH	A-7	0	100	100	90-100	80-95	56-75	33-49
	26-60	Clay----------	CH	A-7	0	100	100	95-100	90-100	76-96	49-70
32---------- Kiomatia	0-6	Loamy fine sand	SM, SM-SC	A-4, A-2-4	0	100	95-100	80-100	30-45	<26	NP-7
	6-62	Stratified fine sand to loam.	SM, SM-SC	A-2-4	0	100	95-100	80-90	13-35	<22	NP-5

See footnote at end of table.

TABLE 16.--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	
33---------- Larue	0-28	Loamy fine sand	SM	A-2-4	0	100	98-100	50-75	15-30	---	NP
	28-42	Sandy clay loam	SC, SM-SC	A-2-4, A-4, A-6	0	100	95-100	80-90	30-45	20-35	5-12
	42-80	Sandy clay loam, loam, clay loam.	SM, SM-SC, SC	A-2-4, A-4	0	100	95-100	60-70	30-40	20-30	3-10
34---------- Latanier	0-12	Clay----------	CH	A-7-6	0	100	100	100	95-100	51-75	26-45
	12-23	Clay, silty clay	CH	A-7-6	0	100	100	100	95-100	51-75	26-45
	23-66	Silt loam, silty clay loam, very fine sandy loam.	CL-ML, CL, ML	A-4, A-6	0	100	100	100	80-100	<40	NP-17
35---------- Lula	0-6	Silt loam-------	CL, ML, CL-ML	A-4, A-6	0	100	100	96-100	65-97	21-37	1-15
	6-12	Silty clay loam, clay loam, silt loam.	CL	A-6, A-4, A-7	0	100	100	96-100	65-98	30-43	9-20
	12-56	Silty clay loam, clay loam.	CL	A-6, A-7	0	95-100	95-100	95-100	75-98	33-50	12-26
	56-61	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
36---------- Muskogee	0-10	Silt loam-------	ML, CL, CL-ML	A-4	0	100	100	95-100	85-100	18-30	1-10
	10-26	Silty clay loam, silt loam.	CL, CH	A-6, A-7-6	0	100	100	95-100	90-100	35-55	15-30
	26-72	Silty clay, clay	CH	A-7-6	0	100	100	95-100	90-100	55-70	30-40
37---------- Newtonia	0-6	Silt loam-------	CL, ML	A-4, A-6	0	100	100	96-100	65-97	30-37	9-14
	6-10	Silt loam, silty clay loam.	CL, ML	A-4, A-6	0	100	100	96-100	80-98	30-40	8-19
	10-32	Silty clay loam	CL	A-6, A-7	0	100	100	98-100	90-98	33-42	12-19
	32-68	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	100	100	96-100	90-98	37-60	15-34
38---------- Oklared	0-10	Very fine sandy loam.	SM, SC, ML, CL	A-4	0	100	98-100	94-100	36-60	<30	NP-10
	10-44	Fine sandy loam, very fine sandy loam, loam.	SM, SC, ML, CL	A-4	0	100	98-100	94-100	36-60	<30	NP-10
	44-72	Fine sandy loam, very fine sandy loam, loamy fine sand.	SM, SC, ML, CL	A-2, A-4	0	100	98-100	90-100	15-60	<30	NP-10
39---------- Panola	0-9	Silt loam-------	CL, ML	A-4, A-6	0	100	100	96-100	75-95	30-40	8-17
	9-39	Clay loam, silty clay loam, silty clay.	CL, CH	A-7	0	95-100	95-100	90-100	85-99	45-60	25-37
	39-72	Clay----------	CH	A-7	0	95-100	95-100	90-100	85-95	55-70	33-44
40---------- Pledger	0-6	Clay----------	CH, CL	A-7-6	0	100	100	90-100	75-95	44-66	22-39
	6-72	Clay, clay loam, silty clay loam.	CH, CL	A-7-6	0	100	100	90-100	75-95	44-66	22-39
41---------- Redlake	0-42	Clay----------	CL, CH, ML, MH	A-7	0	100	100	98-100	90-99	41-70	18-38
	42-72	Clay loam-------	CL	A-6, A-7	0	100	100	96-100	80-90	37-50	16-26
42---------- Roebuck	0-70	Clay----------	CL, CH	A-6, A-7	0	100	100	96-100	90-99	37-70	15-40

See footnote at end of table.

TABLE 16.--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	
43, 44---------- Ruston	0-16	Fine sandy loam	SM, ML	A-4, A-2-4	0	85-100	78-100	65-100	30-75	<20	NP-3
	16-41	Sandy clay loam, loam, clay loam.	SC, CL	A-6	0	85-100	78-100	70-100	36-75	30-40	11-18
	41-80	Sandy clay loam, loam, clay loam.	SC, CL	A-6	0	85-100	78-100	70-100	36-75	30-40	11-18
45---------- Saffell	0-11	Gravelly fine sandy loam.	SM	A-1, A-2, A-4	0-5	70-80	50-75	40-65	20-40	<20	NP-3
	11-58	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
	58-65	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
46---------- Severn	0-10	Very fine sandy loam.	ML, CL-ML, CL	A-4, A-6	0	100	100	94-100	65-97	22-31	3-12
	10-72	Stratified silt loam to loamy very fine sand.	ML, CL-ML	A-4	0	100	100	94-100	65-97	<28	NP-7
47, 48---------- Smithdale	0-16	Fine sandy loam	SM, SM-SC	A-4	0	100	85-100	60-80	36-49	<20	NP-5
	16-38	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
	38-66	Loam, sandy loam	SM, ML, CL, SC	A-4	0	100	85-100	65-80	36-70	<30	NP-10
49---------- Speer	0-12	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4	0	100	98-100	94-100	36-60	<26	NP-7
	12-72	Clay loam, sandy clay loam, loam.	CL, SC	A-4, A-6	0	100	100	90-100	36-90	25-40	7-18
50*:											
Swink----------	0-14	Stony clay------	CL, CH	A-7	10-85	90-95	90-95	90-95	85-95	45-65	25-40
	14-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hollywood---------	0-18	Silty clay------	CL	A-6, A-7	0	98-100	98-100	95-100	75-95	25-45	11-25
	18-56	Silty clay, clay	CH	A-7	0	98-100	98-100	95-100	75-95	51-75	25-45
	56-66	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
51, 52---------- Tenaha	0-28	Loamy fine sand	SM	A-2-4	0	95-100	95-100	70-85	15-34	---	NP
	28-56	Sandy clay loam	SC, CL	A-6, A-4	0	95-100	95-100	80-90	36-55	25-35	8-15
	56-72	Weathered bedrock.	---	---	---	---	---	---	---	---	---
53*:											
Tenaha----------	0-28	Loamy fine sand	SM	A-2-4	0	95-100	95-100	70-85	15-34	---	NP
	28-56	Sandy clay loam	SC, CL	A-6, A-4	0	95-100	95-100	80-90	36-55	25-35	8-15
	56-65	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--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	
53*:											
Kirvin	0-8	Fine sandy loam	SM, SM-SC	A-4	0-2	75-100	75-95	65-90	36-50	<25	NP-4
	8-45	Clay, sandy clay, clay loam.	CH, MH, CL, ML	A-7	0	95-100	85-100	85-99	51-75	41-60	15-30
	45-52	Sandy clay loam, clay loam, sandy loam.	CL, SC, SM, ML	A-4, A-6	0	95-100	85-100	85-99	36-65	20-40	4-20
	52-65	Weathered bedrock.	---	---	---	---	---	---	---	---	---
54*:											
Tenaha	0-22	Loamy fine sand	SM	A-2-4	0	95-100	95-100	70-85	15-34	---	NP
	22-54	Sandy clay loam	SC, CL	A-6, A-4	0	95-100	95-100	80-90	36-55	25-35	8-15
	54-65	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Smithdale	0-12	Fine sandy loam	SM, SM-SC	A-4	0	100	85-100	60-80	36-49	<20	NP-5
	12-56	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
	56-64	Loam, sandy loam	SM, ML, CL, SC	A-4	0	100	85-100	65-80	36-70	<30	NP-10
55---------- Trinity	0-62	Clay----------	CH	A-7	0	100	98-100	85-100	80-99	55-90	30-60
56---------- Tuscumbia	0-8	Clay----------	CL	A-7, A-6	0	100	100	90-100	75-90	35-50	15-25
	8-64	Clay, silty clay, silty clay loam.	CH	A-7	0	100	100	95-100	80-95	51-75	30-50
57*. Udorthents											
58, 59---------- Whakana	0-12	Very fine sandy loam.	CL-ML, SM, SC, SM-SC	A-4	0	100	100	75-90	36-70	<25	NP-10
	12-37	Loam, sandy clay loam, clay loam.	CL	A-4, A-6	0	100	100	90-100	70-80	25-40	8-20
	37-72	Loam, sandy clay loam.	SM-SC, SC, CL, CL-ML	A-4, A-6	0	100	100	80-90	36-55	21-38	6-16
60*:											
Wrightsville------	0-12	Silt loam-------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	75-100	<31	NP-10
	12-56	Silty clay, clay, silty clay loam.	CH, CL, MH	A-7	0	100	100	95-100	90-100	41-65	22-40
	56-70	Silty clay loam, silty clay, clay.	CL, CH, MH	A-7, A-6	0	100	95-100	95-100	90-100	35-65	16-40
Elysian----------	0-34	Very fine sandy loam.	SM, ML, SC, CL	A-4	0	100	98-100	94-100	36-75	<30	NP-10
	34-72	Loam----------	ML, CL	A-4	0	100	95-100	94-100	65-85	22-30	2-10

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors	
							K	T
	In	In/hr	In/in	pH	Mmhos/cm			
1----------	0-8	0.6-2.0	0.15-0.24	5.1-6.0	<2	Low----------	0.49	5
Alusa	8-54	<0.06	0.12-0.22	4.5-7.3	<2	High----------	0.43	
	54-72	<0.06	0.12-0.18	7.4-8.4	<2	High----------	0.37	
2, 3----------	0-23	2.0-6.0	0.11-0.15	5.1-7.3	<2	Low----------	0.24	5
Bernow	23-34	0.6-2.0	0.12-0.20	4.5-6.5	<2	Moderate-------	0.32	
	34-72	0.6-2.0	0.12-0.20	4.5-6.5	<2	Low----------	0.32	
4*, 5*:								
Bernow----------	0-9	2.0-6.0	0.11-0.15	5.1-7.3	<2	Low----------	0.24	5
	9-37	0.6-2.0	0.12-0.20	4.5-6.5	<2	Moderate-------	0.32	
	37-72	0.6-2.0	0.12-0.20	4.5-6.5	<2	Low----------	0.32	
Romia----------	0-10	2.0-6.0	0.11-0.15	5.1-6.5	<2	Low----------	0.24	3
	10-41	0.6-2.0	0.08-0.18	4.5-6.0	<2	Low----------	0.32	
	41-56	---	---	---	---	----------	---	
6*:								
Bernow----------	0-8	2.0-6.0	0.11-0.15	5.1-7.3	<2	Low----------	0.24	5
	8-30	0.6-2.0	0.12-0.20	4.5-6.5	<2	Moderate-------	0.32	
	30-62	0.6-2.0	0.12-0.20	4.5-6.5	<2	Low----------	0.32	
Bosville--------	0-6	0.6-2.0	0.11-0.15	5.1-6.0	<2	Low----------	0.37	5
	6-70	<0.06	0.15-0.20	4.5-6.0	<2	High----------	0.43	
Romia----------	0-14	2.0-6.0	0.11-0.15	5.1-6.5	<2	Low----------	0.24	3
	14-44	0.6-2.0	0.08-0.18	4.5-6.0	<2	Low----------	0.32	
	44-58	---	---	---	---	----------	---	
7----------	0-20	0.6-2.0	0.11-0.15	5.6-6.5	<2	Low----------	0.24	5
Boggy	20-68	0.6-2.0	0.11-0.15	5.1-6.5	<2	Low----------	0.24	
8, 9, 10, 11-----	0-12	0.6-2.0	0.11-0.15	5.1-6.0	<2	Low----------	0.37	5
Bosville	12-64	<0.06	0.15-0.20	4.5-6.0	<2	High----------	0.43	
12----------	0-48	<0.06	0.12-0.18	5.6-8.4	<2	High----------	0.32	5
Burleson	48-64	<0.06	0.12-0.18	7.4-8.4	<2	High----------	0.32	
13----------	0-18	0.6-2.0	0.21-0.23	5.6-8.4	<2	Low----------	0.37	5
Caspiana	18-48	0.6-2.0	0.20-0.22	5.6-8.4	<2	Moderate-------	0.32	
	48-72	0.6-2.0	0.15-0.23	6.1-8.4	<2	Low----------	0.32	
14*:								
Clebit----------	0-4	2.0-6.0	0.06-0.10	5.1-6.5	<2	Low----------	0.20	1
	4-16	2.0-6.0	0.06-0.10	4.5-6.5	<2	Low----------	0.20	
	16-20	---	---	---	---	----------	---	
Tuskahoma-------	0-4	0.2-2.0	0.15-0.24	5.6-7.8	<2	Low----------	0.49	1
	4-12	<0.06	0.08-0.20	5.1-7.3	<2	High----------	0.37	
	12-18	<0.06	0.05-0.15	5.6-7.8	<2	High----------	0.32	
	18-30	---	---	---	---	----------	---	
15----------	0-8	0.2-0.6	0.18-0.21	5.6-7.3	<2	Moderate-------	0.32	5
Coushatta	8-31	0.6-2.0	0.18-0.23	6.1-8.4	<2	Moderate-------	0.32	
	31-72	0.6-2.0	0.14-0.23	6.6-8.4	<2	Low----------	0.37	
16----------	0-11	2.0-6.0	0.10-0.15	5.1-6.5	<2	Low----------	0.20	5
Dela	11-26	2.0-6.0	0.10-0.20	5.1-6.5	<2	Low----------	0.32	
	26-72	2.0-6.0	0.07-0.15	5.1-6.5	<2	Low----------	0.20	
17----------	0-8	0.6-2.0	0.15-0.24	5.6-6.5	<2	Low----------	0.49	5
Durant	8-11	<0.06	0.12-0.22	5.1-6.5	<2	Moderate-------	0.43	
	11-64	<0.06	0.12-0.18	5.6-8.4	<2	High----------	0.37	

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors	
							K	T
	In	In/hr	In/in	pH	Mmhos/cm			
18, 19, 20------- Ferris	0-62	<0.06	0.15-0.18	7.9-8.4	<2	Very high------	0.32	4
21----------	0-6	0.2-2.0	0.15-0.24	6.1-7.3	<2	Low----------	0.43	5
Garton	6-46	0.06-0.2	0.12-0.22	6.1-7.8	<2	High----------	0.37	
	46-75	0.2-0.6	0.15-0.20	6.6-7.8	<2	Moderate-------	0.37	
22----------	0-18	0.6-2.0	0.20-0.23	4.5-6.0	<2	Low----------	0.49	3
Guyton	18-72	0.06-0.2	0.15-0.22	4.5-5.5	<2	Low----------	0.37	
23----------	0-18	<0.06	0.15-0.20	7.9-8.4	<2	Very high------	0.32	5
Heiden	18-64	<0.06	0.12-0.20	7.9-8.4	<2	Very high------	0.32	
24, 25----------	0-19	0.2-0.6	0.15-0.22	6.1-8.4	<2	Moderate-------	0.32	3
Hollywood	19-72	<0.06	0.12-0.18	6.6-8.4	<2	High----------	0.37	
26*:								
Hollywood-------	0-8	0.2-0.6	0.15-0.22	6.1-8.4	<2	Moderate-------	0.32	3
	8-60	<0.06	0.12-0.18	6.6-8.4	<2	High----------	0.37	
	60-70	---	---	---	---	---	---	
Swink----------	0-14	0.06-0.2	0.07-0.12	6.6-8.4	<2	High----------	0.32	1
	14-30	---	---	---	---	---	---	
27----------	0-40	0.2-0.6	0.18-0.22	6.6-8.4	<2	Moderate-------	0.37	5
Hopco	40-60	0.2-0.6	0.15-0.20	6.6-8.4	<2	Moderate-------	0.37	
28----------	0-8	2.0-6.0	0.15-0.20	6.6-7.8	<2	Low----------	0.32	5
Idabel	8-72	2.0-6.0	0.12-0.17	6.6-8.4	<2	Low----------	0.32	
29----------	0-18	0.6-2.0	0.11-0.20	5.6-7.8	<2	Low----------	0.24	5
Karma	18-46	0.6-2.0	0.12-0.20	5.6-7.8	<2	Low----------	0.32	
	46-80	0.6-6.0	0.11-0.20	5.6-7.8	<2	Low----------	0.37	
30, 31----------	0-26	0.06-0.2	0.15-0.20	5.6-7.8	<2	High----------	0.32	5
Kaufman	26-60	<0.06	0.15-0.18	5.6-7.8	<2	Very high------	0.32	
32----------	0-6	0.6-2.0	0.10-0.15	6.1-8.4	<2	Low----------	0.17	5
Kiomatia	6-62	6.0-20	0.05-0.10	6.1-8.4	<2	Low----------	0.17	
33----------	0-28	6.0-20	0.05-0.10	5.6-6.5	<2	Low----------	0.17	5
Larue	28-42	0.6-2.0	0.10-0.15	5.1-6.5	<2	Low----------	0.24	
	42-80	0.6-2.0	0.10-0.15	5.1-6.5	<2	Low----------	0.24	
34----------	0-12	<0.06	0.18-0.20	6.6-8.4	<2	Very high------	0.32	5
Latanier	12-23	<0.06	0.18-0.20	6.6-8.4	<2	Very high------	0.32	
	23-66	0.06-2.0	0.18-0.22	6.6-8.4	<2	Low----------	0.37	
35----------	0-6	0.6-2.0	0.16-0.20	5.6-6.5	<2	Low----------	0.37	3
Lula	6-12	0.6-2.0	0.16-0.20	5.6-6.5	<2	Moderate-------	0.37	
	12-56	0.6-2.0	0.16-0.20	5.1-7.3	<2	Moderate-------	0.32	
	56-61	---	---	---	---	---	---	
36----------	0-10	0.6-2.0	0.16-0.24	4.5-6.0	<2	Low----------	0.43	5
Muskogee	10-26	0.2-0.6	0.16-0.24	4.5-6.0	<2	Moderate-------	0.37	
	26-72	0.06-0.2	0.14-0.18	5.1-7.8	<2	High----------	0.32	
37----------	0-5	0.6-2.0	0.15-0.24	5.6-6.5	<2	Low----------	0.37	5
Newtonia	5-10	0.6-2.0	0.16-0.22	5.1-6.5	<2	Moderate-------	0.37	
	10-32	0.6-2.0	0.18-0.22	5.1-6.0	<2	Moderate-------	0.32	
	32-68	0.6-2.0	0.12-0.20	5.1-6.0	<2	High----------	0.32	
38----------	0-10	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low----------	0.32	5
Oklared	10-44	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low----------	0.32	
	44-72	2.0-20	0.10-0.16	7.4-8.4	<2	Low----------	0.32	

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors	
							K	T
	In	In/hr	In/in	pH	Mmhos/cm			
39----------	0-9	0.2-2.0	0.15-0.24	5.1-6.5	<2	Moderate-------	0.49	5
Panola	9-39	0.2-2.0	0.12-0.22	4.5-6.5	<2	High----------	0.43	
	39-72	<0.06	0.12-0.18	5.1-7.8	<2	High----------	0.37	
40----------	0-6	0.06-0.2	0.12-0.22	6.1-8.4	<2	High----------	0.32	5
Pledger	6-72	<0.06	0.12-0.18	7.4-8.4	<2	High----------	0.32	
41----------	0-42	<0.06	0.12-0.18	7.4-8.4	<2	High----------	0.37	5
Redlake	42-72	0.06-0.2	0.15-0.20	7.4-8.4	<2	Moderate-------	0.43	
42----------	0-70	<0.06	0.12-0.20	6.1-8.4	<2	High----------	0.37	5
Roebuck								
43, 44----------	0-16	0.6-2.0	0.09-0.16	5.1-6.5	<2	Low-----------	0.32	5
Ruston	16-41	0.6-2.0	0.12-0.17	4.5-6.0	<2	Low-----------	0.28	
	41-80	0.6-2.0	0.12-0.17	4.5-6.0	<2	Low-----------	0.28	
45----------	0-11	2.0-6.0	0.05-0.10	4.5-5.5	<2	Low-----------	0.20	4
Saffell	11-58	0.6-2.0	0.06-0.12	4.5-5.5	<2	Low-----------	0.28	
	58-65	0.6-6.0	0.04-0.11	4.5-5.5	<2	Low-----------	0.17	
46----------	0-10	2.0-6.0	0.13-0.20	7.4-8.4	<2	Low-----------	0.32	5
Severn	10-72	2.0-6.0	0.11-0.20	7.9-8.4	<2	Low-----------	0.32	
47, 48----------	0-16	2.0-6.0	0.14-0.16	4.5-5.5	<2	Low-----------	0.28	5
Smithdale	16-38	0.6-2.0	0.15-0.17	4.5-5.5	<2	Low-----------	0.24	
	38-66	2.0-6.0	0.14-0.16	4.5-5.5	<2	Low-----------	0.28	
49----------	0-12	0.6-2.0	0.11-0.15	5.1-7.3	<2	Low-----------	0.24	5
Speer	12-44	0.6-2.0	0.12-0.20	4.5-6.0	<2	Low-----------	0.32	
50*:								
Swink----------	0-14	0.06-0.2	0.07-0.12	6.6-8.4	<2	High----------	0.32	1
	14-30	---	---	---	---	---	---	
Hollywood-------	0-18	0.2-0.6	0.15-0.22	6.1-8.4	<2	Moderate-------	0.32	3
	18-56	<0.06	0.12-0.18	6.6-8.4	<2	High----------	0.37	
	56-66	---	---	---	---	---	---	
51, 52----------	0-28	6.0-20	0.07-0.11	5.1-6.5	<2	Low-----------	0.17	3
Tenaha	28-56	0.6-2.0	0.12-0.17	4.5-5.5	<2	Low-----------	0.24	
	56-72	---	---	---	---	---	---	
53*:								
Tenaha----------	0-28	6.0-20	0.07-0.11	5.1-6.5	<2	Low-----------	0.17	3
	28-56	0.6-2.0	0.12-0.17	4.5-5.5	<2	Low-----------	0.24	
	56-65	---	---	---	---	---	---	
Kirvin----------	0-8	2.0-6.0	0.10-0.15	5.1-7.3	<2	Low-----------	0.37	4
	8-45	0.2-0.6	0.12-0.18	3.6-5.5	<2	Moderate-------	0.32	
	45-52	0.6-2.0	0.12-0.17	3.6-5.5	<2	Moderate-------	0.32	
	52-65	---	---	---	---	---	---	
54*:								
Tenaha----------	0-22	6.0-20	0.07-0.11	5.1-6.5	<2	Low-----------	0.17	3
	22-54	0.6-2.0	0.12-0.17	4.5-5.5	<2	Low-----------	0.24	
	54-65	---	---	---	---	---	---	
Smithdale-------	0-12	2.0-6.0	0.14-0.16	4.5-5.5	<2	Low-----------	0.28	5
	12-44	0.6-2.0	0.15-0.17	4.5-5.5	<2	Low-----------	0.24	
	44-64	2.0-6.0	0.14-0.16	4.5-5.5	<2	Low-----------	0.28	
55----------	0-62	<0.06	0.15-0.20	7.4-8.4	<2	Very high------	0.32	5
Trinity								

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors	
							K	T
	In	In/hr	In/in	pH	Mmhos/cm			
56----------	0-4	0.06-0.20	0.20-0.22	5.0-8.4	<2	High----------	0.28	3
Tuscumbia	4-64	<0.06	0.18-0.20	5.0-8.4	<2	Very high------	0.28	
57*.								
Udorthents								
58, 59----------	0-12	2.0-6.0	0.10-0.15	5.1-7.3	<2	Low----------	0.32	5
Whakana	12-37	0.6-2.0	0.10-0.15	4.5-6.5	<2	Moderate-------	0.32	
	37-72	0.6-2.0	0.10-0.15	4.5-6.0	<2	Low----------	0.32	
60*:								
Wrightsville----	0-12	0.2-0.6	0.16-0.24	3.6-5.5	<2	Low----------	0.49	5
	12-56	<0.06	0.14-0.22	3.6-5.5	<2	High----------	0.37	
	56-70	<0.06	0.14-0.22	3.6-8.4	<2	High----------	0.43	
Elysian---------	0-34	2.0-6.0	0.11-0.20	4.5-6.5	<2	Low----------	0.37	5
	34-72	0.6-2.0	0.15-0.20	4.5-6.0	<2	Low----------	0.37	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched." The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
1---------- Alusa	D	None--------	---	---	0-1.0	Perched	Nov-Apr	>60	---	High-----	Moderate.
2, 3---------- Bernow	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
4*, 5*: Bernow----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Romia----------	B	None--------	---	---	>6.0	---	---	40-60	Ripable	High-----	High.
6*: Bernow----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Bosville---------	D	None--------	---	---	1.0-2.0	Perched	Feb-Jul	>60	---	High-----	High.
Romia----------	B	None--------	---	---	>6.0	---	---	40-60	Ripable	High-----	High.
7---------- Boggy	C	Frequent----	Very brief	Jan-May	0.0-2.0	Apparent	Nov-Apr	>60	---	Moderate	Moderate.
8, 9, 10, 11------ Bosville	D	None--------	---	---	1.0-2.0	Perched	Feb-Jul	>60	---	High-----	High.
12---------- Burleson	D	None--------	---	---	>6.0	---	---	>60	---	High-----	Low.
13---------- Caspiana	B	None--------	---	---	>4.0	Apparent	Dec-Apr	>60	---	Moderate	Low.
14*: Clebit----------	D	None--------	---	---	>6.0	---	---	10-20	Hard	Low------	Moderate.
Tuskahoma--------	D	None--------	---	---	0.5-1.5	Perched	Nov-Apr	10-20	Ripable	High-----	Moderate.
15---------- Coushatta	B	Rare--------	Brief-----	Dec-Jun	4.0-6.0	Apparent	Dec-Apr	>60	---	Moderate	Low.
16---------- Dela	B	Occasional	Very brief	Nov-May	3.0-5.0	Apparent	Nov-May	>60	---	Moderate	Moderate.
17---------- Durant	D	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
18, 19, 20-------- Ferris	D	None--------	---	---	>6.0	---	---	>60	---	High-----	Low.
21---------- Garton	C	Rare--------	---	---	2.0-3.0	Perched	Nov-Apr	>60	---	High-----	Low.
22---------- Guyton	D	Occasional	Very brief	Jan-Dec	0-1.5	Apparent	Dec-May	>60	---	High-----	Moderate.
23---------- Heiden	D	None--------	---	---	>6.0	---	---	>60	---	High-----	Low.
24, 25---------- Hollywood	D	None--------	---	---	>6.0	---	---	>48	Hard	High-----	Low.
26*: Hollywood--------	D	None--------	---	---	>6.0	---	---	>48	Hard	High-----	Low.
Swink----------	D	None--------	---	---	>6.0	---	---	8-20	Hard	High-----	Low.

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
27---------- Hopco	C	Occasional	Brief-----	Dec-May	0.5-1.0	Apparent	Dec-May	>60	---	High-----	Low.
28---------- Idabel	B	Rare--------	Very brief	Mar-Jun	>6.0	---	---	>60	---	Low------	Low.
29---------- Karma	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
30---------- Kaufman	D	Occasional	Brief-----	Nov-May	0-3.5	Apparent	Nov-Apr	>60	---	High-----	Low.
31---------- Kaufman	D	Frequent----	Brief-----	Nov-May	0-3.5	Apparent	Nov-Apr	>60	---	High-----	Low.
32---------- Kiomatia	A	Occasional	Brief-----	Feb-Jun	3.0-5.0	Apparent	Jan-Jul	>60	---	Low------	Low.
33---------- Larue	A	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
34---------- Latanier	D	Occasional	Brief-----	Nov-Jul	1.0-3.0	Apparent	Dec-Apr	>60	---	High-----	Low.
35---------- Lula	B	None--------	---	---	>6.0	---	---	40-60	Hard	Moderate	Moderate.
36---------- Muskogee	C	None--------	---	---	1.0-2.0	Perched	Jan-Apr	>60	---	High-----	Moderate.
37---------- Newtonia	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
38---------- Oklared	B	Rare--------	Very brief	Mar-Aug	3.0-4.0	Apparent	Mar-May	>60	---	Moderate	Low.
39---------- Panola	D	None--------	---	---	0.5-1.0	Perched	Nov-Apr	>60	---	High-----	Moderate.
40---------- Pledger	D	Rare--------	Brief-----	Mar-Oct	0-2.5	Apparent	Dec-Feb	>60	---	High-----	Low.
41---------- Redlake	D	Occasional	Very brief	Jan-May	>6.0	---	---	>60	---	High-----	Low.
42---------- Roebuck	D	Occasional	Brief-----	Jan-Jul	>6.0	---	---	>60	---	High-----	Low.
43, 44---------- Ruston	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
45---------- Saffell	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
46---------- Severn	B	Rare--------	Very brief	Jan-Oct	>6.0	---	---	>60	---	Low------	Low.
47, 48---------- Smithdale	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
49---------- Speer	C	Rare--------	Very brief	Jan-May	>6.0	---	---	>60	---	Moderate	Moderate.
50*:											
Swink----------	D	None--------	---	---	>6.0	---	---	8-20	Hard	High-----	Low.
Hollywood--------	D	None--------	---	---	>6.0	---	---	>48	Hard	High-----	Low.

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
51, 52--Tenaha	B	None	---	---	>6.0	---	---	40-60	Ripable	Moderate	Moderate.
53*: Tenaha	B	None	---	---	>6.0	---	---	40-60	Ripable	Moderate	Moderate.
53*: Kirvin	C	None	---	---	>6.0	---	---	40-60	Ripable	High	High.
54*: Tenaha	B	None	---	---	>6.0	---	---	40-60	Ripable	Moderate	Moderate.
Smithdale	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate.
55--Trinity	D	Frequent	Brief	Feb-May	0-3.0	Apparent	Nov-Feb	>60	---	High	Low.
56--Tuscumbia	D	Occasional	Brief	Jan-Mar	0.5-1.5	Apparent	Dec-Apr	>60	---	High	Low.
57*. Udorthents											
58, 59--Whakana	B	None	---	---	>6.0	---	---	>60	---	Moderate	High.
60*: Wrightsville	D	None	---	---	0.6-1.5	Perched	Dec-Apr	>60	---	High	High.
Elysian	B	None	---	---	3.0-6.0	Perched	Dec-May	>60	---	Moderate	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19.--CLASSIFICATION OF THE SOILS

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

Soil name	Family or higher taxonomic class
Alusa	Fine, montmorillonitic, thermic Typic Albaqualfs
Bernow	Fine-loamy, siliceous, thermic Glossic Paleudalfs
*Boggy	Coarse-loamy, siliceous, nonacid, thermic Aeric Fluvaquents
Bosville	Fine, mixed, thermic Albaquic Paleudalfs
*Burleson	Fine, montmorillonitic, thermic Udic Pellusterts
Caspiana	Fine-silty, mixed, thermic Typic Argiudolls
Clebit	Loamy-skeletal, siliceous, thermic Lithic Dystrochrepts
Coushatta	Fine-silty, mixed, thermic Fluventic Eutrochrepts
Dela	Coarse-loamy, siliceous, nonacid, thermic Typic Udifluvents
Durant	Fine, montmorillonitic, thermic Vertic Argiustolls
Elysian	Coarse-loamy, siliceous, thermic Haplic Glossudalfs
Ferris	Fine, montmorillonitic, thermic Udorthentic Chromusterts
Garton	Fine, mixed, thermic Aquic Argiudolls
Guyton	Fine-silty, siliceous, thermic Typic Glossaqualfs
Heiden	Fine, montmorillonitic, thermic Udic Chromusterts
Hollywood	Fine, montmorillonitic, thermic Typic Pelluderts
*Hopco	Fine-silty, mixed, thermic Cumulic Haplaquolls
Idabel	Coarse-loamy, mixed, thermic Fluventic Eutrochrepts
Karma	Fine-loamy, mixed, thermic Typic Hapludalfs
Kaufman	Very-fine, montmorillonitic, thermic Typic Pelluderts
Kiomatia	Sandy, mixed, thermic Typic Udifluvents
Kirvin	Clayey, mixed, thermic Typic Hapludults
Larue	Loamy, siliceous, thermic Arenic Paleudalfs
Latanier	Clayey over loamy, mixed, thermic Vertic Hapludolls
Lula	Fine-silty, mixed, thermic Typic Argiudolls
Muskogee	Fine-silty, mixed, thermic Aquic Paleudalfs
Newtonia	Fine-silty, mixed, thermic Typic Paleudolls
Oklared	Coarse-loamy, mixed (calcareous), thermic Typic Udifluvents
Panola	Fine, montmorillonitic, thermic Vertic Ochraqualfs
Pledger	Fine, mixed, thermic Vertic Hapludolls
Redlake	Fine, mixed, thermic Vertic Eutrochrepts
Roebuck	Fine, montmorillonitic, thermic Vertic Hapludolls
Romia	Fine-loamy, siliceous, thermic Ultic Hapludalfs
Ruston	Fine-loamy, siliceous, thermic Typic Paleudults
Saffell	Loamy-skeletal, siliceous, thermic Typic Hapludults
Severn	Coarse-silty, mixed (calcareous), thermic Typic Udifluvents
Smithdale	Fine-loamy, siliceous, thermic Typic Paleudults
Speer	Fine-loamy, siliceous, thermic Ultic Hapludalfs
Swink	Clayey-skeletal, montmorillonitic, thermic Lithic Hapludolls
Tenaha	Loamy, siliceous, thermic Arenic Hapludults
Trinity	Very-fine, montmorillonitic, thermic Typic Pelluderts
Tuscumbia	Fine, mixed, nonacid, thermic Vertic Haplaquepts
*Tuskahoma	Clayey, mixed, thermic, shallow Albaquic Hapludalfs
Udorthents	Udorthents
Whakana	Fine-loamy, mixed, thermic Glossic Paleudalfs
Wrightsville	Fine, mixed, thermic Typic Glossaqualfs

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