United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Texas Agricultural Experiment Station and Texas State Soil and Water Conservation Board

Soil Survey of Wood County, Texas

How to Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

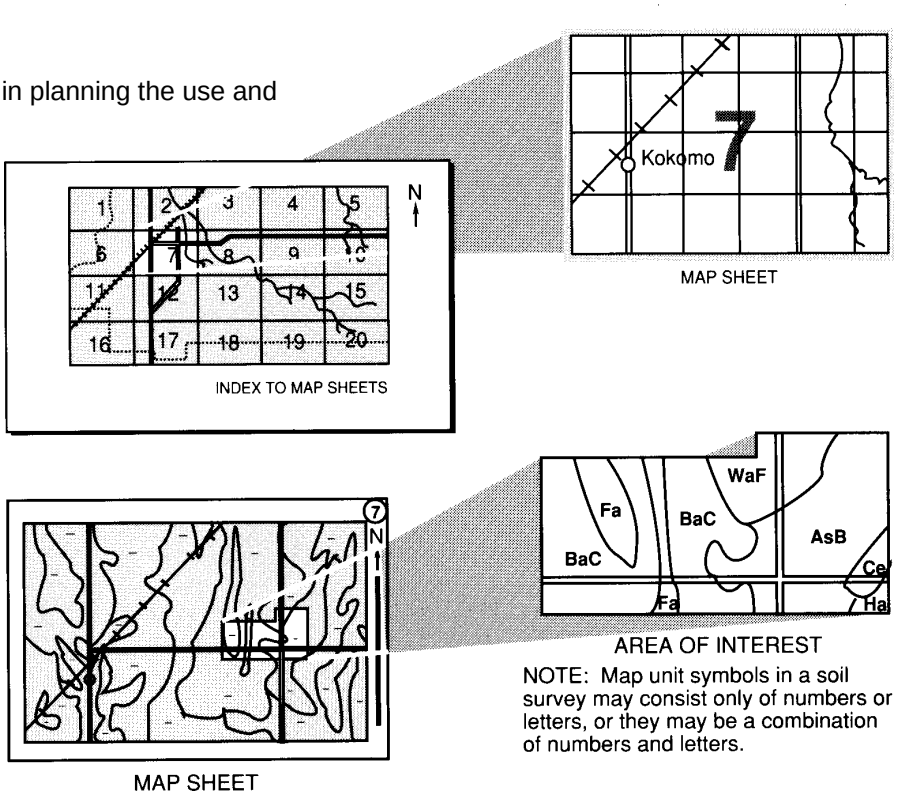
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1991. Soil names and descriptions were approved in 1992. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1992. This survey was made cooperatively by the Natural Resources Conservation Service, the Texas Agricultural Experiment Station, and the Texas State Soil and Water Conservation Board. The survey is part of the technical assistance furnished to the Wood County Soil and Water Conservation District.

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

Cover: Crimson clover is a popular legume grown in Wood County pastures.

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Issued May 1998

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Summary of Tables

Foreword

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

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

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

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

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

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Soil Survey of
Wood County, Texas

By Don T. Hatherly, Natural Resources Conservation Service

Fieldwork by Don T. Hatherly, Thomas C. Byrd, Dennis R. Falk, and Kirthell Roberts, soil scientists, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the Texas Agricultural Experiment Station and the Texas State Soil and Water Conservation Board

Wood County is in the central part of northeastern Texas (fig. 1). Quitman is the county seat. The total area of the county is 445,402 acres, or about 696 square miles. Of this total, 25,863 acres is areas of water more than 40 acres in size. Elevations range from about 285 feet above mean sea level on the Sabine River flood plain in the southeastern part of the county to about 640 feet in the east-central part.

Wood County is in the East Texas Timberlands, which is a part of the Western Coastal Plain Major Land Resource Area *(10)*. The topography of the county is nearly level to steep. The drainage pattern is well defined, and many streams dissect the county. Nearly all the streams flow in a southeasterly direction to the Sabine River. All of Wood County is in the Sabine River watershed except for a small area in the extreme northeastern part. Lake Fork Creek and Big Sandy Creek are major drainageways. Wood County is joined on the west by Rains County, on the southwest by Van Zandt County, on the east by Camp and Upshur Counties, and on the north by Hopkins and Franklin Counties. The Sabine River forms the southern boundary.

The soils of the county formed mostly under forest vegetation. Those on uplands are light colored and sandy or loamy, and in unprotected sloping areas, they are subject to water erosion. The soils on flood plains are loamy or clayey.

Beef cattle, dairy cattle, timber, sweet potatoes, corn, peas, peaches, watermelons, and poultry (fig. 2) are the major agricultural products in the county. About 53 percent of the county is pasture and hayland, 31 percent woodland, 8 percent cropland, 6 percent water areas, and 2 percent urban and built-up areas.

General Nature of the County

This section provides general information about Wood County. It briefly describes the settlement and population, agriculture, natural resources, and climate.

Settlement and Population

Wood County was created from Van Zandt County by an act of the Texas Legislature in 1850. The county was named for George T. Wood, a native of Georgia, who became Texas' second Governor in 1847.

Some early settlements in the county were Mineola, Webster, Perryville, and Redland.

In 1990 the population of Wood County was 31,205. Quitman, the county seat, had a population of 1,672. Mineola, the largest town, had a population of 4,507. Other towns are Alba, Hawkins, Winnsboro, and Yantis.

Agriculture

Agriculture has always been significant to the economy of Wood County. It has changed drastically over the years. The early economy of the county was based mainly on cotton production. Before the coming of the railroad, cotton was hauled by wagon to Jefferson. Other early agricultural crops were corn and other grains, ribbon cane, and timber. Over the years syrup mills, gristmills, sawmills, and cotton gins have operated in the county.

Many areas that previously were used as cropland have been converted to pasture or have been planted to pine. Most livestock are raised in cow-calf operations or in dairy herds. The livestock are pastured in summer and

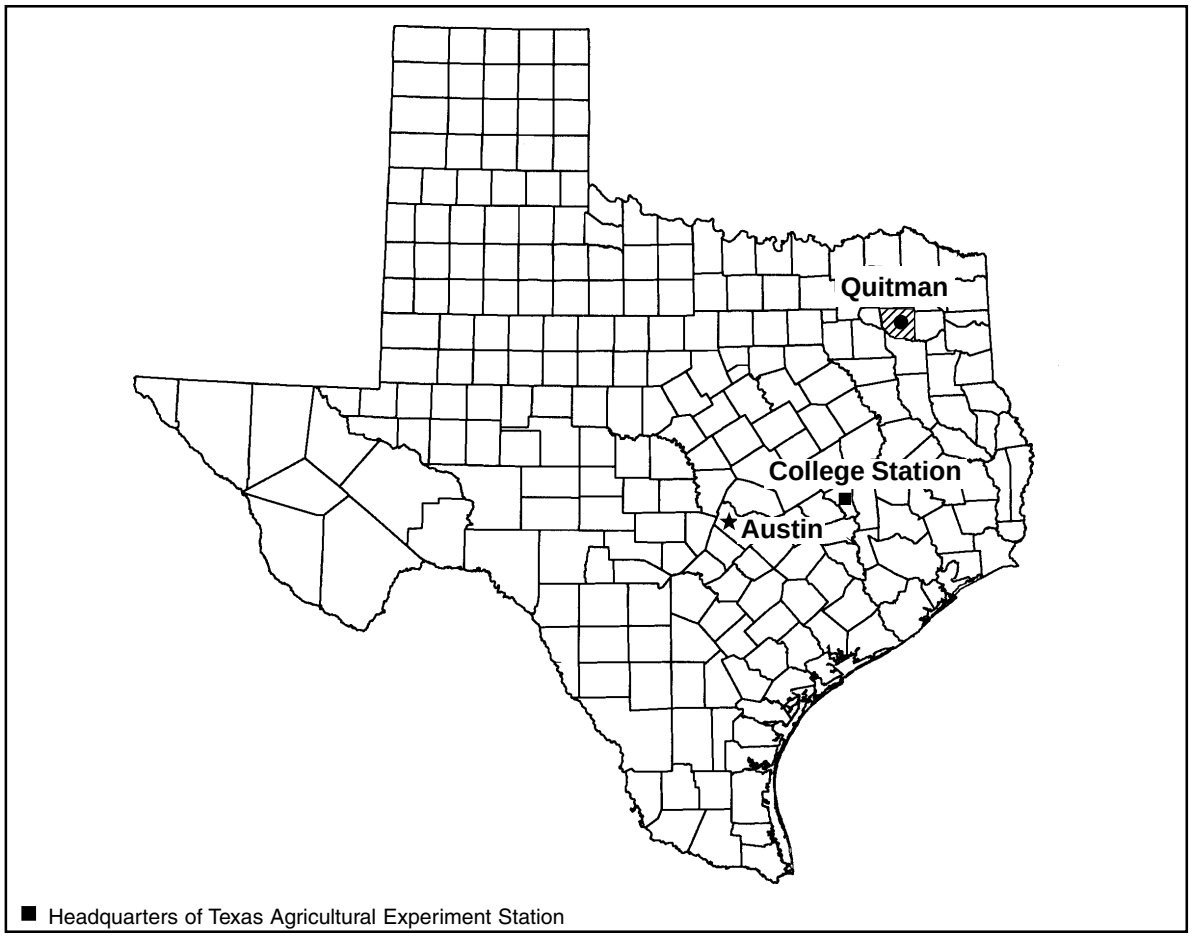

Figure 1.—Location of Wood County in Texas.

fed hay and feed supplements in winter. The main pasture plants are coastal bermudagrass, bahiagrass, and common bermudagrass. Large amounts of hay are produced. Many pastures are overseeded with cool-season legumes to improve the fertility of the soils and provide additional forage.

The main crops grown in Wood County are corn, sweet potatoes, peas, watermelons, and peaches. Most farms are small.

Most commercial timber production in the county is on small, locally owned tracts. Pines and hardwoods are harvested for pulpwood, saw logs, crossties, posts, and poles.

Natural Resources

Soil is the most important natural resource in Wood County. The livelihood of many people in the county depends on the ability of the soil to produce timber, forage for livestock, and cultivated crops.

Oil and gas also are valuable natural resources in the county. The numerous oil and gas wells are sources of income for many landowners. Exploring for oil and gas, drilling, and servicing provide many jobs in the survey area.

Sand and gravel are mined in the county. Sand is mined from thick beds, mainly north of Hawkins in the southeastern part of the county. Gravel is obtained from the surface mining of gravelly soils throughout the county. The sand and gravel are used mainly in construction.

Water, fish, and wildlife are important natural resources in Wood County. Lake Fork Reservoir, Lake Winnsboro, Lake Quitman, Lake Hawkins, Lake Holbrook, and many smaller private lakes and ponds provide abundant water for recreational activities and for domestic, industrial, and agricultural uses.

Climate

Wood County is hot in summer but cool in winter, when an occasional surge of cold air causes a sharp drop in otherwise mild temperatures. Rainfall is uniformly

distributed throughout the year, reaching a slight peak in spring. Snowfalls are infrequent. Annual total precipitation is normally adequate for corn, sweet potatoes, and watermelons.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Mineola, Texas, in the period 1961 to 1990. 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 45 degrees F and the average daily minimum temperature is 33 degrees. The lowest temperature on record, which occurred on December 30, 1983, is 1 degree. In summer, the average temperature is 80 degrees and the average daily maximum temperature is 92 degrees. The highest recorded temperature, which occurred on July 16, 1978, is 107 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 45 inches. Of this, 22.5 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 15 inches. The heaviest 1-day rainfall during the period of record was 6.5 inches on December 3, 1982. Thunderstorms occur on about 45 days each year, and most occur in the spring.

Tornadoes and severe thunderstorms occur occasionally. These storms are local and of short duration, and the pattern of damage is variable and spotty.

The average seasonal snowfall is about 2 inches. The

Figure 2.—A modern poultry operation in Wood County. The soil is Kirvin very fine sandy loam, 2 to 5 percent slopes.

greatest snow depth at any one time during the period of record was 9 inches.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 55 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 13 miles per hour, in spring.

How This Survey Was Made

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

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

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

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

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

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

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

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

General Soil Map Units

The general soil map included with this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

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

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

There are 12 general soil map units in Wood County. These units make up 94 percent of the total acreage. The rest of the acreage is covered by water.

Gently sloping to steep soils that formed under dominantly pine forests on uplands

This group of general soil map units makes up about 43 percent of the land area in Wood County. The major soils in this group are Cuthbert, Bowie, Kirvin, Darco, Lilbert, Duffern, Redsprings, and Elrose soils. They are dominantly on broad interstream divides, convex ridgetops, and side slopes above drainageways. They have a sandy or loamy surface layer and a sandy, loamy, or clayey subsoil. They are acid throughout.

The dominant native vegetation is shortleaf pine and loblolly pine. Native hardwoods consist mainly of red oak, post oak, sweetgum, and hickory. Many areas have been cleared of trees and are used mostly as pasture. Some of the less sloping soils are used as cropland. Plantations of loblolly pine have been established in a few areas that were previously used as cropland.

1. Cuthbert-Bowie-Kirvin

Gently sloping to steep, well drained, loamy soils that have a loamy or clayey subsoil

This map unit consists of Cuthbert soils on side slopes above drainageways, Bowie soils on broad interstream divides, and Kirvin soils on convex ridgetops.

This unit makes up about 18 percent of the land area in the county. It is about 41 percent Cuthbert soils, 28 percent Bowie soils, 13 percent Kirvin soils, and 18 percent soils of minor extent (fig. 3).

The Cuthbert soils are strongly sloping to steep. Typically, the surface layer is dark grayish brown fine sandy loam about 3 inches thick. The subsurface layer, from a depth of 3 to 7 inches, is yellowish brown fine sandy loam. The subsoil, from a depth of 7 to 31 inches, is yellowish red clay that grades to sandy clay loam in the lower part. The underlying material is stratified sandstone, sandy clay loam, and shale.

The Bowie soils are gently sloping. Typically, the surface layer is yellowish brown fine sandy loam about 9 inches thick. The subsoil, from a depth of 9 to 80 inches, is yellowish brown sandy clay loam in the upper part and red, yellow, and gray clay loam in the lower part.

The Kirvin soils are gently sloping to moderately sloping. Typically, the surface layer is dark grayish brown very fine sandy loam about 4 inches thick. The subsurface layer, from a depth of 4 to 11 inches, is brown very fine sandy loam. The subsoil, from a depth of 11 to 50 inches, is clay. The upper part is red, and the lower part is red, brown, and gray. The underlying material is stratified sandstone and shale.

Of minor extent in this map unit are the Briley, Darco, Lilbert, Manco, and Tenaha soils. Briley, Darco, Lilbert, and Tenaha soils are on hills and side slopes. Manco soils are on flood plains along streams.

Most areas of this unit are used as woodland. Native trees are loblolly pine, shortleaf pine, red oak, post oak, sweetgum, and hickory. Loblolly pine and shortleaf pine are the principal commercial trees. In some areas the

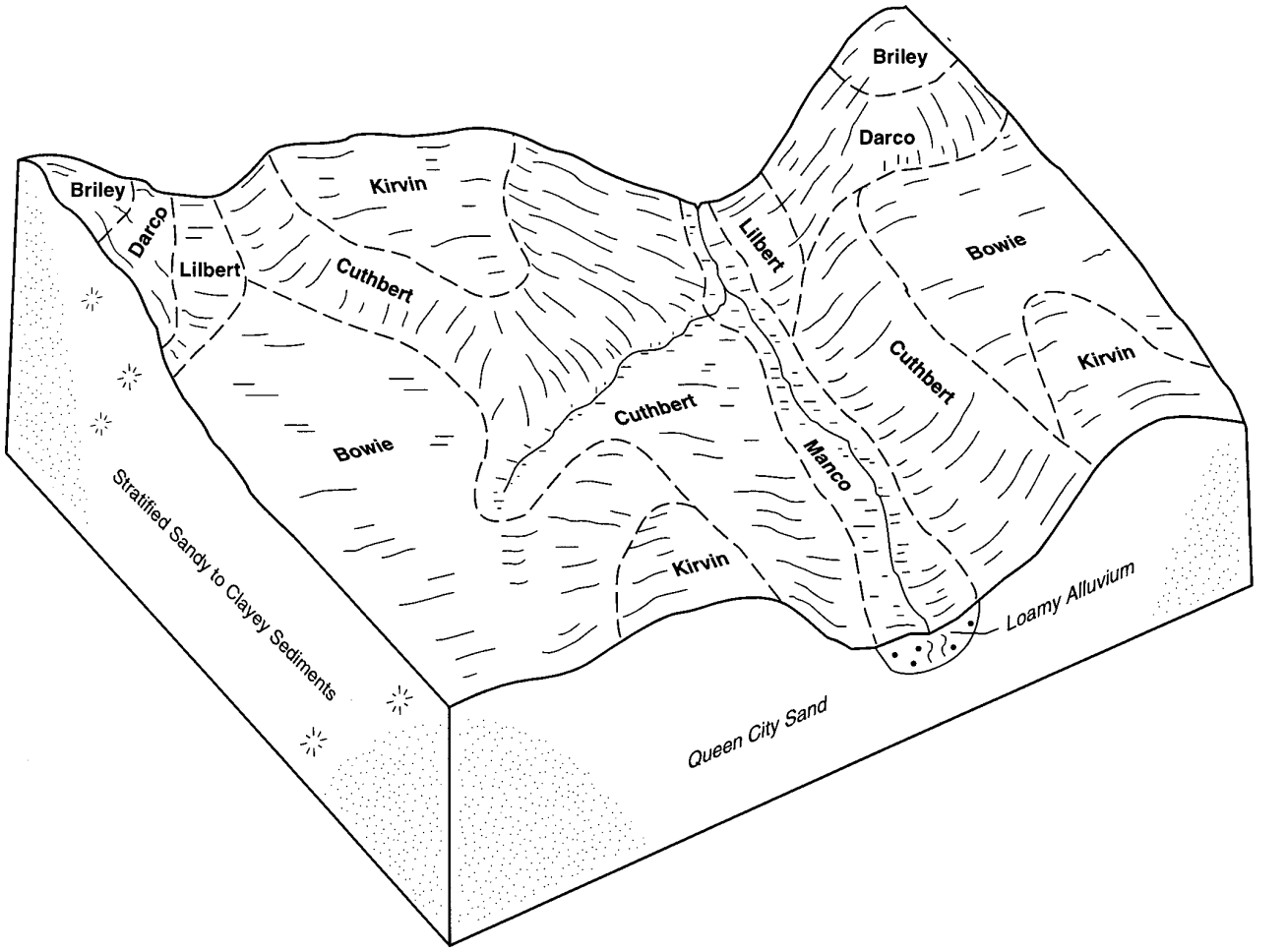

Figure 3.—Typical pattern of soils and parent material in the Cuthbert-Bowie-Kirvin general soil map unit.

slope, the erosion hazard, and the equipment limitation are management concerns.

Many areas of this unit have been cleared of trees and planted to pasture. The main pasture grasses are coastal bermudagrass, common bermudagrass, and bahiagrass. Many pastures are overseeded with arrowleaf clover or crimson clover to increase forage production and to improve the fertility of the soils. Applications of fertilizer and lime also increase forage production.

A few of the smoother, less sloping areas are used for crops and home gardens. The Bowie and Kirvin soils are suited to crops, such as corn and vegetables. Erosion is a hazard in many areas. The Cuthbert soils are not suited to crops because of the slope and erosion hazard.

The soils in this unit are suited to most urban uses. Restricted permeability and the slope are limitations on sites for sanitary facilities. Uncoated steel and concrete are subject to corrosion.

2. Darco-Lilbert

Gently sloping to moderately steep, well drained or somewhat excessively drained, sandy soils that have a loamy subsoil

This map unit consists of Darco soils on broad interstream divides and side slopes, and Lilbert soils on broad interstream divides.

This map unit makes up about 17 percent of the land area in Wood County. It is about 50 percent Darco soils, 31 percent Lilbert soils, and 19 percent soils of minor extent.

The Darco soils are gently sloping to moderately steep and are somewhat excessively drained. Typically, the surface layer is dark grayish brown fine sand about 3

inches thick. The subsurface layer, from a depth of 3 to 56 inches, is fine sand that is brown in the upper part and pale brown in the lower part. The subsoil, from a depth of 56 to 80 inches, is strong brown sandy clay loam.

The Lilbert soils are gently sloping and are well drained. Typically, the surface layer is brown loamy fine sand about 9 inches thick. The subsurface layer, from a depth of 9 to 32 inches, is light yellowish brown loamy fine sand. The subsoil, from a depth of 32 to 80 inches, is yellowish brown sandy clay loam in the upper part and mottled red, yellowish red, yellowish brown, and light brownish gray sandy clay loam in the lower part.

Of minor extent in this map unit are the Bibb, Bowie, Cuthbert, Iulus, Kirvin, Kullit, Leagueville, and Manco soils. Bibb, Iulus, and Manco soils are on flood plains along streams. Bowie and Kullit soils are lower on the landscape than the Darco and Lilbert soils. Cuthbert soils are on side slopes above drainageways. Kirvin soils are on convex ridgetops. Leagueville soils are on foot slopes.

Most areas of this unit are used as woodland. The principal commercial trees are loblolly pine and shortleaf pine. Native hardwood trees are red oak, post oak, blackjack oak, and hickory. Seedling mortality is a management concern.

Many areas of this unit have been cleared of trees and planted to pasture. The main pasture grasses are coastal bermudagrass and bahiagrass. Some pastures are overseeded with arrowleaf clover or vetch to increase forage production and to improve the fertility of the soils. Applications of fertilizer and lime also increase forage production.

A few areas of this unit are used for crops, such as watermelons. Droughtiness is the main limitation on cropland. Applications of fertilizer and lime increase yields.

These soils are suited to most urban uses. Uncoated steel and concrete are subject to corrosion.

3. Duffern

Gently sloping, excessively drained, sandy soils that have a sandy subsoil

This map unit consists of Duffern soils on broad interstream divides.

This unit makes up about 5 percent of the land area in the county. It is about 78 percent Duffern soils and 22 percent soils of minor extent.

Typically, the Duffern soils have a surface layer that is dark grayish brown sand about 9 inches thick. The subsurface layer, from a depth of 9 to 57 inches, is yellowish brown and pale brown sand in the upper part and light yellowish brown sand in the lower part. The underlying material, from a depth of 57 to 80 inches, is sand that is very pale brown in the upper part and pale brown in the lower part.

Of minor extent in this map unit are the Briley, Cuthbert, Darco, Leagueville, Lilbert, and Tenaha soils. Briley, Darco, Leagueville, Lilbert, and Tenaha soils are on interstream divides, foot slopes, and side slopes. Cuthbert soils are on side slopes above drainageways.

Most areas of this unit are used as woodland. Loblolly pine and shortleaf pine are the principal commercial trees. Native hardwood trees are sandjack oak, post oak, blackjack oak, and hickory. Seedling mortality is a management concern.

Some areas have been cleared of trees and planted to pasture. The main pasture grasses are coastal bermudagrass and lovegrass. Some pastures are overseeded with vetch to increase forage production and to improve the fertility of the soils. Droughtiness is the main limitation for forage production. Applications of fertilizer and lime increase forage production.

A few small areas are used for crops such as watermelons. Droughtiness is the main limitation for cropland. Applications of fertilizer and lime increase yields.

This unit is suited to most urban uses. Seepage and rapid permeability are severe limitations on sites for sanitary facilities.

4. Redsprings-Elrose

Gently sloping to steep, well drained, loamy soils that have a loamy or clayey subsoil

This map unit consists of Redsprings soils on convex ridgetops and side slopes above drainageways and Elrose soils in the lower positions on the landscape.

This unit makes up about 3 percent of the land area in the county. It is about 56 percent Redsprings soils, 22 percent Elrose soils, and 22 percent soils of minor extent.

The Redsprings soils are gently sloping to steep. Typically, the surface layer is dark reddish brown very gravelly fine sandy loam about 7 inches thick. The subsoil, from a depth of 7 to 42 inches, is red clay. The underlying material, from a depth of 42 to 65 inches, is stratified red clay, brown and yellow weathered glauconite, and gray shale.

The Elrose soils are gently sloping. Typically, the surface layer is reddish brown fine sandy loam about 6 inches thick. The subsoil, from a depth of 6 to 80 inches, is clay loam that is red in the upper part and yellowish red in the lower part.

Of minor extent in this map unit are the Iulus, Kirvin, Lilbert, Manco, and Wolfpen soils. Iulus and Manco soils are on flood plains along streams. Kirvin soils are lower on the landscape than the Redsprings and Elrose soils. Lilbert and Wolfpen soils are on high ridgetops.

Most areas of this unit are used as woodland. Loblolly pine and shortleaf pine are the principal commercial trees. Native hardwood trees are red oak, post oak, and elm. The erosion hazard, the equipment limitation, and seedling mortality are management concerns.

Some areas of this unit have been cleared of trees and planted to pasture. The main pasture grasses are coastal bermudagrass, common bermudagrass, and bahiagrass. Some pastures are overseeded with arrowleaf clover or crimson clover to increase forage production and to improve the fertility of the soils. Applications of fertilizer and lime also increase forage production.

A few of the less sloping areas are used for crops, mainly home gardens. Applications of fertilizer and lime increase yields. The steeper soils are not suited to crops because of the slope and erosion hazard.

This unit is suited to most urban uses. The slope, seepage, and the clayey subsoil of the Redsprings soils are limitations on sites for sanitary facilities. The steeper soils in this unit have severe limitations that affect urban uses.

Gently sloping to moderately steep soils that formed under dominantly hardwood forests on uplands

This group of general soil map units makes up about 33 percent of the land area in Wood County. The major soils in this group are Woodtell, Freestone, Oakwood, Kirvin, Wolfpen, and Pickton soils. They are dominantly on broad interstream divides, convex ridgetops, and side slopes above drainageways. They have a sandy or loamy surface layer and a loamy or clayey subsoil.

The dominant native vegetation is hardwoods. The main tree species are oak, hickory, and elm. Shortleaf pine and loblolly pine are in scattered areas throughout the units. Many large areas have been cleared of trees and are used mostly as pasture. Some of the less sloping soils are used as cropland. Plantations of loblolly pine have been established in a few areas that were previously used as cropland. The remaining native woodland is mostly on the steeper soils.

5. Woodtell-Freestone

Very gently sloping to moderately steep, moderately well drained or well drained, loamy soils that have a loamy or clayey subsoil

This map unit consists of Woodtell soils on high convex ridgetops and side slopes and Freestone soils on broad interstream divides.

This unit makes up about 15 percent of the land area in the county. It is about 46 percent Woodtell soils, 41 percent Freestone soils, and 13 percent soils of minor extent (fig. 4).

The Woodtell soils are gently sloping to moderately steep and are well drained. Typically, the surface layer is brown loam about 3 inches thick. The subsurface layer, from a depth of 3 to 7 inches, is yellowish brown loam. The subsoil, from a depth of 7 to 57 inches, is red clay in the upper part and mottled red, brown, and gray weathered shale that has clay texture in the lower part. The underlying material, from a depth of 57 to 67 inches, is mottled brown and gray weathered shale that has clay texture.

The Freestone soils are very gently sloping and are moderately well drained. Typically, the surface layer is very dark grayish brown fine sandy loam about 3 inches thick. The subsurface layer, from a depth of 3 to 10 inches, is brown fine sandy loam. The upper part of the subsoil, from a depth of 10 to 27 inches, is yellowish brown sandy clay loam and clay loam with brownish and reddish mottles. The lower part, from a depth of 27 to 80 inches, is dark red, brownish gray, and yellowish brown clay that becomes grayer with depth. The subsoil has streaks and pockets of uncoated sand.

Of minor extent in this map unit are the Bernaldo, Derly, Gladewater, Manco, Pickton, Raino, and Wolfpen soils. Bernaldo soils are on stream terraces. Derly and Raino soils are on flats and low mounds. Gladewater and Manco soils are on flood plains along streams. Pickton and Wolfpen soils are on the higher parts of the landscape.

Most areas of this unit are used as pasture. The main pasture grasses are coastal bermudagrass, common bermudagrass, and bahiagrass. Some pastures are overseeded with arrowleaf clover to increase forage production and to improve the fertility of the soils. Applications of fertilizer and lime also increase forage production.

The dominant native trees in wooded areas of this unit are post oak, blackjack oak, red oak, elm, and sweetgum. Loblolly pine is the main commercial tree. The equipment limitation and seedling mortality are management concerns on the Woodtell soils. Wetness is a management concern on the Freestone soils.

A few areas are used as cropland, mainly home gardens. Some areas are planted to sweet potatoes. Applications of fertilizer and lime increase yields. The steeper soils are not suited to cropland because of the slope and the erosion hazard.

This unit is suited to most urban uses. Restricted permeability and a high shrink-swell potential are limitations on sites for sanitary facilities, buildings, and

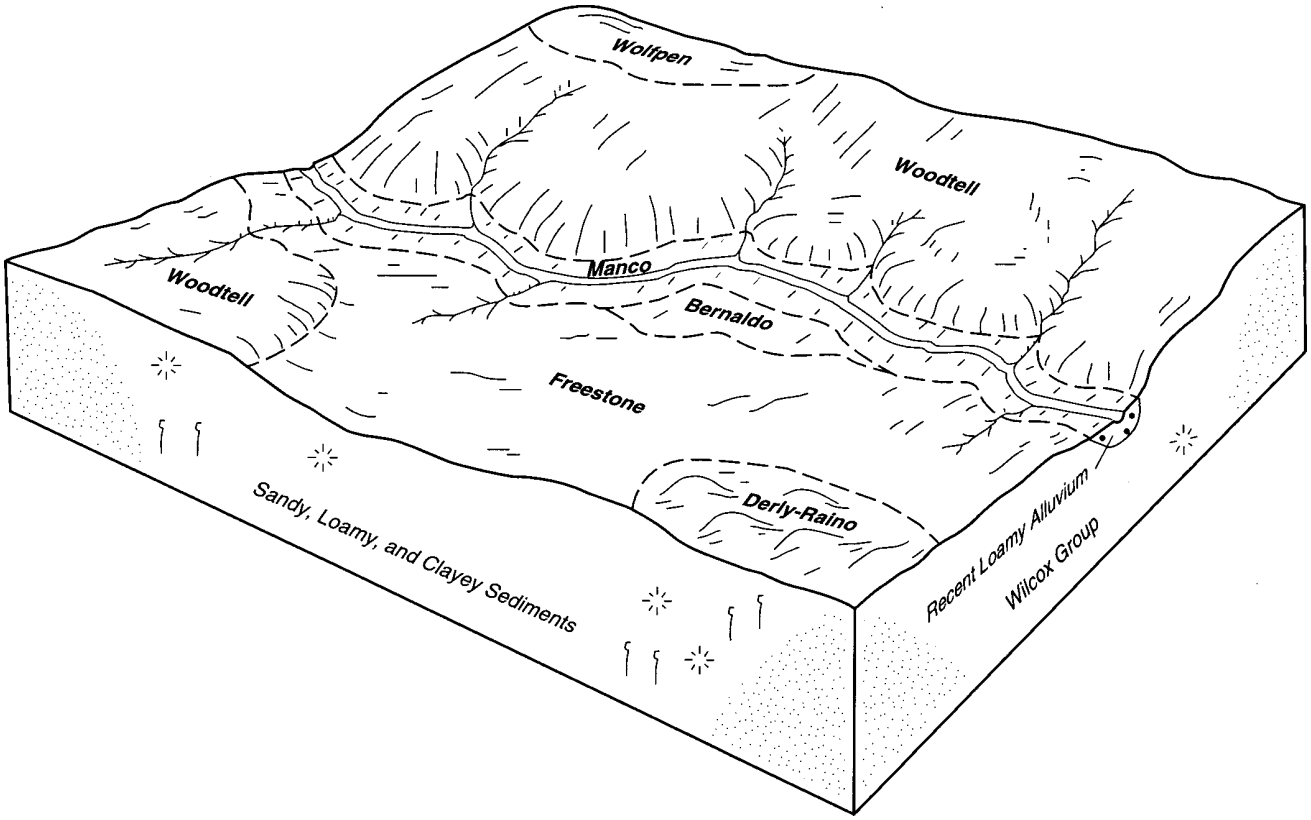

Figure 4.—Typical pattern of soils and parent material in the Woodtell-Freestone general soil map unit.

local roads and streets in areas of the Woodtell soils. Wetness and restricted permeability are limitations on sites for sanitary facilities in areas of the Freestone soils.

6. Oakwood-Kirvin

Gently sloping or moderately sloping, moderately well drained or well drained, loamy soils that have a loamy or clayey subsoil

This map unit consists of Oakwood soils on broad interstream divides and Kirvin soils on high convex ridgetops.

This unit makes up about 11 percent of the land area in the county. It is about 45 percent Oakwood soils, 32 percent Kirvin soils, and 23 percent soils of minor extent (fig. 5).

The Oakwood soils are moderately well drained and gently sloping. Typically, the surface layer is brown very fine sandy loam about 12 inches thick. The subsurface layer, from a depth of 12 to 19 inches, is light yellowish brown very fine sandy loam. The subsoil, from a depth of 19 to 80 inches, is yellowish brown loam in the upper part and yellowish brown sandy clay loam in the lower part.

The Kirvin soils are well drained and are gently sloping or moderately sloping. Typically, the surface layer is dark brown gravelly fine sandy loam about 4 inches thick. The subsurface layer, from a depth of 4 to 7 inches, is strong brown gravelly fine sandy loam. The subsoil, from a depth of 7 to 48 inches, is red clay in the upper part and red, reddish yellow, and light gray stratified sandy clay loam in the lower part. The underlying material, from a depth of 48 to 80 inches, is red, brownish yellow, and light gray stratified fine sandy loam and weathered shale that has clay texture.

Of minor extent in this map unit are the Bernaldo, Cuthbert, Derly, Freestone, Lilbert, Manco, Pickton, Raino, Wolfpen, and Woodtell soils. Bernaldo and Freestone soils are on stream terraces. Cuthbert soils are on side slopes. Derly and Raino soils are on flats and low mounds. Lilbert, Pickton, and Wolfpen soils are higher on the landscape than the Oakwood and Kirvin soils. Manco soils are on flood plains along streams. Woodtell soils are on interstream divides and side slopes.

Most areas of this unit are used as pasture. The main pasture grasses are coastal bermudagrass, common bermudagrass, and bahiagrass. Some pastures are

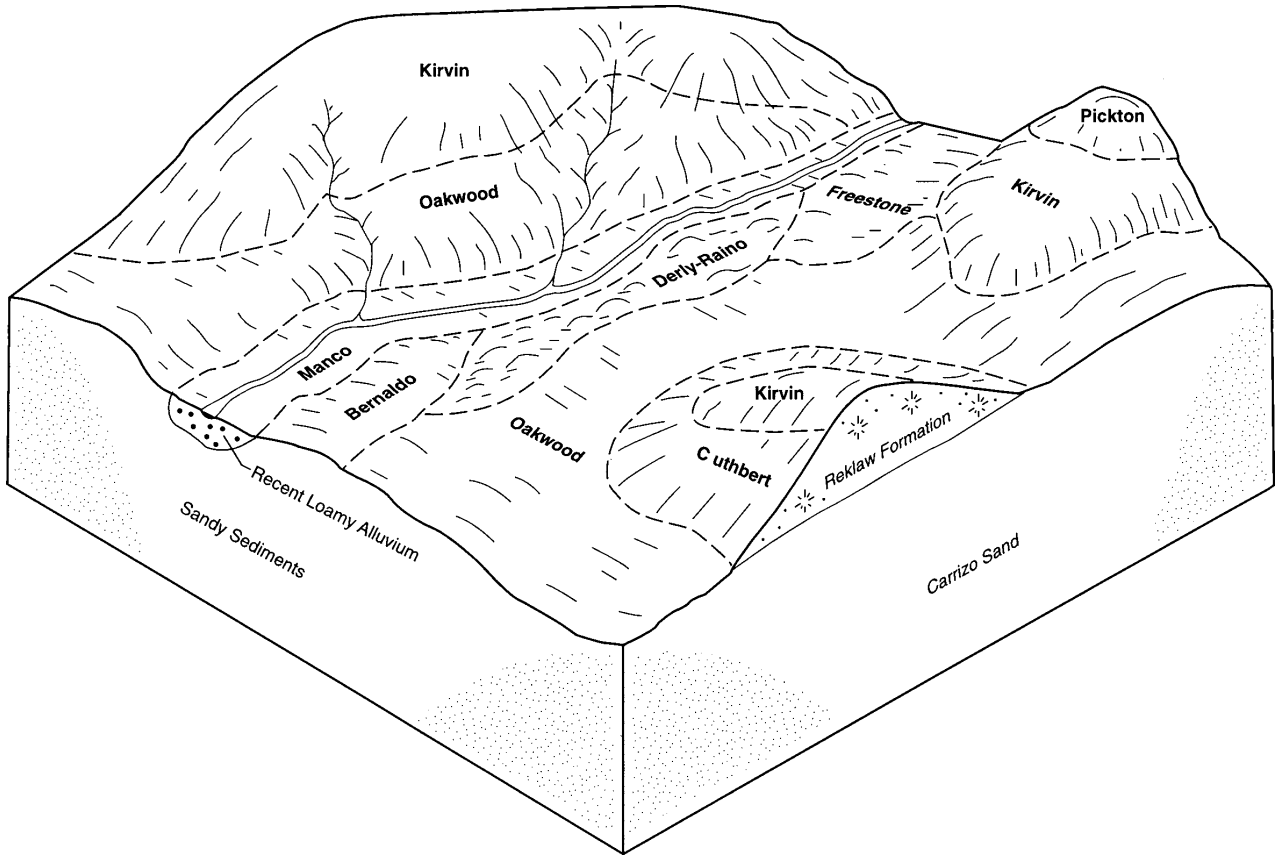

Figure 5.—Typical pattern of soils and parent material in the Oakwood-Kirvin general soil map unit.

overseeded with arrowleaf clover to increase forage production and to improve the fertility of the soils. Applications of fertilizer and lime also increase forage production.

A few areas are used as woodland. The main trees are hardwoods with lesser amounts of loblolly pine and shortleaf pine. Native tree species are post oak, red oak, elm, and sweetgum. Loblolly pine is the main commercial tree. The gravelly surface layer of the Kirvin soils is a management concern.

A few areas are used for crops, such as sweet potatoes, or for home gardens. The erosion hazard and the gravelly surface layer limit crop production on the Kirvin soils. Terracing and farming on the contour help to control erosion. Applications of fertilizer and lime increase yields.

This unit is suited to most urban uses. The slope and restricted permeability are limitations on sites for sanitary facilities in areas of the Kirvin soils. Uncoated steel and concrete are subject to corrosion. Low strength is a limitation on sites for local roads and streets.

7. Wolfpen-Pickton

Gently sloping to moderately steep, well drained, sandy soils that have a loamy subsoil

This map unit consists of Wolfpen and Pickton soils on broad interstream divides and side slopes. Pickton soils are slightly higher on the landscape than Wolfpen soils.

This unit makes up about 7 percent of the land area in the county. It is about 39 percent Wolfpen soils, 24 percent Pickton soils, and 37 percent soils of minor extent (fig. 6).

The Wolfpen soils typically have a surface layer that is dark brown loamy fine sand about 4 inches thick. The subsurface layer, from a depth of 4 to 28 inches, is loamy fine sand that is dark yellowish brown in the upper part and yellowish brown in the lower part. The subsoil, from a

depth of 28 to 80 inches, is sandy clay loam that is yellowish brown in the upper part and brownish yellow in the lower part.

The Pickton soils typically have a surface layer that is dark brown loamy fine sand about 6 inches thick. The subsurface layer, from a depth of 6 to 56 inches, is yellowish brown and light yellowish brown loamy fine sand. The subsoil, from a depth of 56 to 80 inches, is strong brown sandy clay loam in the upper part and mottled yellowish brown, brown, and gray sandy clay loam in the lower part.

Of minor extent in this map unit are the Bernaldo, Cuthbert, Estes, Freestone, Manco, Oakwood, Redsprings, and Woodtell soils. Bernaldo soils are on stream terraces. Cuthbert, Redsprings, and Woodtell soils are on side slopes above drainageways. Estes and Manco soils are on flood plains. Freestone and Oakwood soils are on broad interstream divides on the slightly lower parts of the landscape.

Most areas of this unit are used as pasture. The main pasture grasses are coastal bermudagrass and bahiagrass. Some pastures are overseeded with arrowleaf clover or vetch to increase forage production and to improve the fertility of the soils. Applications of fertilizer and lime also increase forage production.

In wooded areas of this unit, the dominant native trees are hardwoods, such as post oak, red oak, blackjack oak, and sweetgum. Loblolly pine and shortleaf pine are in lesser amounts. Plantations of loblolly pine have been established in some areas previously used as cropland. Seedling mortality is the main management concern.

Some areas of this unit are used for crops, such as sweet potatoes and watermelons. The steeper soils are not suited to crops because of the hazard of erosion. Also, the sandy surface layer limits crop production.

This unit is suited to most urban uses. These soils are a

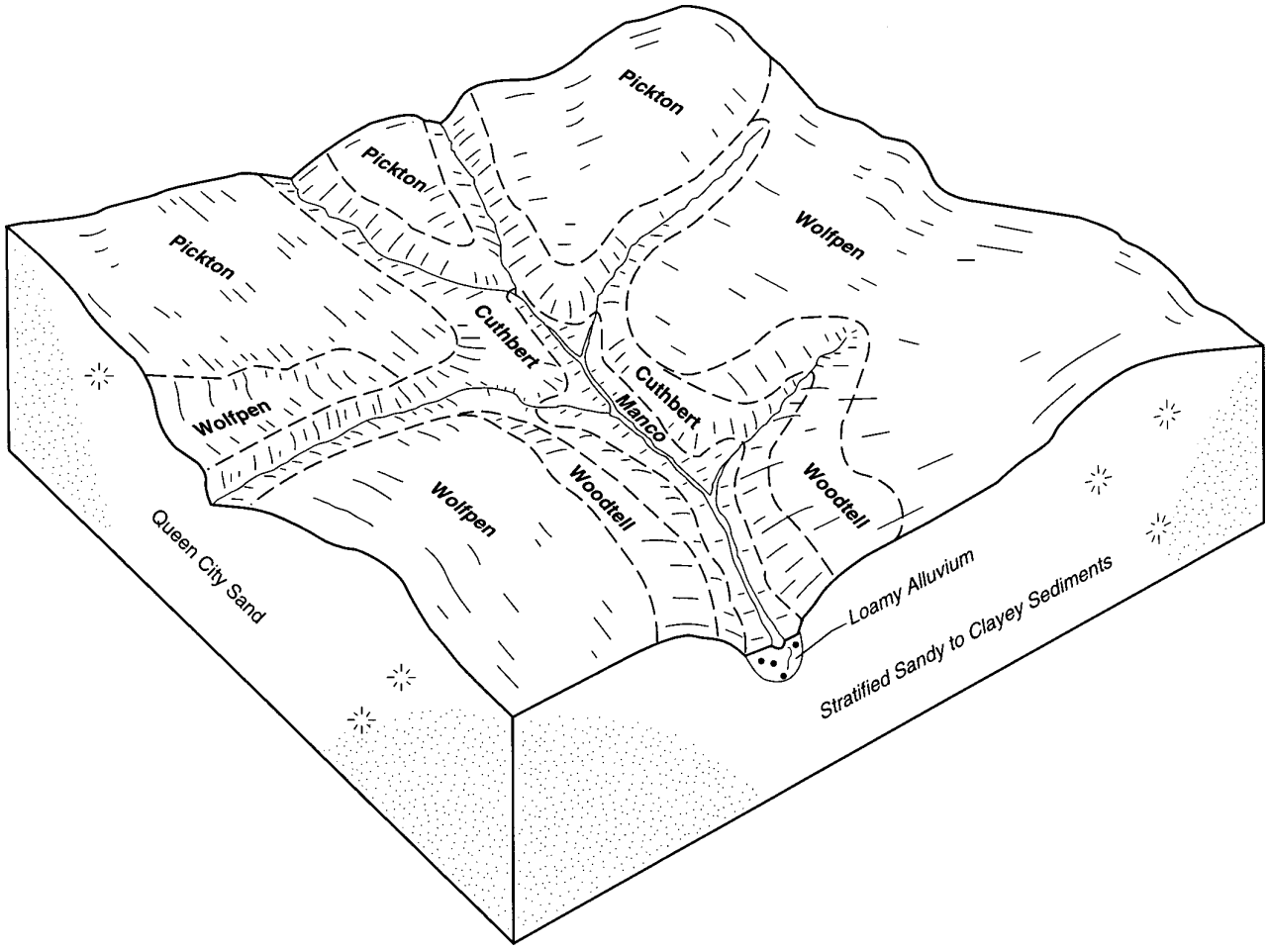

Figure 6.—Typical pattern of soils and parent material in the Wolfpen-Pickton general soil map unit.

poor filter for septic tank absorption fields. On the steeper soils, the slope is a limitation.

Nearly level soils that formed under dominantly hardwood forests on flood plains

This group of general soil map units makes up 16 percent of the land area in Wood County. The major soils in this group are Manco, Gladewater, and Estes soils. They are on flood plains along the Sabine River and the major streams in the county. These soils have a loamy or clayey surface layer and subsoil.

The dominant native vegetation is hardwoods. The main tree species are water oak, willow oak, sweetgum, and ash. Pine grows in some areas of the better drained soils. A few areas have been cleared of trees and are used as pasture. These soils are not suited to crops or urban uses because of the flooding hazard and wetness.

8. Manco

Nearly level, somewhat poorly drained soils that are loamy throughout

This map unit consists of Manco soils on flood plains along most of the major streams in the county.

This unit makes up about 9 percent of the land area in the county. It is about 70 percent Manco soils and 30 percent soils of minor extent.

The Manco soils typically have a surface layer that is dark grayish brown loam about 3 inches thick. The subsoil, from a depth of 3 to 80 inches, is grayish brown and gray loam in the upper part and dark gray silt loam in the lower part.

Of minor extent in this map unit are the Bernaldo, Cuthbert, Estes, Gallime, Gladewater, Hainesville, Latch, and Mollville soils. Bernaldo, Gallime, Hainesville, Latch, and Mollville soils are on low stream terraces, slightly higher than the flood plains. Cuthbert soils are on side slopes above the flood plains. Estes and Gladewater soils are clayey throughout.

Most areas of this unit are used as woodland. The principal commercial trees are hardwoods, such as water oak, willow oak, and sweetgum. The flooding hazard and wetness are severe limitations for pine production.

Some areas of this unit have been cleared of trees and planted to pasture. The main pasture grasses are bahiagrass and common bermudagrass. Tall fescue commonly is overseeded with white clover in areas of this unit.

This unit is not suited to crops or urban uses because of the flooding hazard and wetness.

9. Gladewater-Estes

Nearly level, somewhat poorly drained soils that are clayey throughout

This map unit is on the flood plains along the Sabine River and Lake Fork Creek. Gladewater soils are mainly in the western part of the Sabine River flood plain. Estes soils are mainly in the Lake Fork Creek flood plain and the eastern part of the Sabine River flood plain.

This map unit makes up about 7 percent of the land area in the county. It is about 41 percent Gladewater soils, 30 percent Estes soils, and 29 percent soils of minor extent.

The Gladewater soils typically have a surface layer that is very dark gray clay about 8 inches thick. The subsoil, from a depth of 8 to 80 inches, is dark gray, dark grayish brown, and light brownish gray clay in the upper part and gray clay loam in the lower part.

The Estes soils typically have a surface layer that is dark grayish brown silty clay about 4 inches thick. The subsoil, from a depth of 4 to 80 inches, is dark grayish brown and grayish brown silty clay in the upper part and grayish brown clay in the lower part.

Of minor extent in this map unit are the Bernaldo, Gallime, Hainesville, Iulus, and Manco soils. Bernaldo, Gallime, and Hainesville soils are on low stream terraces. Iulus and Manco soils are in the slightly higher positions on the flood plains.

This map unit is used mainly as woodland. The principal commercial trees are water oak, willow oak, sweetgum, and ash. Wetness and the flooding hazard are the management concerns.

Some areas have been planted to pasture. The main pasture grasses are common bermudagrass and bahiagrass. Tall fescue commonly is overseeded with white clover in areas of this unit. Applications of fertilizer and lime increase forage production.

The soils of this unit are not suited to crops or urban uses because of the flooding hazard and wetness.

Nearly level to moderately sloping soils that formed under mixed hardwood and pine forests on stream terraces

This group of general soil map units makes up about 8 percent of the land area of Wood County. The major soils in this group are Derly, Raino, Bernaldo, Kirvin, Latch, Mollville, and Hainesville soils. These soils are dominantly

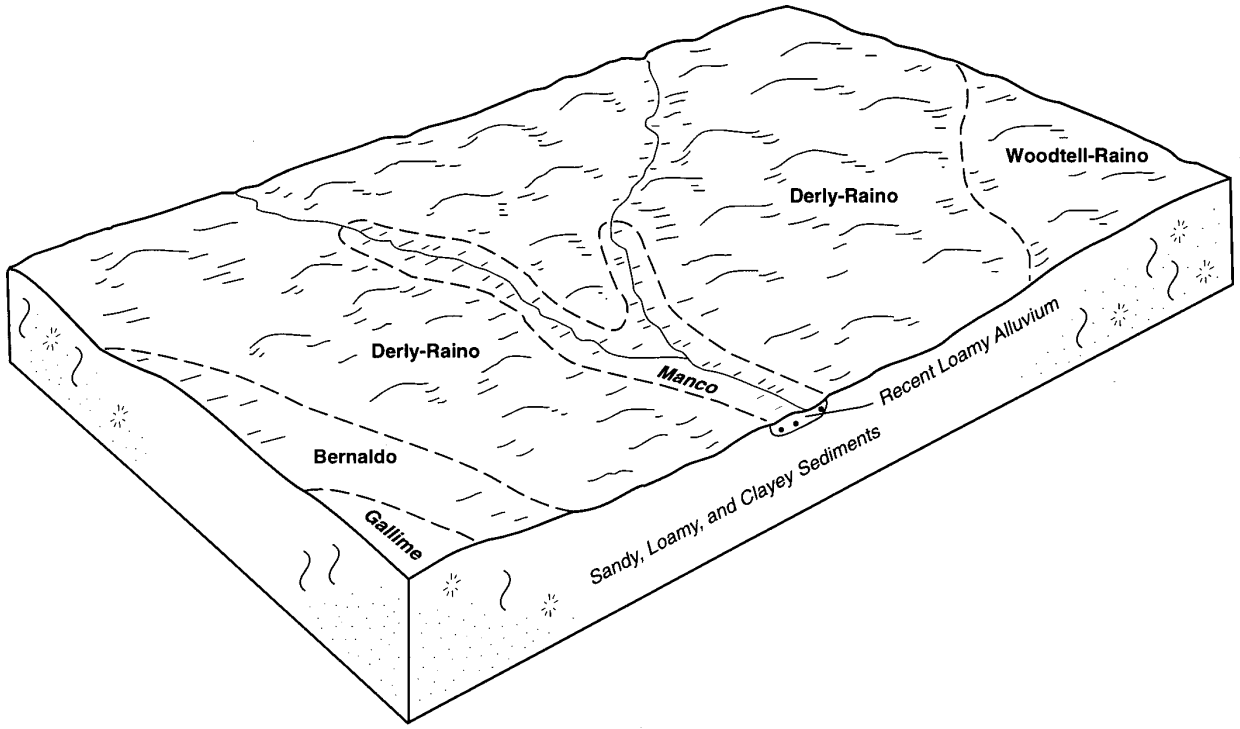

Figure 7.—Typical pattern of soils and parent material in the Derly-Raino general soil map unit.

on terraces along the major streams. They have a sandy or loamy surface layer and a sandy, loamy, or clayey subsoil.

The dominant native vegetation is mixed hardwoods and pine. The main tree species are loblolly pine, shortleaf pine, red oak, post oak, and sweetgum. A few areas have been cleared of trees and are used as pasture or cropland.

10. Derly-Raino

Nearly level, poorly drained or moderately well drained, loamy soils that have a loamy or clayey subsoil

This map unit consists of Derly soils on flats and in intermound areas and Raino soils on mounds.

This unit makes up about 4 percent of the land area in the county. It is about 75 percent Derly and Raino soils and 25 percent soils of minor extent (fig. 7).

The Derly soils are poorly drained. Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsurface layer, from a depth of 4 to 9 inches, is grayish brown loam. The subsoil, from a depth of 9 to 80 inches, is dark grayish brown clay loam in the upper part and dark grayish brown and light brownish gray clay loam in the lower part.

The Raino soils are moderately well drained. Typically, the surface layer is dark brown loam about 10 inches thick. The subsurface layer, from a depth of 10 to 25 inches, is brown loam. The upper part of the subsoil, from a depth of 25 to 35 inches, is light yellowish brown loam. The next part, from a depth of 35 to 72 inches, is brownish, grayish, and reddish clay. The lower part, to a depth of 80 inches, is light brownish gray clay loam that has brownish and yellowish mottles.

Of minor extent in this map unit are the Bernaldo, Gallime, Manco, and Woodtell soils. Bernaldo and Gallime soils are in the slightly higher and smoother areas. Manco soils are on flood plains along streams. Woodtell soils are in the higher areas on convex ridgetops and side slopes.

Most areas of this unit are used as woodland. The main tree species on the Derly soils are post oak, water oak, and willow oak. Loblolly pine, shortleaf pine, and oaks grow on the Raino soils. The equipment limitation and plant competition are management concerns.

Some areas of this unit have been cleared of trees and

are planted to pasture. The main pasture grasses are common bermudagrass, fescue, and bahiagrass. Pastures are overseeded with white clover and singletary peas to increase forage production and to improve the fertility of the soils. Applications of fertilizer and lime also increase forage production.

Because of the poorly drained Derly soils, this unit is not suited to most crops.

This unit is not suited to most urban uses. Wetness, the shrink-swell potential, and very slow permeability are the limitations on sites for sanitary facilities, buildings, and local roads and streets. Uncoated steel and concrete are subject to corrosion.

11. Bernaldo-Kirvin

Gently sloping or moderately sloping, well drained, loamy soils that have a loamy or clayey subsoil

This map unit consists of Bernaldo soils on high terraces and Kirvin soils on convex ridgetops.

This unit makes up about 3 percent of the land area in the county. It is about 48 percent Bernaldo soils, 28 percent Kirvin soils, and 24 percent soils of minor extent.

The Bernaldo soils typically have a surface layer that is dark grayish brown fine sandy loam about 3 inches thick. The subsurface layer, from a depth of 3 to 10 inches, is yellowish brown fine sandy loam. The subsoil, from a depth of 10 to 80 inches, is strong brown loam and sandy clay loam in the upper part and mottled red, light yellowish brown, and strong brown sandy clay loam in the lower part.

The Kirvin soils typically have a surface layer that is dark brown gravelly fine sandy loam about 4 inches thick. The subsurface layer, from a depth of 4 to 7 inches, is strong brown gravelly fine sandy loam. The subsoil, from a depth of 7 to 48 inches, is red clay in the upper part and red, reddish yellow, and light gray stratified sandy clay loam in the lower part. The underlying material, from a depth of 48 to 80 inches, is stratified fine sandy loam and weathered shale that has clay texture.

Of minor extent in this map unit are the Cuthbert, Freestone, Manco, Pickton, Wolfpen, and Woodtell soils. Cuthbert soils are on side slopes above drainageways. Freestone soils are slightly lower on the landscape than Bernaldo and Kirvin soils. Manco soils are on flood plains. Pickton and Wolfpen soils are in the higher positions. Woodtell soils are on convex ridgetops and side slopes.

Most areas of this unit are used as pasture. The main pasture grasses are coastal bermudagrass, common bermudagrass, and bahiagrass. Some pastures are overseeded with arrowleaf clover to increase forage production and to improve the fertility of the soils. Applications of fertilizer and lime also increase forage production.

In wooded areas, the dominant trees are mixed hardwoods and pine. The main hardwood trees are red oak, post oak, sweetgum, and elm. The principal commercial trees are loblolly pine and shortleaf pine. The erosion hazard, the equipment limitation, and seedling mortality are management concerns on the Kirvin soils.

Some areas of this unit are used as cropland. Sweet potatoes and watermelons are grown mainly on the Bernaldo soils. Erosion is the main hazard affecting crop production. Applications of fertilizer and lime increase yields.

This unit is suited to most urban uses. Low strength is a major limitation on sites for local roads and streets.

12. Latch-Mollville-Hainesville

Nearly level, poorly drained, moderately well drained, or somewhat excessively drained, sandy and loamy soils that have a sandy or loamy subsoil

This map unit consists of Mollville soils in low, wet areas and Latch and Hainesville soils in the slightly higher positions. Hainesville soils are near streams.

This unit makes up about 1 percent of the land area in the county. It is about 43 percent Latch and Mollville soils, 23 percent Hainesville soils, and 34 percent soils of minor extent.

The Latch soils are moderately well drained. Typically, the surface layer is brown loamy fine sand about 7 inches thick. The subsurface layer, from a depth of 7 to 44 inches, is very pale brown loamy fine sand. The subsoil, from a depth of 44 to 65 inches, is yellowish brown sandy clay loam. The underlying material is yellowish brown and light gray loamy fine sand.

The Mollville soils are poorly drained. Typically, the surface layer is grayish brown loam about 4 inches thick. The subsurface layer, from a depth of 4 to 9 inches, is light brownish gray loam. The subsoil, from a depth of 9 to 75 inches, is grayish brown and light brownish gray sandy clay loam. The underlying material is light brownish gray fine sandy loam.

The Hainesville soils are somewhat excessively drained. Typically, the surface layer is dark brown and brown loamy fine sand about 11 inches thick. The subsurface layer, from a depth of 11 to 37 inches, is light yellowish brown loamy fine sand. The subsoil, from a depth of 37 to 80 inches, is light yellowish brown and pale brown loamy fine sand.

Of minor extent in this map unit are the Bernaldo, Bibb, Gallime, and Manco soils. Bernaldo and Gallime soils are on the slightly higher stream terraces. Bibb and Manco soils are on flood plains along streams.

Most areas of this unit are used as woodland. The main tree species are red oak, post oak, water oak, willow oak, sweetgum, loblolly pine, and shortleaf pine. The Latch and

Hainesville soils support mixed hardwoods and pine. The Mollville soils support mainly hardwoods. The equipment limitation, seedling mortality, and plant competition are management concerns on the Latch and Hainesville soils. Wetness is a management concern on the Mollville soils.

Some areas of this unit have been cleared of trees and are planted to pasture. The main pasture grasses are coastal bermudagrass, common bermudagrass, and bahiagrass. The poorly drained Mollville soils are suited to tall fescue. Some areas have been overseeded with arrowleaf clover to increase forage production and to improve the fertility of the soils. Applications of fertilizer and lime also increase forage production.

The Latch and Hainesville soils are suited to crops, such as corn, peas, and watermelons. Wetness is a limitation on the Mollville soils. Applications of fertilizer and lime increase yields.

The soils in this unit are suited to most urban uses. Wetness is a limitation on sites for septic systems on the Latch and Mollville soils.

Detailed Soil Map Units

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

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

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Derly-Raino complex, 0 to 1 percent slopes is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Oil wasteland is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables")

give properties of the soils and the limitations, capabilities, and potentials for many uses. The "Glossary" defines many of the terms used in describing the soils or miscellaneous areas.

AtB—Attoyac fine sandy loam, 1 to 3 percent slopes. This very deep, very gently sloping, well drained soil is on stream terraces. Areas are irregular in shape and range from 10 to 200 acres.

Typically, the surface layer is brown fine sandy loam about 8 inches thick. The subsoil, from a depth of 8 to 80 inches, is red sandy clay loam that has strong brown mottles in the lower part.

Permeability is moderate, and the available water capacity is high. Surface runoff is very low. The hazard of water erosion is slight.

Included with this soil in mapping are small areas of Bernaldo, Briley, and Gallime soils. Bernaldo soils have a yellowish subsoil. Briley soils have a sandy surface soil 20 to 40 inches thick. Gallime soils have a loamy surface soil 20 to 40 inches thick and a yellowish subsoil. Included soils make up less than 20 percent of the map unit.

This Attoyac soil is used mainly as pasture or woodland.

This soil is well suited to coastal bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with crimson clover, arrowleaf clover, or vetch increases forage production and improves soil fertility. Good grazing management and applications of fertilizer and lime also increase forage production.

Loblolly pine and shortleaf pine are the main commercial trees on this soil. Good woodland management increases timber production.

This soil is well suited to crops, such as corn and watermelons. Applications of fertilizer and lime increase yields. Farming on the contour and terracing help to control erosion. Incorporating crop residue into the soil and planting cover crops help maintain tilth.

This Attoyac soil is well suited to most urban uses. The moderate permeability is a limitation affecting septic systems. Low strength is a moderate limitation on sites for local roads and streets. The corrosion of uncoated steel and concrete is a limitation. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IIe. The woodland ordination symbol is 10A.

BeB—Bernaldo fine sandy loam, 1 to 3 percent slopes. This very deep, very gently sloping, well drained soil is on stream terraces. Areas are irregular in shape and range from 10 to 200 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 3 inches thick. The subsurface layer, from a depth of 3 to 10 inches, is yellowish brown fine sandy loam. The upper part of the subsoil, from a depth of 10 to 35 inches, is strong brown loam. The middle part, from a depth of 35 to 42 inches, is strong brown sandy clay loam. The lower part of the subsoil, from a depth of 42 to 80 inches, is mottled strong brown, light yellowish brown, and red sandy clay loam.

Permeability is moderate, and the available water capacity is high. Surface runoff is very low. The hazard of water erosion is moderate. The seasonal high water table is at a depth of 4 to 6 feet during the winter and spring.

Included with this soil in mapping are areas of Attoyac, Freestone, Gallime, and Kirvin soils. Attoyac soils have a red subsoil. Freestone soils have a subsoil that is clayey in the lower part. Gallime soils have a loamy surface soil 20 to 40 inches thick. Kirvin soils have a red, clayey subsoil. Included soils make up less than 20 percent of the map unit.

This Bernaldo soil is used mainly as pasture or woodland. Some areas are used as cropland.

This soil is well suited to coastal bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with arrowleaf clover or vetch increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

The main commercial trees on this soil are loblolly pine and shortleaf pine. Plantations of loblolly pine have been established in some areas that previously were used as cropland. Good woodland management increases timber production.

This soil is well suited to Virginia pine and Scotch pine, which are grown for use as Christmas trees.

This soil is well suited to crops, such as corn, sweet potatoes, and watermelons. It is also well suited to growing peaches and nectarines. Applications of fertilizer and lime increase yields. Incorporating crop residue into the soil and planting cover crops help to maintain tilth and control erosion. Farming on the contour and terracing also help to control erosion.

This Bernaldo soil is suited to most urban uses. Wetness, moderate permeability, and seepage are the main limitations on sites for sanitary facilities. Wetness and the moderate shrink-swell potential are limitations on building sites. Low strength is a severe limitation on sites for local roads and streets. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IIe. The woodland ordination symbol is 10A.

BeD—Bernaldo fine sandy loam, 5 to 8 percent slopes. This very deep, moderately sloping, well drained soil is on stream terraces. Areas are mainly oblong and range from 10 to 50 acres.

Typically, the surface layer is brown fine sandy loam about 3 inches thick. The subsurface layer, from a depth of 3 to 10 inches, is pale brown fine sandy loam. The subsoil

extends to a depth of 80 inches. The upper part is strong brown clay loam and sandy clay loam that has brownish mottles. The lower part is mottled yellowish brown, light brownish gray, and light gray sandy clay loam.

Permeability is moderate, and the available water capacity is high. Surface runoff is medium. The hazard of water erosion is severe. The seasonal high water table is at a depth of 4 to 6 feet during winter and spring.

Included with this soil in mapping are areas of Cuthbert, Kirvin, Sacul, and Tenaha soils. Cuthbert and Kirvin soils have a red, clayey subsoil. Sacul soils have gray mottles in the upper part of the subsoil. Tenaha soils have a sandy surface soil 20 to 40 inches thick. Included soils make up less than 20 percent of the map unit.

This Bernaldo soil is used mainly as pasture or woodland.

This soil is well suited to coastal bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with arrowleaf clover or vetch increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

The main commercial trees on this soil are loblolly pine and shortleaf pine. Good woodland management increases timber production.

This soil is well suited to Virginia pine and Scotch pine, which are grown for use as Christmas trees.

This soil is suited to crops, such as corn, sweet potatoes, and peaches and nectarines. The severe hazard of erosion is the main management concern. Incorporating crop residue into the soil and planting cover crops help to maintain tilth and control erosion. Farming on the contour and terracing also help to control erosion. Applications of fertilizer and lime increase yields.

This Bernaldo soil is suited to most urban uses. Wetness, moderate permeability, and seepage are the main limitations on sites for sanitary facilities. Wetness and the moderate shrink-swell potential are limitations on building sites. Low strength is a severe limitation on sites for local roads and streets. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IVe. The woodland ordination symbol is 10A.

Bf—Bibb fine sandy loam, frequently flooded. This very deep, nearly level, poorly drained soil is on flood plains of smaller streams. Slopes are 0 to 1 percent. Areas are mostly long and narrow and range from 20 to 300 acres.

Typically, the surface layer is about 12 inches thick. It is grayish brown fine sandy loam in the upper part and gray silt loam in the lower part. The underlying material, from a depth of 12 to 80 inches, is gray fine sandy loam in the upper part and dark gray silt loam in the lower part.

Permeability is moderate, and the available water capacity is high. Surface runoff is negligible. The hazard of water erosion is slight. This soil is flooded on the average of two or three times a year. Flooding usually lasts from 2 to 7 days and is most likely to occur during the months of December through May. The seasonal high water table is at a depth of 0.5 to 1 foot during winter and spring.

Included with this soil in mapping are small areas of Iulus and Manco soils. Iulus soils are better drained. Manco soils are more clayey and are not as wet as the Bibb soils. Also included is a similar soil that contains decaying organic matter in the surface layer. Included soils make up less than 20 percent of the map unit.

This Bibb soil is used mainly as wildlife habitat. Some areas are used as pasture or woodland.

This soil is well suited to wetland plants. Shallow water areas of this map unit provide a natural refuge for ducks and other waterfowl.

A few areas have been cleared of trees and are used as pasture. This soil is suited to tall fescue. Wetness is the major limitation.

The dominant native trees are loblolly pine, water oak, sweetgum, and blackgum. The equipment limitation, seedling mortality, and plant competition make commercial timber production difficult.

This Bibb soil is not suited to cropland or urban uses because of the flooding hazard and wetness.

The capability subclass is Vw. The woodland ordination symbol is 11W.

BoC—Bowie fine sandy loam, 1 to 5 percent slopes. This very deep, gently sloping, well drained soil is on broad, convex interstream divides on uplands. Areas are mostly irregular in shape and range from 10 to 400 acres.

Typically, the surface layer is yellowish brown fine sandy loam about 9 inches thick. The upper part of the subsoil, from a depth of 9 to 47 inches, is yellowish brown sandy clay loam that has reddish and yellowish mottles. The middle part, from a depth of 47 to 64 inches, is brownish yellow sandy clay loam. The lower part, from a depth of 64 to 80 inches, is mottled red, brownish yellow, and light brownish gray clay loam. The reddish mottles and plinthite are below a depth of 30 inches.

Permeability is moderately slow, and the available water capacity is high. Surface runoff is low. The hazard of water erosion is moderate. The seasonal high water table is at a depth of 3.5 to 5.0 feet during winter and spring.

Included with this soil in mapping are small areas of Kirvin, Kullit, Lilbert, and Sacul soils. Kirvin soils have a red, clayey subsoil. Kullit soils have gray mottles in the upper part of the subsoil. Lilbert soils have a sandy surface soil 20 to 40 inches thick. Sacul soils have a clayey subsoil with gray mottles in the upper part. Included soils make up less than 20 percent of the map unit.

Figure 8.—Peach orchard in an area of Bowie fine sandy loam, 1 to 5 percent slopes.

This Bowie soil is used mainly as pasture. Some areas are wooded, and a few areas are used as cropland.

This soil is suited to coastal bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with arrowleaf clover or crimson clover increases forage production and improves soil fertility. Good management and applications of fertilizer and lime also increase forage production.

Loblolly pine and shortleaf pine are the main commercial trees on this soil. Good woodland management increases timber production.

This soil is well suited to Virginia pine and Scotch pine, which are grown as Christmas trees.

This soil is well suited to corn, sweet potatoes, watermelons, and peas. It is also well suited to orchard crops, such as peaches and nectarines (fig. 8). Applications of fertilizer and lime increase yields. Farming on the contour and terracing help to control erosion.

This Bowie soil is suited to most urban uses. The moderately slow permeability and wetness are severe limitations on sites for septic tank absorption fields. Corrosion of uncoated steel and concrete is a limitation. Low strength and wetness are limitations on sites for buildings and local roads and streets. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IIIe. The woodland ordination symbol is 9A.

ByC—Briley loamy fine sand, 2 to 5 percent slopes. This very deep, gently sloping, well drained soil is on

convex ridgetops and smooth areas on uplands. Areas are irregular in shape and range from 5 to 50 acres.

Typically, the surface layer is dark grayish brown loamy fine sand about 3 inches thick. The subsurface layer, from a depth of 3 to 33 inches, is loamy fine sand that is brown in the upper part and pale brown in the lower part. The upper part of the subsoil, from a depth of 33 to 60 inches, is red and yellowish red sandy clay loam that has reddish and brownish mottles. The lower part, from a depth of 60 to 80 inches, is strong brown fine sandy loam that has light yellowish brown mottles.

Permeability is moderate, and the available water capacity is moderate. Surface runoff is very low or low. The hazard of water erosion is moderate.

Included with this soil in mapping are small areas of Bowie, Kirvin, Lilbert, Oakwood, and Wolfpen soils. Bowie and Oakwood soils have a loamy surface layer and a yellowish subsoil. Kirvin soils have a loamy surface layer and a red, clayey subsoil. Lilbert and Wolfpen soils have a yellowish subsoil. Also included are areas where the surface layer is not as sandy. Included soils make up less than 15 percent of the map unit.

This Briley soil is used mainly as pasture or woodland. A few areas are used as cropland.

This soil is well suited to coastal bermudagrass, bahiagrass, and lovegrass. Overseeding with arrowleaf clover or vetch increases forage production and improves soil fertility. Good grazing management and applications of fertilizer and lime also increase forage production.

The main commercial trees on this soil are loblolly pine and shortleaf pine. Droughtiness is the main limitation. Good woodland management increases timber production.

This soil is well suited to corn, peas, sweet potatoes, and peaches and nectarines. Droughtiness is the main limitation. Applications of fertilizer and lime increase yields. Farming on the contour helps to control erosion.

This Briley soil is suited to most urban uses. Seepage and the slope are limitations on sites for area sanitary landfills. Corrosion of uncoated steel and concrete is a limitation. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IIIe. The woodland ordination symbol is 8S.

CfE—Cuthbert fine sandy loam, 8 to 25 percent slopes. This soil is moderately deep to weakly consolidated sandstone and shale. It is a strongly sloping to steep, well drained soil on side slopes above drainageways on uplands. Areas are mostly oblong and range from 10 to 1,500 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 3 inches thick. The subsurface layer, from a depth of 3 to 7 inches, is yellowish brown fine sandy loam. The subsoil, from a depth of 7 to 31 inches, is yellowish red clay that has red and yellowish brown mottles in the upper part and light brownish gray fragments of weathered shale in the lower part. The underlying material, from a depth of 31 to 60 inches, is stratified red, yellowish red, yellowish brown, and light brownish gray sandy clay loam, soft sandstone, and weathered shale.

Permeability is moderately slow, and the available water capacity is moderate. Surface runoff is medium or high. The hazard of water erosion is severe.

Included with this soil in mapping are small areas of Darco, Kirvin, Redsprings, Tenaha, and Woodtell soils. Darco and Tenaha soils have a sandy surface layer. Kirvin, Redsprings, and Woodtell soils are underlain by mostly loamy and clayey weathered materials at a depth of more than 40 inches. Also included are small areas of Cuthbert soils that are eroded and gravelly. Included soils make up less than 20 percent of the map unit.

This Cuthbert soil is used mainly as woodland. Some areas have been cleared of trees and are used as pasture.

The main commercial trees on this soil are loblolly pine and shortleaf pine. The slope and the clayey subsoil limit pine production. Good woodland management increases timber production.

This soil is suited to coastal bermudagrass and bahiagrass. Overseeding pastures with legumes, such as clover or vetch, increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production. The hazard of erosion can be reduced by good grazing management.

This soil is not suited to cropland because of the slope and the severe hazard of erosion.

This Cuthbert soil has severe limitations as a site for most urban uses. It is highly corrosive to uncoated steel and concrete. The slope and low strength are severe limitations on sites for local roads and streets. The slope and the shrink-swell potential are limitations on building sites. The moderately slow permeability and the slope are severe limitations on sites for septic tank absorption fields.

The capability subclass is VIIe. The woodland ordination symbol is 8R.

CgE—Cuthbert gravelly fine sandy loam, 8 to 25 percent slopes. This soil is moderately deep to weakly consolidated sandstone and shale. It is a strongly sloping to steep, well drained soil on side slopes above drainageways on uplands. Areas are mostly oblong and range from 10 to 300 acres.

Typically, the surface layer is dark grayish brown gravelly fine sandy loam about 5 inches thick. The subsurface layer, from a depth of 5 to 12 inches, is yellowish brown gravelly fine sandy loam. The subsoil, from a depth of 12 to 31 inches, is red clay in the upper

part and red clay and yellow, soft sandstone in the lower part. The underlying material, from a depth of 31 to 60 inches, is stratified red and gray clay that has light brown mottles and gray weathered shale.

Permeability is moderately slow, and the available water capacity is moderate. Surface runoff is medium or high. The hazard of water erosion is severe.

Included with this soil in mapping are small areas of Darco, Kirvin, Redsprings, Tenaha, and Woodtell soils. Darco and Tenaha soils have a sandy surface layer. Kirvin, Redsprings, and Woodtell soils are underlain by weathered, mostly loamy and clayey materials at a depth of more than 40 inches. Also included are areas of Cuthbert soils where about 10 percent of the surface is covered with stones and areas of Cuthbert soils where the surface layer has been removed. Included soils make up less than 20 percent of the map unit.

This Cuthbert soil is used mainly as woodland.

The main commercial trees on this soil are loblolly pine and shortleaf pine. The slope and fragments of ironstone on the surface are the main limitations affecting timber production. Because of these limitations, areas are generally inaccessible to vehicles. Wooded areas in this unit are natural refuges for deer and other wildlife. These areas can be managed in such a manner that natural reproduction maintains the number of trees.

This soil is not suited to pasture or cropland because of the slope, the hazard of erosion, and fragments of ironstone on the surface.

This Cuthbert soil is poorly suited to urban uses. The moderately slow permeability and the slope are severe limitations on sites for septic tank absorption fields. The slope and a high shrink-swell potential are severe limitations on building sites. Corrosion of uncoated steel and concrete is a limitation. The slope and low strength are severe limitations on sites for local roads and streets. Some areas that are used as homesites have scenic views.

The capability subclass is VIIe. The woodland ordination symbol is 8R.

DaC—Darco fine sand, 2 to 5 percent slopes. This very deep, gently sloping, somewhat excessively drained soil is on broad interstream divides on uplands. Areas are mostly irregular in shape and range from 5 to 1,000 acres.

Typically, the surface layer is dark grayish brown fine sand about 3 inches thick. The subsurface layer, from a depth of 3 to 56 inches, is fine sand that is brown in the upper part and pale brown in the lower part. The subsoil, from a depth of 56 to 80 inches, is strong brown sandy clay loam that has red and light brownish gray mottles.

Permeability is rapid in the surface layer and moderate in the subsoil. The available water capacity is low. Surface runoff is very low. The hazard of water erosion is slight.

Included with this soil in mapping are small areas of Briley, Duffern, and Lilbert soils. Briley and Lilbert soils have a sandy surface soil 20 to 40 inches thick. Duffern soils are sandy throughout. Included soils make up less than 20 percent of the map unit.

This Darco soil is used mainly as woodland or pasture. Some areas are used as cropland.

This soil is well suited to coastal bermudagrass and lovegrass. Overseeding pastures with legumes, such as vetch, increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

Mixed hardwoods and pine are the native trees on this soil. Shortleaf pine and loblolly pine are the main commercial trees. Plantations of loblolly pine have been established in a few areas that previously were used as cropland. Droughtiness is the main limitation.

This soil is suited to the production of Christmas trees; however, an irrigation system is needed because of the low available water capacity.

This soil is suited to crops, such as watermelons, peas, sweet potatoes, and peaches and nectarines. Droughtiness is the main limitation. Applications of fertilizer and lime increase yields. Farming on the contour and planting cover crops help to control erosion.

This Darco soil is suited to most urban uses. Corrosion of uncoated steel and concrete is a limitation. Seepage is a limitation on sites for sanitary facilities. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IIIs. The woodland ordination symbol is 8S.

DaE—Darco fine sand, 8 to 15 percent slopes. This very deep, strongly sloping to moderately steep, somewhat excessively drained soil is on narrow side slopes above drainageways on uplands. Areas are mostly oblong and range from about 5 to 400 acres.

Typically, the surface layer is brown fine sand about 8 inches thick. The subsurface layer, from a depth of 8 to 50 inches, is fine sand that is yellowish brown in the upper part and light yellowish brown in the lower part. The subsoil, from a depth of 50 to 80 inches, is yellowish brown sandy clay loam that has red, yellowish red, strong brown, and light brownish gray mottles.

Permeability is rapid in the surface layer and moderate in the subsoil. The available water capacity is low. Surface runoff is low. The hazard of water erosion is severe.

Included with this soil in mapping are areas of Cuthbert and Tenaha soils. Cuthbert soils have a loamy surface layer and a clayey subsoil. Tenaha soils have a sandy surface soil 20 to 40 inches thick. Also included is a similar soil that is wetter and is on foot slopes. Included soils make up less than 20 percent of the map unit.

This Darco soil is used mainly as woodland. Some areas have been cleared of trees and are used as pasture.

Mixed hardwoods and pine are the native trees on this soil. Shortleaf pine and loblolly pine are the main commercial trees. The slope and droughtiness are the main limitations affecting timber production.

This soil is well suited to coastal bermudagrass and lovegrass. The low available water capacity is the main limitation. Applications of fertilizer and lime increase forage production.

This soil is not suited to cropland because of the slope and the hazard of erosion.

This Darco soil is suited to most urban uses. Corrosion of uncoated steel and concrete is a limitation. The slope is a limitation on sites for buildings and for local roads and streets. The seepage and the slope are severe limitations on sites for sanitary facilities. Proper design and careful installation can help to overcome these limitations.

The capability subclass is VIe. The woodland ordination symbol is 8S.

DrA—Derly-Raino complex, 0 to 1 percent slopes. These very deep, nearly level soils are on mounded areas of high stream terraces. The Derly soil is on flats and intermound areas and is poorly drained. The Raino soil is on mounds and is moderately well drained. The mounds are round to oblong, 1.5 to 3 feet high, and 20 to 75 feet across. Areas are irregular in shape and range from 5 to 500 acres.

This unit is about 55 percent Derly soils, 35 percent Raino soils, and 10 percent other soils. The areas of soils that make up this complex are so intricately mixed that separating them is not practical at the scale mapped.

Typically, the surface layer of the Derly soil is dark grayish brown loam about 4 inches thick. The subsurface layer, from a depth of 4 to 9 inches, is grayish brown loam. The upper part of the subsoil, from a depth of 9 to 21 inches, is dark grayish brown clay loam that has vertical streaks of light brownish gray loam. The middle part, from a depth of 21 to 65 inches, is dark grayish brown clay loam with yellowish brown mottles. The lower part of the subsoil, from a depth of 65 to 80 inches, is light brownish gray clay loam with brownish yellow mottles.

The Derly soil is very slowly permeable, and the available water capacity is high. Surface runoff is negligible. The hazard of water erosion is slight. Water ponds in the shallow depressional areas during periods of heavy rainfall. The seasonal high water table is at a depth of 0.5 to 1 foot during winter and spring.

Typically, the surface layer of the Raino soil is dark brown loam about 10 inches thick. The subsurface layer, from a depth of 10 to 25 inches, is brown loam. The upper part of the subsoil, from a depth of 25 to 35 inches, is light yellowish brown loam mixed with very pale brown and light brownish gray sandy material. From a depth of 35 to 58 inches, it is light brownish gray and brown clay. From a depth of 58 to 72 inches, it is mottled light brownish gray, brown, and red clay. The lower part of the subsoil, from a depth of 72 to 80 inches, is light brownish gray clay loam that has strong brown and brownish yellow mottles.

The Raino soil is very slowly permeable and the available water capacity is high. Surface runoff is low. The hazard of water erosion is slight. The seasonal high water table is at a depth of 2 to 3 feet during winter and spring.

Included with these soils in mapping are small areas of Freestone and Woodtell soils. Freestone soils have a clay texture in the lower part of the subsoil and are not as wet as the Derly soils. Woodtell soils have a red, clayey subsoil. Also included is a soil similar to Derly that does not have a light-colored loam mixed with the upper part of the subsoil. Included soils make up less than 10 percent of the map unit.

These soils are used mainly as woodland. Some areas have been cleared of trees and are used as pasture.

The dominant trees on this map unit are post oak, water oak, and willow oak on the Derly soil and loblolly pine and water oak on the Raino soil. Loblolly pine is the main commercial tree. The wetness of the Derly soil makes it difficult to harvest pine on the higher-lying Raino soil.

These soils are suited to common bermudagrass, tall fescue, and bahiagrass. Overseeding pastures with white clover or singletary peas increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

The Derly soil is too wet for most cultivated crops. A drainage system is needed if cultivated crops are grown. Applications of fertilizer and lime increase yields.

These soils are not suited to most urban uses. Wetness, the shrink-swell potential, and the very slow permeability are severe limitations on sites for septic tank absorption fields, buildings, and local roads and streets. Corrosion of uncoated steel and concrete is a limitation. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IVw for areas of the Derly soil and IIIs for areas of the Raino soil. The woodland ordination symbol is 4W in areas of the Derly soil and 9W in areas of the Raino soil.

DuC—Duffern sand, 1 to 5 percent slopes. This very deep, gently sloping, excessively drained soil is on broad interstream divides on uplands. Areas are irregular in shape and range from 50 to 3,000 acres.

Typically, the surface layer is dark grayish brown sand about 9 inches thick. The next layer, from a depth of 9 to 80 inches, is brownish sand. It has reddish lamellae in the lower part.

Permeability is rapid, and the available water capacity is

Figure 9.—Improved pasture of coastal bermudagrass. The soil is Duffern sand, 1 to 5 percent slopes.

low. Surface runoff is negligible or very low. The hazard of water erosion is moderate.

Included with this soil in mapping are small areas of Darco and Lilbert soils. Darco soils have a sandy surface soil 40 to 80 inches thick. Lilbert soils have a sandy surface soil 20 to 40 inches thick. Also included are a similar soil that does not have lamellae in the lower part and a similar soil that is redder in the lower part. Included soils make up about 20 percent of the map unit.

This Duffern soil is used mainly as woodland. Some areas are used as pasture.

The native trees on this soil are mixed hardwoods and pine. Tree species include sandjack oak, post oak, and hickory along with loblolly pine and shortleaf pine, which are scattered in some areas. Droughtiness, low available water capacity, and seedling mortality are management concerns.

Christmas trees can be grown on this soil; however, an irrigation system is needed because of the low available water capacity.

This soil is suited to coastal bermudagrass and lovegrass (fig. 9). Droughtiness is the main limitation. Good grazing management and applications of fertilizer and lime increase forage production.

This soil is not suited to most cultivated crops because of the low available water capacity and droughtiness. However, this soil is well suited to watermelons. Incorporating crop residue into the soil and planting green manure crops help to maintain tilth. Applications of fertilizer and lime increase yields.

This Duffern soil is suited to most urban uses. Seepage and the rapid permeability are severe limitations on sites for sanitary facilities. The instability of cutbanks is a severe limitation on sites for shallow excavations.

The capability subclass is IVs. The woodland ordination symbol is 7S.

ErC—Elrose fine sandy loam, 2 to 5 percent slopes. This very deep, gently sloping, well drained soil is on foot slopes on uplands. Areas are irregular in shape and range from 5 to 200 acres.

Typically, the surface layer is reddish brown fine sandy loam about 6 inches thick. The upper part of the subsoil, from a depth of 6 to 71 inches, is dark red and red clay loam. The lower part, to a depth of 80 inches, is yellowish red clay loam that has brownish weathered glauconitic material.

Permeability is moderate, and the available water capacity is high. Surface runoff is low. The hazard of water erosion is moderate.

Included with this soil in mapping are small areas of Bernaldo, Briley, and Kirvin soils. Bernaldo soils have a yellowish subsoil. Briley soils have a sandy surface layer. Kirvin soils have a clayey subsoil. Also included are a similar soil that has a gravelly surface and a similar soil that has gravelly strata in the subsoil. Included soils make up less than 15 percent of the map unit.

This Elrose soil is used mostly as pasture or woodland. A few areas are used as cropland.

This soil is well suited to coastal bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with crimson clover, arrowleaf clover, or vetch increases forage production and improves soil fertility. Good grazing management and applications of fertilizer and lime also increase forage production.

The main commercial trees on this soil are loblolly pine and shortleaf pine. This soil is well suited to timber production. Plantations of loblolly pine and slash pine have been established in some areas that previously were used as cropland. Good woodland management increases timber production.

This soil is suited to corn, peas, beans, sweet potatoes, and onions. It is also suited to peaches and nectarines. Farming on the contour and terracing help to control erosion. Applications of fertilizer and lime increase yields.

This Elrose soil is suited to most urban uses. Seepage and the moderate permeability are limitations on sites for sewage lagoons and trench landfills. Corrosion of uncoated steel and concrete is a limitation. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IIIe. The woodland ordination symbol is 10A.

Es—Estes silty clay, frequently flooded. This very deep, nearly level, somewhat poorly drained soil is on wide flood plains mainly along Lake Fork Creek and the Sabine River. Slopes are 0 to 1 percent. Areas are generally long and narrow and range from 20 to 4,000 acres.

Typically, the surface layer is dark grayish brown silty clay about 4 inches thick. The upper part of the subsoil, from a depth of 4 to 53 inches, is dark grayish brown and grayish brown silty clay that has yellowish and brownish mottles. The lower part, to a depth of 80 inches, is grayish brown and gray clay that has yellowish brown mottles.

Permeability is very slow, and the available water capacity is high. Surface runoff is very low. The hazard of water erosion is slight. This soil is flooded on the average of one or two times a year. The duration of flooding usually lasts from 7 days to 1 month and is most likely to occur during the months of November through May. The seasonal high water table is at the surface to a depth of 1.5 feet during winter and spring.

Included with this soil in mapping are small areas of Gladewater, Hainesville, Iulus, and Manco soils. Gladewater soils are more clayey and not as acid as the Estes soils. Hainesville soils have a thick, sandy surface layer and are on higher landscape positions. Iulus soils have a sandy loam subsoil and are better drained. Manco soils are less clayey. Included soils make up less than 15 percent of the map unit.

This Estes soil is used mainly as woodland. A few areas have been cleared of trees and are used as pasture.

Water oak and willow oak are the dominant native trees on this soil. Other common trees are sweetgum, elm, ash, and honey locust. Water and willow oak have been harvested commercially in some areas. The wetness, equipment limitation, and the flooding hazard hinder timber production.

This soil is suited to dallisgrass and tall fescue. The flooding hazard and wetness severely limit forage production. Applications of fertilizer and lime increase yields.

This soil is not suited to cropland or urban uses because of the flooding hazard and wetness.

The capability subclass is Vw. The woodland ordination symbol is 8W.

FrB—Freestone fine sandy loam, 1 to 3 percent slopes. This very deep, very gently sloping, moderately well drained soil is on stream terraces and remnants of

stream terraces on broad interstream divides. Areas are mostly irregular in shape and range from 5 to 1000 acres.

Typically, the surface layer is very dark grayish brown fine sandy loam about 3 inches thick. The subsurface layer, from a depth of 3 to 10 inches, is brown fine sandy loam. The upper part of the subsoil, from a depth of 10 to 27 inches, is yellowish brown sandy clay loam and clay loam with dark yellowish brown, grayish brown, and red mottles. It has streaks and pockets of uncoated sand. The lower part of the subsoil, from a depth of 27 to 80 inches, is dark red, brownish gray, and yellowish brown clay that becomes grayer with depth. It has streaks and pockets of uncoated sand from a depth of 27 to 38 inches.

Permeability is slow, and the available water capacity is high. Surface runoff is very low. The hazard of water erosion is moderate. The seasonal high water table is at a depth of 2 to 3 feet during the winter and spring.

Included with this soil in mapping are small areas of Bernaldo, Derly, Raino, Wolfpen, and Woodtell soils. Bernaldo soils are loamy throughout. Derly soils have a clayey subsoil and are wetter than the Freestone soils. Raino and Woodtell soils have a clayey layer that is closer to the surface. Wolfpen soils have a sandy surface soil that is 20 to 40 inches thick. Included soils make up less than 20 percent of the map unit.

This Freestone soil is used mainly as pasture. Other areas are in native woodland, mostly hardwoods. A few areas are used as cropland.

This soil is well suited to coastal bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with arrowleaf clover, singletary peas, or vetch increases forage production and improves soil fertility. Good grazing management and applications of fertilizer and lime also increase forage production.

Red oak, post oak, elm, and sweetgum are the dominant native trees on this soil. Loblolly pine can be planted for commercial timber production. The equipment limitation and wetness hinder timber production.

This soil is well suited to Virginia pine and Scotch pine, which are grown for use as Christmas trees.

This soil is suited to corn, peas, sweet potatoes, beans, and turnips (fig. 10). Applications of fertilizer and lime increase yields. Farming on the contour and terracing can help to control erosion.

This Freestone soil is suited to urban uses. Wetness and the slow permeability are severe limitations on sites for septic tank absorption fields and sanitary landfills. Wetness, the shrink-swell potential, and low strength are severe limitations on sites for buildings and local roads and streets. This soil is highly corrosive to uncoated steel. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IIe. The woodland ordination symbol is 8W.

GaB—Gallime fine sandy loam, 1 to 3 percent slopes. This very deep, very gently sloping, well drained soil is on stream terraces. Areas are oblong or irregular in shape and range from 10 to 200 acres.

Typically, the surface layer is dark brown fine sandy loam about 8 inches thick. The subsurface layer, from a depth of 8 to 34 inches, is fine sandy loam that is dark yellowish brown in the upper part and yellowish brown in the lower part. The upper part of the subsoil, from a depth of 34 to 50 inches, is strong brown sandy clay loam that has reddish and brownish mottles. The lower part, from a depth of 50 to 80 inches, is yellowish brown sandy clay loam and loam that has reddish and brownish mottles. It has streaks and pockets of uncoated sand that increase in number with depth.

Permeability is moderate, and the available water capacity is high. Surface runoff is negligible. The hazard of water erosion is moderate. The seasonal high water table is at a depth of 4 to 6 feet during winter and spring.

Included with this soil in mapping are small areas of Attoyac, Bernaldo, and Freestone soils. Attoyac soils have a red subsoil. Bernaldo soils have a surface soil less than 20 inches thick. Freestone soils are clayey in the lower part of the subsoil. Included soils make up less than 15 percent of the map unit.

This Gallime soil is used mainly as pasture or woodland. A few areas are used as cropland.

This soil is well suited to bahiagrass, common bermudagrass, and coastal bermudagrass. Overseeding pastures with arrowleaf clover or vetch increases forage production and improves soil fertility. Good grazing management and applications of fertilizer and lime also increase forage production.

Loblolly pine and shortleaf pine are the main commercial trees on this soil. Plantations of loblolly pine have been established in some areas that previously were used as cropland.

This soil is well suited to corn, peas, beans, and sweet potatoes. Applications of fertilizer and lime increase yields. Planting cover crops, terracing, and farming on the contour help to control erosion.

This Gallime soil is suited to most urban uses. Seepage is a severe limitation on sites for sewage lagoons and sanitary landfills. Wetness and the moderately slow permeability are limitations on sites for septic tank absorption fields and trench sanitary landfills. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IIe. The woodland ordination symbol is 9A.

Gw—Gladewater clay, frequently flooded. This very deep, nearly level, somewhat poorly drained soil is on wide flood plains along the Sabine River. Slopes are 0 to 1

Figure 10.—Sweet potatoes in an area of Freestone fine sandy loam, 1 to 3 percent slopes.

percent. Areas are broad and long and range from 10 to 5,000 acres.

Typically, the surface layer is very dark gray clay about 8 inches thick. The upper part of the subsoil, from a depth of 8 to 73 inches, is grayish and brownish clay that has brownish mottles. The lower part, from a depth of 73 to 80 inches, is gray clay loam that has reddish and brownish mottles.

Permeability is very slow, and available water capacity is high. Surface runoff is negligible. The hazard of water erosion is slight. This soil is flooded on the average of one or two times a year. The duration of flooding usually lasts from 7 days to more than a month and is most likely to occur during the months of November through May. The seasonal high water table is at a depth of 1.5 to 3.5 feet during winter and spring.

Included with this soil in mapping are small areas of Estes, Iulus, and Manco soils. Estes, Iulus, and Manco soils are less clayey, and Estes soils are more acid than the Gladewater soils. Included soils make up less than 10 percent of the map unit.

This Gladewater soil is used mostly as woodland. A few areas have been cleared of trees and are used as pasture.

Water oak and willow oak are the dominant native trees

on this soil. Other tree species are elm, sweetgum, and ash. Because of the hazard of flooding and wetness, this soil is not suited to pine production.

This soil is suited to dallisgrass and tall fescue. The flooding hazard is the main management concern. Applications of fertilizer and lime increase forage production.

This soil is not suited to cropland because of the flooding hazard.

This Gladewater soil is not suited to urban uses because of the hazard of flooding and wetness.

The capability subclass is Vw. The woodland ordination symbol is 6W.

HaA—Hainesville loamy fine sand, 0 to 2 percent slopes. This very deep, nearly level, somewhat excessively drained soil is on stream terraces adjacent to flood plains of the Sabine River and larger streams. Areas are mainly oblong and range from about 10 to 100 acres.

Typically, the surface layer is dark brown and brown loamy fine sand about 11 inches thick. The subsurface layer, from a depth of 11 to 37 inches, is light yellowish brown loamy fine sand. The subsoil, from a depth of 37 to 80 inches, is light yellowish brown and pale brown loamy fine sand that has thin, discontinuous yellowish red lamellae.

Permeability is rapid, and the available water capacity is low. Surface runoff is negligible. The hazard of water erosion is slight. The seasonal high water table is at a depth of 4 to 6 feet during fall and spring.

Included with this soil in mapping are small areas of Gallime and Mollville soils. Gallime soils have a more clayey subsoil. Mollville soils are wetter and more clayey throughout. Also included is a similar soil that has slightly more clay throughout. Included soils make up less than 20 percent of the map unit.

This Hainesville soil is used mainly as pasture or woodland.

This soil is suited to coastal bermudagrass and bahiagrass. Overseeding pastures with legumes, such as vetch, increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

The woodland species on this soil are mostly mixed pine and hardwoods. Loblolly pine and shortleaf pine are the main commercial trees. The equipment limitation and seedling mortality are management concerns.

This soil is suited to crops, such as peas, corn, and watermelons. Applications of fertilizer and lime increase yields. Incorporating crop residue into the soil improves tilth and helps to control erosion.

This Hainesville soil is suited to most urban uses. Seepage and the sandy texture are severe limitations on sites for sanitary facilities. The instability of cutbanks is a severe limitation for shallow excavations. Proper design and careful installation can help to overcome these limitations.

This soil is in capability subclass IIIs. The woodland ordination symbol is 10S.

Iu—Iulus fine sandy loam, frequently flooded. This very deep, nearly level, moderately well drained soil is on flood plains of smaller streams. Slopes are 0 to 1 percent. Areas are mostly long and narrow and range from 5 to 100 acres.

Typically, the surface layer is brown fine sandy loam about 7 inches thick that has yellowish and grayish mottles. The upper part of the subsoil, from a depth of 7 to 25 inches, is yellowish brown fine sandy loam that has brownish mottles. The middle part, from a depth of 25 to 56 inches, is loam that is mottled in shades of red, yellow, brown, and gray. The lower part, to a depth of 80 inches, is stratified light brownish gray clay loam and fine sandy loam that has reddish and brownish mottles.

Permeability is moderate, and the available water capacity is moderate. Surface runoff is low. The hazard of water erosion is slight. This soil is flooded on the average of once a year. The duration of flooding is 1 to 2 days and is most likely to occur during the months of December through April. The seasonal high water table is at a depth of 1.5 to 4 feet during winter and spring.

Included with this soil in mapping are small areas of Bibb and Manco soils. Bibb soils are in low, wet areas. Manco soils are in slightly higher positions. Also included are Iulus soils that are occasionally flooded. Included soils make up less than 20 percent of the map unit.

This Iulus soil is used mainly as woodland. A few small areas have been cleared of trees and are used as pasture.

Loblolly pine, shortleaf pine, sweetgum, water oak, and willow oak are the dominant trees on this soil. The main commercial trees are loblolly pine and shortleaf pine.

This soil is suited to coastal bermudagrass, common bermudagrass, and bahiagrass and to cool-season grasses, such as tall fescue. Overseeding pastures with legumes, such as white clover, increases forage production. Applications of fertilizer and lime can also increase forage production.

This soil is not suited to cropland because of the hazard of flooding.

This Iulus soil is not suited to most urban uses because of the hazard of flooding and wetness.

The capability subclass is Vw. The woodland ordination symbol is 10A.

KfC—Kirvin very fine sandy loam, 2 to 5 percent slopes. This soil is deep to stratified sandstone and shale. It is a gently sloping, well drained soil on broad, convex

ridgetops on uplands. Areas are mostly irregular in shape and range from 10 to 400 acres.

Typically, the surface layer is dark grayish brown very fine sandy loam about 4 inches thick. The subsurface layer, from a depth of 4 to 11 inches, is brown very fine sandy loam. The upper part of the subsoil, from a depth of 11 to 43 inches, is red clay that has brownish mottles that increase in number with depth. The lower part, from a depth of 43 to 50 inches, is mottled light brownish gray, red, and strong brown clay and soft sandstone. The underlying material, to a depth of 70 inches, is stratified strong brown and gray soft sandstone and weathered shale that has clay texture.

Permeability is moderately slow, and the available water capacity is moderate. Surface runoff is low. The hazard of water erosion is moderate.

Included with this soil in mapping are small areas of Bowie, Briley, Lilbert, Oakwood, and Sacul soils. Bowie and Oakwood soils have a yellowish, loamy subsoil. Briley and Lilbert soils have a sandy surface layer. Sacul soils are wetter than the Kirvin soil and have gray mottles in the upper part of the subsoil. Included soils make up less than 20 percent of the map unit.

This Kirvin soil is used mainly as pasture. Some areas are used as woodland, and a few areas are used as cropland.

This soil is well suited to coastal bermudagrass, bahiagrass, and common bermudagrass. Overseeding pastures with crimson clover or arrowleaf clover increases forage production and improves soil fertility. Good grazing management and applications of fertilizer and lime also increase forage production.

Shortleaf pine and loblolly pine are the main commercial trees on this soil. Good woodland management increases timber production.

This soil is suited to corn, vegetable crops, and peaches and nectarines. Applications of fertilizer and lime increase yields. Planting cover crops, terracing, and farming on the contour help to control erosion.

This Kirvin soil is suited to most urban uses. The moderately slow permeability is a severe limitation on sites for septic tank absorption fields. Corrosion of uncoated steel and concrete is a limitation. Low strength is a severe limitation on sites for local roads and streets. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IIIe. The woodland ordination symbol is 8A.

KgC—Kirvin gravelly fine sandy loam, 3 to 8 percent slopes. This soil is deep to stratified sandstone and shale. It is a gently sloping to moderately sloping, well drained soil on knobs and ridgetops on uplands. Areas are mostly rounded to oblong and range from 5 to 150 acres.

Typically, the surface layer is dark brown gravelly fine sandy loam about 4 inches thick. The subsurface layer, from a depth of 4 to 7 inches, is strong brown gravelly fine sandy loam. The subsoil extends to a depth of 48 inches. In the upper part it is red clay that has brownish yellow mottles. In the lower part it is red, reddish yellow, and light gray stratified sandy clay loam. The underlying material, from a depth of 48 to 80 inches, is red, brownish yellow, and light gray stratified fine sandy loam and weathered shale that has clay texture.

Permeability is moderately slow, and the available water capacity is moderate. Surface runoff is low or medium. The hazard of water erosion is moderate.

Included with this soil in mapping are small areas of Bowie, Briley, Cuthbert, and Lilbert soils. Bowie soils have a yellowish, loamy subsoil. Briley and Lilbert soils have a sandy surface soil that is 20 to 40 inches thick. Cuthbert soils are underlain by sandstone and shale within a depth of 40 inches and are on the steeper slopes. Also included are areas of Kirvin soils where 5 to 10 percent of the surface is covered with stones and areas of Kirvin soils where the surface layer has been removed. Included soils make up less than 20 percent of the map unit.

This Kirvin soil is used mainly as woodland. Some areas are used as pasture. A few small areas are used as cropland.

Loblolly pine and shortleaf pine are the main commercial trees on this soil. The gravelly surface layer and the slope are limitations. Good woodland management increases timber production.

This soil is suited to bahiagrass, common bermudagrass, and coastal bermudagrass. Overseeding pastures with crimson clover, arrowleaf clover, or vetch increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

The hazard of erosion and the gravelly surface layer limit crop production. Planting cover crops, terracing, and farming on the contour help to control erosion. Applications of fertilizer and lime increase yields.

This Kirvin soil is suited to most urban uses. The moderately slow permeability is a severe limitation on sites for septic systems. Corrosion of uncoated steel and concrete is a limitation. Low strength is a severe limitation on sites for local roads and streets. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IVe. The woodland ordination symbol is 8A.

KsC—Kirvin soils, graded, 3 to 8 percent slopes. These soils are deep to stratified sandstone and shale. They are gently sloping and moderately sloping, well drained soils on knobs and ridgetops on uplands. Areas

are mostly oblong to rounded and range from 5 to 100 acres.

This map unit is broadly defined, and thus its composition varies more than that of most other map units in the county. The mapping has been sufficiently controlled, however, for the anticipated use of the soils.

This map unit has been surface-mined for ironstone gravel. Because much of the topsoil has been removed, soil reclamation and revegetation can be difficult. Most areas have sparse stands of grasses, weeds, and trees. Some areas are barren.

Typically, the surface layer is brown gravelly fine sandy loam about 2 inches thick. The subsoil extends to a depth of 42 inches. The upper part is red clay. The lower part is red clay that has strata of brownish yellow soft sandstone. The underlying material, from a depth of 42 to 65 inches, is stratified brownish yellow soft sandstone, gray weathered shale that has clay texture, and discontinuous fragments of ironstone.

Permeability is moderately slow, and the available water capacity is moderate. Surface runoff is low or medium. The hazard of water erosion is severe.

Included with these soils in mapping are small areas of Cuthbert, Elrose, and Redsprings soils. Cuthbert and Redsprings soils are on the steeper side slopes. Elrose soils have a loamy surface layer and a loamy subsoil. Also included are small areas of Kirvin soils where the surface layer has not been removed. Included soils make up less than 30 percent of the map unit.

Most areas of these Kirvin soils are idle. A few areas are used as pasture or woodland.

These soils are suited to bahiagrass, common bermudagrass, and coastal bermudagrass. Because much of the topsoil has been removed, good grazing management and applications of fertilizer and lime are needed to establish and maintain pasture plants.

A few areas of these soils have been planted to loblolly pine, and some areas are reseeding naturally. The timber on these soils is generally of low quality. Seedling mortality and droughtiness are the main management concerns.

These soils are not suited to crops because the hazard of erosion is severe and because the topsoil has been removed.

These Kirvin soils are suited to most urban uses. They are highly corrosive to uncoated steel and concrete. The shrink-swell potential is a limitation on sites for buildings and local roads and streets. The moderately slow permeability and the slope are limitations on sites for sanitary facilities.

The capability subclass is VIe. The woodland ordination symbol is 6C.

KuB—Kullit very fine sandy loam, 1 to 3 percent slopes. This very deep, very gently sloping, moderately well drained soil is on broad areas, foot slopes, and heads of drainageways on uplands. Areas are irregular in shape and range from 10 to 200 acres.

Typically, the surface layer is brown very fine sandy loam about 5 inches thick. The subsurface layer, from a depth of 5 to 13 inches, is light yellowish brown very fine sandy loam. The upper part of the subsoil, from a depth of 13 to 40 inches, is yellowish brown loam and clay loam that has reddish, brownish, and grayish mottles. The lower part, from a depth of 40 to 80 inches, is light gray clay and clay loam that has reddish and brownish mottles.

Permeability is moderately slow, and the available water capacity is moderate. Surface runoff is very low. The hazard of water erosion is moderate. The seasonal high water table is at a depth of 2 to 3 feet during winter and spring.

Included with this soil in mapping are small areas of Bowie, Lilbert, and Sacul soils. Bowie soils do not have gray mottles in the upper part of the subsoil. Lilbert soils have a sandy surface layer. Sacul soils are red clay in the upper part of the subsoil. Included soils make up less than 15 percent of the map unit.

This Kullit soil is used mainly as pasture. Some areas are woodland. A few small areas are used as cropland.

This soil is well suited to coastal bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with arrowleaf clover or crimson clover increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

The woodland species on this soil are mostly mixed pine and hardwoods. Loblolly pine and shortleaf pine are the main commercial trees. Good woodland management increases timber production.

This soil is well suited to corn and vegetable crops. Applications of fertilizer and lime increase yields. Planting cover crops, terracing, and farming on the contour help to control erosion.

This Kullit soil is suited to most urban uses. Wetness and the moderately slow permeability are severe limitations on sites for sanitary facilities. Corrosion of uncoated steel and concrete is a limitation. Low strength is a severe limitation on sites for buildings and local roads and streets. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IIe. The woodland ordination symbol is 9W.

LaA—Latch-Mollville complex, 0 to 1 percent slopes. This very deep, nearly level complex is on stream terraces of the Sabine River and large creeks. The Latch soil is on low ridges that are 2 to 4 feet high and 50 to 150 feet across. It is moderately well drained. The Mollville soil is between the ridges in low areas that are 30 to 100 feet

across. It is poorly drained. Areas of this map unit are irregular in shape and range from 20 to 300 acres.

This unit is about 50 percent Latch soils, 40 percent Mollville soils, and 10 percent other soils. The areas of soils that make up this complex are so intricately mixed that separating them is not practical at the scale mapped.

Typically, the surface layer of the Latch soil is brown loamy fine sand about 7 inches thick. The subsurface layer, from a depth of 7 to 44 inches, is very pale brown loamy fine sand. The subsoil, from a depth of 44 to 65 inches, is yellowish brown sandy clay loam that has red and gray mottles. The underlying material, from a depth of 65 to 80 inches, is light gray fine sand in the upper part and yellowish brown sand in the lower part.

The Latch soil is moderately permeable, and the available water capacity is low. Surface runoff is low. The hazard of water erosion is slight. The seasonal high water table is at a depth of 2.5 to 4 feet during winter and spring.

Typically, the surface layer of the Mollville soil is dark grayish brown loam about 4 inches thick. The subsurface layer, from a depth of 4 to 9 inches, is light brownish gray loam. The upper part of the subsoil, from a depth of 9 to 43 inches, is grayish brown sandy clay loam that has brownish mottles and streaks and pockets of light gray uncoated sand. The lower part, from a depth of 43 to 65 inches, is light brownish gray sandy clay loam that has brownish mottles. The underlying material, from a depth of 65 to 80 inches, is light brownish gray fine sandy loam.

The Mollville soil is slowly permeable, and the available water capacity is moderate. Surface runoff is low. The hazard of water erosion is slight. Ponding occurs on this soil for 2 to 8 weeks during the cool season. The seasonal high water table is at a depth of 1 foot or less during winter, spring, and summer.

Included with these soils in mapping are small areas of Derly, Hainesville, and Raino soils. Derly and Raino soils have a clayey subsoil. Hainesville soils are sandy throughout. Included soils make up less than 20 percent of the map unit.

Most areas of this map unit are woodland. Some areas have been cleared of trees and are used as pasture.

Loblolly pine and shortleaf pine are the main commercial trees on the Latch soils. Water oak, willow oak, and sweetgum are the main commercial trees on the Mollville soils. Harvesting pine on the Latch soils is difficult because of the wetness of the Mollville soils.

This map unit is well suited to coastal bermudagrass, common bermudagrass, bahiagrass, and tall fescue. Wetness and seasonal ponding are limitations that affect forage production. Overseeding pastures with white clover or singletary peas increases forage production and improves the fertility of the soils. Applications of fertilizer and lime also increase forage production.

A few areas of this map unit are used as cropland. The wetness, slow permeability, and seasonal droughtiness are the main limitations. A drainage system is needed if cultivated crops are grown. Applications of fertilizer and lime increase yields.

These soils are not suited to most urban uses because of the seasonal ponding, seepage, and wetness.

The capability subclass is IIIs for areas of the Latch soil and IVw for areas of the Mollville soil. The woodland ordination symbol is 10W for the Latch soil and 8W for the Mollville soil.

LgB—Leagueville loamy fine sand, 0 to 3 percent slopes. This very deep, nearly level to very gently sloping, poorly drained soil is in flat to slightly depressional areas and on foot slopes along drainageways on uplands. Areas are long and narrow or irregular in shape and range from about 10 to 100 acres.

Typically, the surface layer is very dark grayish brown loamy fine sand about 8 inches thick. The subsurface layer, from a depth of 8 to 27 inches, is gray loamy fine sand. The upper part of the subsoil, from a depth of 27 to 49 inches, is gray sandy clay loam that has yellowish brown mottles and streaks and pockets of light gray uncoated sand. From a depth of 49 to 61 inches, is light gray fine sandy loam that has pockets of gray sandy clay loam. The lower part of the subsoil, from a depth of 61 to 80 inches, is light gray fine sand that has pockets of yellow and gray fine sandy loam.

Permeability is moderate, and the available water capacity is moderate. Surface runoff is medium. The hazard of water erosion is slight. The seasonal high water table is at a depth of 0.5 to 1.5 feet during winter and spring.

Included with this soil in mapping are small areas of Darco, Duffern, Pickton, and Wolfpen soils. Darco and Pickton soils have a sandy surface soil that is 40 to 80 inches thick, and they are better drained than the Leagueville soil. Duffern soils are sandy to a depth of more than 80 inches. Wolfpen soils have a yellowish subsoil. Also included is a similar soil that has a loamy fine sand layer more than 40 inches thick. Included soils make up less than 20 percent of the map unit.

This Leagueville soil is used mainly as woodland. A few areas are used as pasture.

The main woodland species on this soil are hardwoods. Water oak and sweetgum are the dominant trees. A few loblolly pine are in some areas. The equipment limitation, seedling mortality, and severe plant competition make commercial timber production difficult.

This soil is suited to bahiagrass, common bermudagrass, and tall fescue. The seasonal high water table and wetness are limitations that make establishment of pastures difficult. Applications of fertilizer and lime increase forage production.

This soil is not suited to cropland because of wetness.

This Leagueville soil is not suited to urban uses because of the seasonal ponding and seepage.

The capability subclass is IVw. The woodland ordination symbol is 8W.

LtC—Lilbert loamy fine sand, 2 to 5 percent slopes. This very deep, gently sloping, well drained soil is on broad interstream divides on uplands. Areas are irregular in shape and range from 10 to 600 acres.

Typically, the surface layer is brown loamy fine sand about 9 inches thick. The subsurface layer, from a depth of 9 to 32 inches, is light yellowish brown loamy fine sand. The upper part of the subsoil, from a depth of 32 to 60 inches, is yellowish brown sandy clay loam that has red, yellowish red, and light brownish gray mottles and plinthite. The lower part, from a depth of 60 to 80 inches, is mottled red, yellowish red, yellowish brown, and light brownish gray sandy clay loam.

Permeability is moderately slow, and the available water capacity is moderate. Surface runoff is very low. The hazard of water erosion is moderate.

Included with this soil in mapping are small areas of Bowie, Briley, Darco, and Kirvin soils. Bowie soils have a loamy surface layer. Briley soils have a red subsoil. Darco soils have a sandy surface soil more than 40 inches thick. Kirvin soils have a loamy surface layer and a red, clayey subsoil. Included soils make up less than 20 percent of this map unit.

This Lilbert soil is used mainly as pasture or woodland. A few areas are used as cropland.

This soil is well suited to coastal bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with arrowleaf clover or vetch increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

The woodland species on this soil are mostly mixed pine and hardwoods. Loblolly pine and shortleaf pine are the main commercial trees. Plantations of loblolly pine have been established in some areas that previously were used as cropland (fig.11). The equipment limitation, seedling mortality, and low available water capacity are management concerns.

This soil is suited to Virginia pine and Scotch pine, which are grown for use as Christmas trees.

This soil is suited to corn, watermelons, peas, sweet potatoes, and peaches and nectarines. Farming on the contour and planting cover crops help to control erosion. Applications of fertilizer and lime increase yields.

This Lilbert soil is suited to most urban uses. The moderately slow permeability and seepage are severe limitations on sites for sanitary facilities. Corrosion of uncoated steel and concrete is a limitation. The instability of cutbanks is a severe limitation for shallow excavations. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IIIe. The woodland ordination symbol is 9S.

Ma—Manco loam, frequently flooded. This very deep, nearly level, somewhat poorly drained soil is on flood plains of major creeks. Slopes are 0 to 1 percent. Areas are mostly long and narrow and range from 5 to 2,000 acres.

Typically, the surface layer is dark grayish brown loam about 3 inches thick. The upper part of the subsoil, from a depth of 3 to 27 inches, is grayish brown and gray loam and dark gray silt loam. The lower part, to a depth of 80 inches, is gray silty clay loam and clay loam that has reddish and brownish mottles.

Permeability is moderate, and the available water capacity is high. Surface runoff is negligible. The hazard of water erosion is slight. This soil is flooded on the average of one or two times a year. The duration of flooding usually lasts from 7 to 14 days and is most likely to occur during the months of November through May. The seasonal high water table is at a depth of 1 to 1.5 feet during winter and spring.

Included with this soil in mapping are areas of Bibb, Estes, Gladewater, Hainesville, and Iulus soils. Bibb soils are poorly drained. Estes and Gladewater soils are more clayey than the Manco soils. Hainesville soils are more sandy than the Manco soils and are on low terraces. Iulus soils are moderately well drained. Included soils make up less than 30 percent of the map unit.

This Manco soil is used mainly as woodland and pasture.

The woodland species on this soil are dominantly hardwoods. Water oak, willow oak, and sweetgum are the main trees. The flooding hazard and wetness hinder pine production.

This soil is suited to bahiagrass, dallisgrass, and tall fescue. Overseeding pastures with white clover increases forage production and improves soil fertility. Good grazing management and applications of fertilizer and lime also increase forage production.

This soil is not suited to cropland because of the flooding hazard.

This Manco soil is not suited to urban uses because of the flooding hazard and wetness.

The capability subclass is Vw. The woodland ordination symbol is 8W.

MoA—Mollville loam, 0 to 1 percent slopes. This very deep, nearly level, poorly drained soil is on stream terraces of the Sabine River and large creeks. Areas are mostly irregular in shape and range from 10 to about 200 acres.

Figure 11.—A well-managed stand of loblolly pine in an area of Lilbert loamy fine sand, 2 to 5 percent slopes.

Typically, the surface layer is grayish brown loam about 5 inches thick. The subsurface layer, from a depth of 5 to 11 inches, is light brownish gray loam. The upper part of the subsoil, from a depth of 11 to 36 inches, is grayish brown or gray clay loam with dark yellowish brown mottles. It has streaks and pockets of light gray loam. From a depth of 36 to 49 inches, it is grayish brown clay loam with yellowish brown and light brownish gray mottles. From a depth of 49 to 65 inches, it is mottled gray and strong brown clay loam. The lower part of the subsoil, from a depth of 65 to 74 inches, is mottled light brownish gray and strong brown clay loam. The underlying material is mottled strong brown, grayish brown, and light gray clay loam.

Permeability is slow, and the available water capacity is moderate. Surface runoff is negligible. The hazard of water erosion is slight. The seasonal high water table is within 1 foot of the surface mostly during winter and spring. Ponding may occur from 2 to 6 weeks during this period.

Included with this soil in mapping are small areas of Derly, Hainesville, Latch, and Raino soils. Derly and Raino soils have a clayey subsoil. Hainesville soils are sandy throughout. Latch soils have a sandy surface layer. Included soils make up less than 20 percent of the map unit.

This Mollville soil is used mainly as woodland. Some areas are used as pasture.

Woodland species on this soil are mostly water-tolerant hardwoods. Water oak, willow oak, and sweetgum are the dominant trees. Loblolly pine can be planted. Wetness is the main limitation.

This soil is suited to common bermudagrass, bahiagrass, and tall fescue. Overseeding pastures with white clover or singletary peas increases forage production and improves soil fertility. A drainage system and applications of fertilizer and lime can also increase forage production.

This soil is poorly suited to cropland because of wetness and seasonal ponding. A drainage system is

generally needed when this soil is cultivated. Applications of fertilizer and lime increase yields.

This Mollville soil is not suited to most urban uses because of the seasonal ponding and wetness.

The capability subclass is IVw. The woodland ordination symbol is 8W.

OkB—Oakwood very fine sandy loam, 1 to 5 percent slopes. This very deep, gently sloping, moderately well drained soil is on broad interstream divides and upper side slopes on uplands. Areas are mostly irregular in shape and range from 5 to 500 acres.

Typically, the surface layer is brown very fine sandy loam about 12 inches thick. The subsurface layer, from a depth of 12 to 19 inches, is light yellowish brown very fine sandy loam. The subsoil, from a depth of 19 to 34 inches, is yellowish brown loam that has red mottles. From a depth of 34 to 48 inches, it is yellowish brown sandy clay loam that has red and light brownish gray mottles and plinthite. From a depth of 48 to 80 inches, it is yellowish brown sandy clay loam that has red and light brownish gray mottles, plinthite, and streaks and pockets of gray uncoated fine sandy loam.

Permeability is moderately slow, and the available water capacity is high. Surface runoff is low or medium. The hazard of water erosion is moderate. The seasonal high water table is at a depth of 3.5 to 5 feet during winter and spring.

Included with this soil in mapping are small areas of Freestone, Gallime, Kirvin, and Wolfpen soils. Freestone soils are clayey in the lower part of the subsoil. Gallime soils have a loamy surface soil 20 to 40 inches thick. Kirvin soils have a red, clayey subsoil. Wolfpen soils have a sandy surface soil 20 to 40 inches thick. Included soils make up less than 20 percent of the map unit.

This Oakwood soil is used mainly as pasture or woodland. Some areas are used as cropland.

This soil is well suited to coastal bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with arrowleaf clover increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

The main woodland species on this soil are mixed hardwoods and pine. The dominant hardwood trees are southern red oak, post oak, and sweetgum. Loblolly pine and shortleaf pine are the main commercial trees. Good woodland management increases timber production.

This soil is well suited to Virginia pine and Scotch pine, which are grown for use as Christmas trees.

This soil is suited to corn, sweet potatoes, peas, beans, and peaches. Applications of fertilizer and lime increase yields. Planting cover crops, terracing, and farming on the contour help to control erosion.

This Oakwood soil is suited to most urban uses. Moderately slow permeability, the slope, and wetness are limitations on sites for sanitary facilities. Corrosion of uncoated steel and concrete is a limitation. Low strength is a limitation on sites for local roads and streets. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IIIe. The woodland ordination symbol is 9A.

Ow—Oil wasteland. This map unit consists of areas of various soils that have been affected by oil field activity. Some areas on flood plains are nearly level. Others on uplands are gently sloping to moderately sloping. Slopes range from 0 to 8 percent.

The properties of the soils in this map unit have been significantly altered by the addition of oil derivatives and by-products, such as salt brine, drilling mud, and sludge (fig. 12). Some of these areas have been disturbed by construction of sludge pits, roadbeds, and drilling pads.

Soils in areas of Oil wasteland are poorly drained to well drained. Permeability is slow to moderately rapid, and available water capacity is low to high. There is a severe water erosion hazard on gently sloping or moderately sloping areas.

Included with this unit in mapping are small areas of undisturbed soils. Also included are a few areas that have partially recovered with native vegetation of grasses, pine, and hardwoods. Included areas make up less than 15 percent of the map unit.

The productivity of the original soils has been drastically reduced or destroyed, and very little, if any, vegetation remains. An on-site investigation is needed for any planned land use.

The capability subclass is VIIIs. This unit is not assigned a woodland ordination symbol.

PkC—Pickton loamy fine sand, 2 to 5 percent slopes. This very deep, gently sloping, well drained soil is on broad interstream divides on uplands. Areas are irregular in shape and range from 5 to 1,500 acres.

Typically, the surface layer is dark brown loamy fine sand about 6 inches thick. The subsurface layer, from a depth of 6 to 56 inches, is loamy fine sand that is yellowish brown in the upper part and light yellowish brown in the lower part. The upper part of the subsoil, from a depth of 56 to 69 inches, is strong brown sandy clay loam that has red and light yellowish brown mottles. The lower part, from a depth of 69 to 80 inches, is mottled yellowish brown, brown, and gray sandy clay loam.

Permeability is moderate, and the available water capacity is low. Surface runoff is low. The hazard of water erosion is moderate. The seasonal high water table is at a depth of 4 to 6 feet during winter and spring.

Included with this soil in mapping are small areas of

Figure 12.—An area of Oil wasteland. These areas are barren where salt concentrations are toxic to vegetation.

Briley, Duffern, Freestone, Oakwood, and Wolfpen soils. Briley soils have a sandy surface soil 20 to 40 inches thick and a red subsoil. Duffern soils are sandy throughout. Freestone soils have a loamy surface layer and a clayey subsoil. Oakwood soils have a loamy surface layer and a yellowish subsoil. Wolfpen soils have a sandy surface soil 20 to 40 inches thick. Included soils make up less than 20 percent of the map unit.

This Pickton soil is used mainly as pasture. Some areas are used as woodland, and a few areas are used as cropland.

This soil is well suited to coastal bermudagrass and lovegrass. The low available water capacity is the main limitation. Overseeding pastures with vetch increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

The main woodland species on this soil are hardwoods, with some loblolly and shortleaf pine. Red oak, post oak, blackjack oak, and hickory are the dominant hardwood trees. Loblolly pine and shortleaf pine are the main commercial trees. Plantations of loblolly pine have been established in some areas that previously were used as cropland. Droughtiness limits the growth of trees and decreases the survival rate of seedlings.

This soil is suited to the production of Christmas trees;

however, an irrigation system is needed because of the low available water capacity.

This soil is suited to watermelons, peas, sweet potatoes, and peaches and nectarines. The low available water capacity is the main limitation. Applications of fertilizer and lime increase yields. Planting cover crops, high residue crops, and green manure crops can help to control erosion and maintain fertility.

This Pickton soil is suited to most urban uses. Seepage is a severe limitation on sites for most sanitary facilities. Corrosion of uncoated steel and concrete is a limitation. The instability of cutbanks is a severe limitation for shallow excavations.

The capability subclass is IIIs. The woodland ordination symbol is 8S.

PkE—Pickton loamy fine sand, 8 to 15 percent slopes. This very deep, strongly sloping to moderately steep, well drained soil is on narrow side slopes above drainageways on uplands. Areas are mostly oblong or irregular in shape and range from 5 to 500 acres.

Typically, the surface layer is dark yellowish brown loamy fine sand about 12 inches thick. The subsurface layer, from a depth of 12 to 47 inches, is loamy fine sand that is yellowish brown in the upper part and light yellowish brown in the lower part. The subsoil extends to a depth of 80 inches. In the upper part it is yellowish brown fine sandy loam that has dark red and strong brown mottles. The lower part is mottled red, strong brown, and yellowish brown sandy clay loam.

Permeability is moderate, and the available water capacity is low. Surface runoff is medium. The hazard of water erosion is severe. The seasonal high water table is at a depth of 4 to 6 feet during winter and spring.

Included with this soil in mapping are small areas of Cuthbert, Tenaha, Wolfpen, and Woodtell soils. Cuthbert and Woodtell soils have a loamy surface layer and a clayey subsoil. Tenaha and Wolfpen soils have a sandy surface soil 20 to 40 inches thick. Included soils make up less than 20 percent of the map unit.

This Pickton soil is used mainly as woodland. Some areas have been cleared of trees and are used as pasture.

The main woodland species on this soil are hardwoods. Shortleaf and loblolly pine are in some areas. The dominant hardwood trees are red oak, post oak, and hickory. The equipment limitation and low available water capacity are management concerns. Good woodland management increases timber production.

This soil is well suited to coastal bermudagrass and weeping lovegrass. The low available water capacity is a limitation. Frequent applications of fertilizer and lime increase forage production.

This soil is not suited to cropland because of the slope and the hazard of erosion.

This Pickton soil is suited to most urban uses. Seepage and the slope are severe limitations on sites for sanitary facilities. The slope is the main limitation on sites for buildings and local roads and streets. The instability of cutbanks is a severe limitation for shallow excavations. Proper design and careful installation can help to overcome these limitations.

The capability subclass is VIe. The woodland ordination symbol is 8s.

RdC—Redsprings very gravelly fine sandy loam, 2 to 5 percent slopes. This soil is deep to mixed marine sediments, mainly glauconitic. It is a gently sloping, well drained soil on broad convex ridgetops on uplands. Areas are irregular in shape and range from 5 to 300 acres.

Typically, the surface layer is dark reddish brown very gravelly fine sandy loam about 7 inches thick. The subsoil extends to a depth of 41 inches. The upper part is dark red clay. The lower part is red clay that has fragments of ironstone and a mixture of weathered glauconitic material. The underlying material, from a depth of 41 to 60 inches, is strong brown weathered glauconitic material with fragments of ironstone.

Permeability is moderately slow, and the available water capacity is moderate. Surface runoff is low. The hazard of water erosion is moderate.

Included with this soil in mapping are small areas of Briley, Elrose, Kirvin, and Lilbert soils. Briley and Lilbert soils have a sandy surface soil that is 20 to 40 inches thick. Elrose soils have a loamy subsoil and are underlain by glauconitic material at a depth of more than 60 inches. Kirvin soils do not have glauconitic material in the subsoil. Included soils make up less than 20 percent of the map unit.

This Redsprings soil is used mainly as woodland. Some areas are used as pasture, and a few areas are used as cropland.

Shortleaf pine and loblolly pine are the main commercial trees on this soil. The gravel in the surface layer reduces the available water capacity. Good woodland management increases timber production.

This soil is suited to bahiagrass, common bermudagrass, and coastal bermudagrass. Overseeding pastures with crimson clover or arrowleaf clover increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

The moderate available water capacity and the moderate erosion hazard limit crop production. Planting cover crops, terracing, and farming on the contour help to control erosion.

This Redsprings soil is suited to most urban uses. The moderately slow permeability is a severe limitation on sites for septic tank absorption fields. Corrosion of uncoated steel and concrete is a limitation. The shrink-swell potential

and low strength are limitations on sites for local roads and streets. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IIIe. The woodland ordination symbol is 8F.

RdE—Redsprings very gravelly fine sandy loam, 8 to 25 percent slopes. This soil is deep to mixed marine sediments, mainly glauconitic. It is a strongly sloping to steep, well drained soil on side slopes above drainageways on uplands. Areas are mostly oblong or irregular in shape and range from 10 to 1,000 acres.

Typically, the surface layer is dark reddish brown very gravelly fine sandy loam about 7 inches thick. The subsoil is red clay to a depth of 42 inches. The lower part has weathered glauconitic material and gray fragments of weathered shale. The underlying material, from a depth of 42 to 65 inches, is stratified red clay, brownish yellow weathered glauconitic material, and gray weathered shale.

Permeability is moderately slow, and the available water capacity is moderate. Surface runoff is medium or high. The hazard of water erosion is severe.

Included with this soil in mapping are small areas of Briley, Cuthbert, Elrose, and Tenaha soils. Briley and Tenaha soils have a sandy surface soil that is 20 to 40 inches thick. Cuthbert soils are underlain by weathered sandstone and shale between depths of 20 and 40 inches. Elrose soils have a loamy subsoil and are underlain by glauconitic material at a depth of more than 60 inches. Also included are small areas of Redsprings soils that have up to 20 percent stones on the surface. Included soils make up less than 20 percent of the map unit.

This Redsprings soil is used mainly as woodland. A few areas have been cleared of trees and are used as pasture.

The main woodland species on this soil are mixed hardwoods and pine. Shortleaf pine and loblolly pine are the main commercial trees. The hazard of erosion, the equipment limitation, and seedling mortality are management concerns. Woodland can be managed in such a way that natural reproduction maintains the number of trees.

This soil is suited to bahiagrass, common bermudagrass, and coastal bermudagrass. Gravel in the surface layer and the slope limit forage production. Applications of fertilizer and lime increase forage production.

This soil is not suited to cropland because of the slope and the hazard of erosion.

This Redsprings soil has severe limitations for most urban uses. The slope and the moderate permeability are the main limitations. Some areas that are used as homesites have scenic views.

The capability subclass is VIIe. The woodland ordination symbol is 8R.

RsD—Redsprings soils, graded, 3 to 8 percent slopes. These soils are deep to mixed marine sediments, mainly glauconitic. They are gently sloping and moderately sloping, well drained soils on broad convex uplands, mainly on ridgetops on the highest part of the landscape. Areas are irregular in shape and range from 10 to about 100 acres.

This map unit is broadly defined, and thus its composition varies more than that of most other map units in the county. The mapping has been sufficiently controlled, however, for the anticipated use of the soils.

This map unit has been surface-mined for ironstone gravel. Because much of the topsoil has been removed, soil reclamation is difficult. Most areas have sparse stands of grasses, weeds, and trees. Some areas are barren.

Typically, the surface layer is reddish brown gravelly fine sandy loam about 2 inches thick. The subsoil, to a depth of 9 inches, is red clay. The underlying material, from a depth of 9 to 42 inches, is stratified dark red clay, yellowish brown weathered glauconitic material, and gray weathered shale that has clay texture.

Permeability is moderately slow, and the available water capacity is moderate. Surface runoff is medium. The hazard of water erosion is severe.

Included with these soils in mapping are areas of Cuthbert and Kirvin soils. Cuthbert soils are underlain by weathered sandstone and shale between depths of 20 and 40 inches. Kirvin soils do not have glauconitic material in the underlying layer. Also included are areas of Redsprings soils where the surface layer has not been removed. Included soils make up less than 30 percent of the map unit.

Most areas of these Redsprings soils are idle. A few areas are used as pasture or woodland.

These soils are suited to bahiagrass, common bermudagrass, and coastal bermudagrass. Because much of the topsoil has been removed, good grazing management and proper applications of lime and fertilizer are needed to establish and maintain pasture plants.

A few areas of these soils have been planted to loblolly pine. Some areas are reseeding naturally. The timber on these soils is mostly of low quality. The high seedling mortality and droughtiness are management concerns.

These soils are not suited to crops because of the hazard of erosion and the lack of topsoil.

These Redsprings soils are suited to most urban uses. Low strength, the moderate shrink-swell potential, the slope, and the moderate permeability are the main limitations. Corrosion of uncoated steel and concrete is also a limitation.

The capability subclass is VIe. The woodland ordination symbol is 6C.

SaB—Sacul very fine sandy loam, 1 to 3 percent slopes. This very deep, very gently sloping, moderately well drained soil is in slight depressional areas and at the head of drainageways on uplands. Areas are irregular in shape and range from 10 to 100 acres.

Typically, the surface layer is yellowish brown very fine sandy loam about 9 inches thick. The upper part of the subsoil, from a depth of 9 to 18 inches, is red clay that has brownish yellow mottles. The middle part, from a depth of 18 to 41 inches, is mottled red, yellowish red, brownish yellow, and gray clay. The lower part, to a depth of 80 inches, is light grayish brown silty clay loam that has red and strong brown mottles.

Permeability is slow, and the available water capacity is high. Surface runoff is medium. The hazard of water erosion is moderate. The seasonal high water table is at a depth of 2 to 4 feet during winter and spring.

Included with this soil in mapping are small areas of Bowie, Kirvin, Kullit, and Oakwood soils. Bowie and Oakwood soils have a yellowish subsoil. Kirvin soils do not have gray mottles in the upper part of the subsoil. The subsoil in the Kullit soils is yellowish in the upper part and becomes grayer and more clayey with depth. Included soils make up less than 20 percent of the map unit.

This Sacul soil is used mainly as pasture or woodland. A few areas are used as cropland.

This soil is suited to coastal bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with crimson clover, arrowleaf clover, or vetch increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

The main woodland species on this soil are mixed pine and hardwoods. Shortleaf pine and loblolly pine are the principal commercial trees. The clayey subsoil is a limitation for timber production. Good woodland management increases timber production.

Most areas of this soil that are used as cropland are home vegetable gardens. The hazard of erosion and wetness are the main management concerns. Applications of fertilizer and lime increase yields.

This Sacul soil is poorly suited to most urban uses. Wetness and the slow permeability are severe limitations on sites for septic tank absorption fields. The shrink-swell potential is a severe limitation on sites for buildings. Corrosion of uncoated steel and concrete is a limitation. The shrink-swell potential and low strength are severe limitations on sites for local roads and streets. Proper design and careful installation are needed to overcome these limitations.

The capability subclass is IIIe. The woodland ordination symbol is 8C.

TeE—Tenaha loamy fine sand, 8 to 20 percent slopes. This soil is deep to weathered stratified sandstone and shale. It is a strongly sloping to moderately steep, well drained soil on side slopes above drainageways on uplands. Areas are mostly long and narrow and range from 10 to 400 acres.

Typically, the surface layer is very dark grayish brown loamy fine sand about 3 inches thick. The subsurface layer, from a depth of 3 to 32 inches, is dark yellowish brown and yellowish brown loamy fine sand. The subsoil, from a depth of 32 to 42 inches, is yellowish red sandy clay loam that has reddish and brownish mottles. The underlying material, from a depth of 42 to 60 inches, is stratified soft sandstone and weathered shale.

Permeability is moderate, and the available water capacity is also moderate. Surface runoff is low. The hazard of water erosion is severe.

Included with this soil in mapping are small areas of Cuthbert, Darco, and Lilbert soils. Cuthbert soils have a loamy surface layer. Darco soils have a thicker surface soil. Lilbert soils are underlain by stratified loamy deposits at a depth of more than 60 inches. Included soils make up less than 20 percent of the map unit.

This Tenaha soil is used mainly as woodland. A few areas are used as pasture.

The main woodland species on this soil are mixed pine and hardwoods. Loblolly pine and shortleaf pine are the principal commercial trees. The hazard of erosion, seedling mortality, and the slope are management concerns.

This soil is suited to coastal bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with arrowleaf clover or vetch increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

This soil is not suited to cropland because of the slope and the hazard of erosion.

This Tenaha soil is suited to most urban uses. The moderate permeability and seepage are severe limitations on sites for most sanitary facilities. The slope and seepage are limitations on building sites. The instability of cutbanks is a severe limitation for shallow excavations. Proper design and careful installation can help to overcome these limitations.

The capability subclass is VIe. The woodland ordination symbol is 9S.

WoC—Wolfpen loamy fine sand, 2 to 5 percent slopes. This very deep, gently sloping, well drained soil is on broad, convex interstream divides on uplands. Areas are irregular in shape and range from 10 to 500 acres.

Typically, the surface layer is dark brown loamy fine sand about 4 inches thick. The subsurface layer, from a depth of 4 to 28 inches, is loamy fine sand that is dark

yellowish brown in the upper part and yellowish brown in the lower part. The subsoil, from a depth of 28 to 80 inches, is yellowish brown and brownish yellow sandy clay loam that has yellowish red mottles throughout and light brownish gray mottles only in the lower part.

Permeability is moderate, and the available water capacity is also moderate. Surface runoff is very low. The hazard of water erosion is moderate. The seasonal high water table is at a depth of 4 to 6 feet during winter and spring.

Included with this soil in mapping are small areas of Briley, Oakwood, and Pickton soils. Briley soils have a reddish subsoil. Oakwood soils have a loamy surface layer. Pickton soils have a sandy surface soil more than 40 inches thick. Included soils make up less than 20 percent of the map unit.

This Wolfpen soil is used mainly as pasture. Some areas are used as woodland or cropland.

This soil is suited to improved bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with arrowleaf clover or vetch increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

The main woodland species on this soil are mixed hardwoods and pine. Loblolly pine and shortleaf pine are the principal commercial trees. Plantations of loblolly pine have been established in some areas that previously were used as cropland. Seedling mortality and droughtiness are the main management concerns.

This soil is suited to Virginia pine and Scotch pine, which are grown for use as Christmas trees.

This soil is suited to corn, sweet potatoes, watermelons, and peaches and nectarines. Farming on the contour and planting cover crops, high residue crops, and green manure crops help to control erosion and maintain fertility.

This Wolfpen soil is suited to most urban uses. The seepage and wetness are severe limitations on sites for sanitary facilities. Corrosion of uncoated steel and concrete is a limitation. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IIIe. The woodland ordination symbol is 9S.

WoD—Wolfpen loamy fine sand, 5 to 15 percent slopes. This very deep, strongly sloping to moderately steep, well drained soil is on side slopes above drainageways on uplands. Areas are mostly oblong and range from 10 to 200 acres.

Typically, the surface layer is dark brown loamy fine sand about 7 inches thick. The subsurface layer, from a depth of 7 to 29 inches, is light yellowish brown loamy fine sand. The subsoil, from a depth of 29 to 80 inches, is yellowish brown sandy clay loam. The upper part has red mottles, and the lower part has streaks and pockets of uncoated sand.

Permeability is moderate, and the available water capacity is moderate. Surface runoff is low. The hazard of water erosion is severe. The seasonal high water table is at a depth of 4 to 6 feet during winter and spring.

Included with this soil in mapping are small areas of Cuthbert, Pickton, and Tenaha soils. Cuthbert soils have a loamy surface and a red, clayey subsoil. Pickton soils have a thicker surface soil than the Wolfpen soils. Tenaha soils are underlain by weathered, stratified sandstone and shale at a depth of 40 to 60 inches. Included soils make up less than 20 percent of the map unit.

This Wolfpen soil is used mainly as pasture or woodland.

This soil is suited to coastal bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with arrowleaf clover or vetch increases forage production and improves soil fertility. Applications of fertilizer and lime also increase forage production.

The main woodland species on this soil are mixed hardwoods and pine. Shortleaf pine and loblolly pine are the principal commercial trees. The hazard of erosion, seedling mortality, and droughtiness are the main management concerns.

This soil is not suited to cropland because of the slope and the hazard of erosion.

This Wolfpen soil is suited to most urban uses. The slope, wetness, and seepage are severe limitations on sites for sanitary facilities. The slope is a limitation on sites for buildings and local roads and streets. Corrosion of uncoated steel and concrete is also a limitation. Proper design and careful installation can help to overcome these limitations.

The capability subclass is VIe. The woodland ordination symbol is 9S.

WtC—Woodtell loam, 2 to 5 percent slopes. This soil is deep to stratified shale and loamy materials. It is a gently sloping, well drained soil on convex ridgetops on uplands. Areas are irregular in shape and range from 10 to 300 acres.

Typically, the surface layer is dark grayish brown loam about 5 inches thick. The subsoil extends to a depth of 47 inches. The upper part is red clay that has brown and grayish brown mottles. The lower part is light brownish gray clay that has reddish mottles. The underlying material, from a depth of 47 to 65 inches, is light brownish gray clay loam that has yellowish brown and gray mottles.

Permeability is very slow, and the available water capacity is moderate. Surface runoff is medium or high. The hazard of water erosion is moderate.

Included with this soil in mapping are small areas of Derly, Freestone, and Raino soils. Derly soils have a

clayey subsoil and are wetter than the Woodtell soils. Freestone soils have a loamy subsoil. Raino soils have a loamy subsoil and are on small mounds. Included soils make up less than 15 percent of the map unit.

This Woodtell soil is used mainly as woodland or pasture. A few areas are used as cropland.

The main woodland species on this soil are post oak, blackjack oak, and elm. Loblolly pine can be planted for commercial timber production. The equipment limitation and the clayey subsoil are management concerns.

This soil is well suited to coastal bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with clover increases forage production and improves soil fertility. Good grazing management and applications of fertilizer and lime also increase forage production.

This soil is suited to corn and vegetable crops. Applications of fertilizer and lime increase yields. Farming on the contour and terracing help to control erosion.

This Woodtell soil is suited to urban uses. The very slow permeability is a severe limitation on sites for septic tank absorption fields and sanitary landfills. The shrink-swell potential and low strength are severe limitations on sites for buildings and local roads and streets. Corrosion of uncoated steel and concrete is a limitation. Proper design and careful installation can help to overcome these limitations.

The capability subclass is IVe. The woodland ordination symbol is 8C.

WtD—Woodtell loam, 5 to 15 percent slopes. This soil is deep to stratified shale and loamy materials. It is a strongly sloping to moderately steep, well drained soil on side slopes above drainageways on uplands. Areas are mostly oblong or irregular in shape and range from 20 to 500 acres.

Typically, the surface layer is brown loam about 3 inches thick. The subsurface layer, from a depth of 3 to 7 inches, is yellowish brown loam. The upper part of the subsoil, from a depth of 7 to 43 inches, is red clay that has brownish and grayish mottles that increase in number with depth. The lower part, from a depth of 43 to 57 inches, is mottled light brownish gray, yellowish brown, and yellowish red weathered shale that has clay texture. The underlying material, from a depth of 57 to 67 inches, is mottled light yellowish brown and light gray weathered shale that has clay texture.

Permeability is very slow, and the available water capacity is moderate. Surface runoff is very high. The hazard of water erosion is severe.

Included with this soil in mapping are small areas of Woodtell soils that have a stony surface. Also included are soils that have a sandy surface layer and are on foot slopes. Included soils make up less than 15 percent of the map unit.

This Woodtell soil is used mainly as woodland. Some areas have been cleared of trees and are used as pasture.

The main woodland species are post oak, blackjack oak, and elm. Loblolly pine can be planted for commercial timber production. The equipment limitation and the erosion hazard are management concerns.

This soil is well suited to coastal bermudagrass, common bermudagrass, and bahiagrass. Overseeding pastures with clover increases forage production and improves soil fertility. Good grazing management and applications of fertilizer and lime also increase forage production.

This soil is not suited to cropland because of the slope and the hazard of erosion.

This Woodtell soil is suited to urban uses. The very slow permeability and the slope are severe limitations on sites for most sanitary facilities. The shrink-swell potential and low strength are limitations on sites for buildings and local roads and streets. Corrosion of uncoated steel and concrete is a limitation. Proper design and careful installation can help to overcome these limitations.

The capability subclass is VIe. The woodland ordination symbol is 8C.

WxB—Woodtell-Raino complex, 1 to 3 percent slopes. This deep and very deep, very gently sloping complex is on broad uplands. Woodtell soils are on intermound areas and are well drained. Raino soils are on mainly round to slightly oblong mounds and are moderately well drained. The mounds are 2 to 4 feet high and 30 to 70 feet across. Areas are irregular in shape and range from 10 to 100 acres.

This map unit is made up of about 50 percent Woodtell soils, 30 percent Raino soils, and 20 percent other soils. The areas of soils that make up this complex are so intricately mixed that separating them is not practical at the scale mapped.

Typically, the surface layer of the Woodtell soil is very dark grayish brown loam about 4 inches thick. The subsurface layer, from a depth of 4 to 10 inches, is brown loam. The subsoil extends to a depth of 52 inches. The upper part is mottled red, yellowish brown, and gray clay with the red colors decreasing with depth. The lower part is yellowish brown clay that has light yellowish red, olive brown, and gray mottles. The underlying material, from a depth of 52 to 70 inches, is stratified light brownish gray and light gray weathered shale that has clay texture.

This Woodtell soil is very slowly permeable, and the available water capacity is moderate. Surface runoff is medium. The hazard of water erosion is moderate.

Typically, the surface layer of the Raino soil is brown fine sandy loam about 6 inches thick. The subsurface

layer, from a depth of 6 to 16 inches, is light yellowish brown fine sandy loam. The subsoil extends to a depth of 80 inches. It is yellowish brown loam in the upper part. The lower part is mottled red, dark yellowish brown, and gray clay loam that has streaks and pockets of gray uncoated sand. The lower part of the subsoil becomes more clayey with depth.

The Raino soil is very slowly permeable, and the available water capacity is high. Surface runoff is medium. The hazard of water erosion is moderate. A seasonal high water table is at a depth 2 to 3.5 feet during the winter and spring.

Included with these soils in mapping are small areas of Derly and Freestone soils. Derly soils are more clayey, grayer, and wetter. Freestone soils have a yellowish subsoil. Included soils make up less than 20 percent of the map unit.

This unit is used mainly as pasture. Some areas are used as woodland, and a few areas are used as cropland.

These soils are well suited to bermudagrass, bahiagrass, and dallisgrass. Overseeding pastures with arrowleaf clover, crimson clover, or vetch increases forage production and improves soil fertility. Some pastures are planted to cool-season ryegrass, wheat, or oats for winter grazing. Applications of fertilizer and lime also increase forage production.

Loblolly pine and shortleaf pine are the main commercial trees on this map unit. The clayey subsoil is the main limitation.

These soils are suited to small grains, grain sorghum, and corn. The wetness is the main limitation affecting crop production. Farming on the contour and terracing help to control erosion. Incorporating crop residue left on or near the surface helps to maintain tilth.

These soils are poorly suited to most urban uses because of wetness, the clayey texture, the shrink-swell potential, and the corrosion of uncoated steel and concrete.

The capability subclass is IIIe for areas of the Woodtell soil and IIIs for areas of the Raino soil. The woodland ordination symbol is 8C for the Woodtell soil and it is 9W for the Raino soil.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 5 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

The map units in the survey area that are considered prime farmland are listed at the end of this section. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

The map units that meet the requirements for prime farmland are:

AtB	Attoyac fine sandy loam, 1 to 3 percent slopes
BeB	Bernaldo fine sandy loam, 1 to 3 percent slopes
BoC	Bowie fine sandy loam, 1 to 5 percent slopes
ErC	Elrose fine sandy loam, 2 to 5 percent slopes
FrB	Freestone fine sandy loam, 1 to 3 percent slopes
GaB	Gallime fine sandy loam, 1 to 3 percent slopes
KuB	Kullit very fine sandy loam, 1 to 3 percent slopes
OkB	Oakwood very fine sandy loam, 1 to 5 percent slopes

Use and Management of the Soils

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

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

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

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

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

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

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified. The system of land capability classification used by the Natural Resources Conservation Service is explained in this section. The estimated yields of the main crops and hay and pasture plants are listed for each soil in table 5.

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

Cropland

About 35,600 acres, or 8 percent of the total land area, in Wood County is used for cropland. The main crops in the county are sweet potatoes, watermelons, and peaches (fig. 13). Some of the cropland is used for small grains for grazing by livestock. The amount of cropland in the county has been decreasing for many years, with most of it being converted to pasture.

Management is needed to control water erosion, maintain tilth, and improve fertility. The major management practices are crop rotations, conservation tillage, contour farming, terraces, cover crops, and proper applications of fertilizer.

Erosion of the soil by water is a major problem on nearly all of the cropland where slopes are more than 2 percent. Productivity is reduced when part of the topsoil is lost and the subsoil is incorporated into the plow layer. Soil erosion on farmland also results in the sedimentation of streams. Where erosion is controlled, the pollution of streams by sediment is minimized and the quality of water for municipal use, for recreation, and for fish and wildlife is improved.

Management of crop residue helps to control erosion. Keeping crop residue on the surface protects the soil against pounding raindrops, reduces crusting, decreases runoff, and reduces evaporation of soil moisture. Crop residue shades the soil and thus reduces the soil temperature. It also adds organic matter to the soil, thus improving tilth, maintaining fertility, and reducing compaction by farm machinery. Because of its beneficial effects, crop residue should not be burned. Tillage equipment that keeps residue on the surface should be used. Minimum tillage is effective in reducing erosion on sloping land and can be adapted to most soils that are now being cropped.

Figure13.—Harvesting sweet potatoes on a farm in Wood County. The soil is Freestone fine sandy loam, 1 to 3 percent slopes.

Contour terraces reduce runoff and subsequent erosion. They are most practical on loamy soils that have slopes of more than 1 percent.

Most crops respond well to commercial fertilizer. Where the proper kinds and amounts of fertilizer are applied and proper management is used, soil fertility levels can be maintained or improved.

Additional information about soil management practices can be obtained from the local office of the Natural Resources Conservation Service.

Pasture and Hayland

The production of forage for livestock is one of the major agricultural enterprises in Wood County. Pasture and hayland make up about 53 percent of the survey area (fig. 14). The important warm-season forage species are coastal bermudagrass, common bermudagrass, and Pensacola bahiagrass. Tall fescue is a cool-season grass adapted to many of the soils in the county. Weeping lovegrass is a warm-season grass that is used for cool-season forage. Lovegrass is adapted to the very deep, sandy soils in the survey area. Legumes, such as crimson clover, arrowleaf clover, and vetch, are overseeded in permanent pastures for cool-season grazing.

Most improved pastures are in areas formerly used as cropland. Introduced grasses and legumes have increased the quality and overall production of forage in these areas. Information on improved varieties of each species, soil

adaptation, timeliness and quality of seedbed preparation, and seeding methods is available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Controlled grazing, weed and brush control, and proper applications of fertilizer are needed to maximize production of improved pastures. Fertilizer is needed on all soils in the survey area. Most of the soils also require lime to reduce acidity and to improve growing conditions. Poor surface drainage is a major limitation for growing improved pasture grasses on many of the soils on the flood plains.

0rchard Production

Wood County is in one of the primary peach production areas in Texas. The average annual yield of peaches in the county is about 60,000 bushels. A strict management program for the orchards requires pruning, thinning, and spraying of the trees. The trees are sprayed several times throughout the year. Other orchard crops include nectarines and blueberries.

About 60 percent of all fruit is sold on or near the farm, either at roadside stands along the major highways or in orchards where the customers are allowed to do their own harvesting. The other 40 percent is sold at the farmers' market in the larger towns and cities.

A combination of good soils and proper management practices results in increased production and prolongs the average productive life of orchard trees. Peaches and nectarines are best adapted to loamy soils that are well drained or moderately well drained. Most areas of Bernaldo, Bowie, Elrose, Kirvin, and Oakwood soils are well suited to peach and nectarine production. In addition to having good drainage, these soils are deep or very deep and have a medium or high moisture-holding capacity and good fertility. Sandy soils that have a loamy

Figure 14.—Round bales of bahiagrass hay on Freestone fine sandy loam, 1 to 3 percent slopes.

subsoil, such as Briley, Darco, Lilbert, Pickton, and Wolfpen soils, are moderately suited to peach and nectarine production. Droughtiness is the most limiting feature. Proper slopes for orchards range from 0 to about 5 percent. In areas where slopes are more than 5 percent, production is limited because the hazard of erosion is much greater and the soils are more droughty.

Yields per Acre

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

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

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

The estimated yields reflect the productive capacity of each soil for each of the principal crops and pasture grasses. 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 and pasture grasses other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops and pasture grasses.

Land Capability Classification

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

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

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

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

The capability classification of each map unit is given in the section “Detailed Soil Map Units” and in table 5.

Figure 15.—A field of Virginia pine grown for use as Christmas trees in an area of Freestone fine sandy loam, 1 to 3 percent slopes.

Woodland Management and Productivity

John Patterson, area resource conservationist, Natural Resources Conservation Service, helped prepare this section.

Nearly 33 percent of Wood County, or about 145,000 acres, is used for woodland. These areas not only produce commercial timber but also provide opportunities for hunting and other recreational activities. Most of the woodland is owned by individual landowners.

The soils of Wood County are generally well suited to the production of timber, an important source of income. In many areas Virginia pine and Scotch pine are grown as Christmas trees (fig. 15). Most of the harvested timber must be transported to processing plants outside the county. There is presently only one sawmill, which is in the southern part of the county. The major timber management concern is competition from other plant species. Timber production can be increased in most areas by better management.

The woodland on upland soils of the county consists mainly of mixed pine and hardwoods. The major species are loblolly pine, shortleaf pine, red oak, hickory, and sweetgum. The woodland on flood plains consists mostly of hardwoods, such as water oak, willow oak, hickory, and sweetgum.

Soils vary in their ability to produce trees. Available water capacity has a major effect on tree growth. Fertility, permeability, drainage, and position on the landscape also are important.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land.

Some soils respond better to applications of fertilizer than others, and some are more susceptible to erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. Table 6 summarizes forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

Table 6 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species based on its site index. The larger the number, the greater the potential productivity.

Loblolly pine is the indicator species for soils that produce pine in Wood County. For soils having a very high potential productivity (site indices of 92 or more), the first part of the ordination symbol is 10 or more. For soils having a low potential productivity (site indices of 70 or less), the first part of the ordination symbol is 6 or less.

Sweetgum is the indicator species for soils that normally produce only hardwoods. For soils having a very high potential productivity (site indices of 91 or more), the first part of the ordination symbol is 8 or more. For soils having a low potential productivity (site indices of less than 80), the first part of the ordination symbol is 5 or less.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of steepness of slope. The letter W indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the profile. The letter *S* indicates a dry, sandy soil. The letter *F* indicates a soil that has a large amount of coarse fragments. The letter *A* indicates a soil having no significant limitations that affect forest use and management. If a soil has more than one limitation, the priority is as follows: R, W, C, S, and F.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of moderate or severe indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and reforestation activities, or the use of special equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, and texture of the surface layer. As slope gradient and length increase, it becomes more difficult to use wheeled equipment. On the steeper slopes, tracked equipment may be needed. The rating is *slight* if equipment use is restricted by wetness for less than 1 month and if special equipment is not needed. The rating is *moderate* if slopes are so steep (15 to 25 percent) that wheeled equipment may not be operated safely across the slope, if wetness restricts equipment use from 1 to 3 months per year, if a sandy or clayey surface layer restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. The rating is *severe* if slopes are so steep (more than 25 percent) that wheeled equipment cannot be operated safely across the slope, if wetness restricts equipment use for more than 3 months per year, if the surface layer is loose sand that severely restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. Ratings of moderate or severe indicate a need to choose the best suited equipment and to carefully plan the timing of harvesting and other management activities.

Ratings of *seedling mortality* refer to the probability of the death of naturally occurring or properly planted seedlings of good stock in periods of normal rainfall, as influenced by kinds of soil or topographic features. Seedling mortality is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, and rooting depth. The mortality rate generally is highest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of moderate or severe indicate that it may be necessary to increase the number of trees planted per acre or to make special site preparations, such as bedding, furrowing, installing a surface drainage system, and providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is moderate or severe.

Ratings of *windthrow hazard* indicate the likelihood that trees will be uprooted by the wind. A restricted rooting depth is the main reason for windthrow. The rooting depth can be restricted by a high water table, a fragipan, or bedrock or by a combination of such factors as soil wetness, texture, structure, and depth. The risk is *slight* if strong winds cause trees to break but do not uproot them; *moderate* if strong winds cause an occasional tree to be blown over and many trees to break; and *severe* if the rooting depth is less than 20 inches. A severe rating

indicates that care is needed in thinning or that the stand should not be thinned at all. Special equipment may be needed to prevent damage to shallow root systems in partial cutting operations. A plan for the periodic removal of windthrown trees and the maintenance of a road and trail system may be needed.

Ratings of *plant competition* indicate the likelihood of the growth or invasion of undesirable plants. Plant competition is more severe on the more productive soils, on poorly drained soils, and on soils having a restricted root zone that holds moisture. The risk is *slight* if competition from undesirable plants hinders adequate natural or artificial reforestation but does not necessitate intensive site preparation and maintenance. The risk is *moderate* if competition from undesirable plants hinders natural or artificial reforestation to the extent that intensive site preparation and maintenance are needed. The risk is *severe* if competition from undesirable plants prevents adequate natural or artificial reforestation unless the site is intensively prepared and maintained. A moderate or severe rating indicates the need for site preparation to control plant competition and ensure the development of an adequately stocked stand. Managers must plan site preparation measures to ensure reforestation without delays.

The *potential productivity* of *common trees* on a soil is expressed as a *site index* and a *volume* number. Common trees that have a commercial value are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil. The productivity of the soils in this survey generally is based on loblolly pine for all sites suited to pine and sweetgum for areas on bottomland suitable only for hardwoods.

The *site index* is determined by taking height measurements and determining the age of selected dominant and codominant trees within stands of a given species. This index is the average height, in feet, that the trees attain in 50 years. This index applies to fully stocked, even-aged, unmanaged stands. Site index values shown in table 6 are based on published site index tables *(3, 4, 5, 6, 8)*.

The *volume* is the yield likely to be produced by the most important trees in fully stocked natural stands, expressed in board feet (Doyle Rule) per acre per year. These annual yield figures apply to fully stocked natural stands that do not have a history of any intermediate cutting management. Therefore, applying sound forestry management practices, such as scheduled thinnings, significantly increases the listed yields.

Trees to plant are those that are used for reforestation or, under suitable conditions, natural regeneration. They are adapted to the soils and can produce a commercial wood crop. The desired product, topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for use in reforestation.

Woodland Understory Vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. If well managed, some woodland can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

Many livestock owners in Wood County utilize areas of woodland for grazing. Herbage yields average about 1,500 pounds (air-dry) per acre in a normal year. On some soils the yield can exceed 3,000 pounds. On grazed woodland that is periodically burned, grasses make up at least 80 percent of the understory vegetation. Sedges, forbs, and shrubs make up the rest.

The density of the canopy determines the amount of light that reaches the understory plants. Canopy cover is a major factor affecting the production of vegetation that is within reach of livestock and large game animals. Livestock management and good silviculture practices, such as thinning of timber stands, removal of cull trees, and controlled burning, are necessary to maintain moderate to good production of understory vegetation. Without the proper management practices, the canopy cover increases drastically because of the growth of shrubs and hardwoods in the midstory. A site that has a closed canopy of 75 percent or more may not have sufficient carrying capacity for a profitable livestock operation. Grazing of the area by large game animals will be limited because sufficient browse plants are not available.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter.

In addition to proper woodland management, the following practices can help to achieve high levels of forage production.

Proper woodland grazing is grazing at an intensity that maintains or improves the quantity and quality of desirable plants. It is generally thought to be grazing of no more than half, by weight, of the annual growth of key forage plants in preferred grazing areas. Proper grazing increases the vigor and reproductive capacity of key forage plants, conserves soil and water, improves the condition of the vegetation, increases forage production, maintains natural beauty, and reduces the hazard of wildfire.

Deferred grazing consists of postponing grazing or resting the grazing land for a prescribed period. The rest period promotes the growth of natural vegetation by permitting the vigor of the forage to increase and by allowing desirable plants to seed. Deferred grazing provides feed reserves for fall and winter, improves the appearance of the land by increasing the plant cover, and reduces the hazard of erosion.

Planned grazing systems are systems in which two or more grazing units are rested in a planned sequence throughout the year or during the growing season of key forage plants. These systems improve the production of desirable forage plants and trees.

Prescribed burning is the use of fire under controlled conditions. It can be used to control undesirable vegetation; increase production by removal of part of the organic layer; reduce the hazard of wildfire; and remove old, unpalatable forage plants.

Table 7 shows, for each soil suitable for woodland, the potential for producing understory vegetation. The total production of understory vegetation includes the herbaceous plants and the leaves, twigs, and fruit of woody plants up to a height of 4.5 feet. It is expressed in pounds per acre of air-dry vegetation in favorable, normal, and unfavorable years. In a favorable year, 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.

Table 7 also lists the common names of the characteristic vegetation on each soil and the *composition*, by percentage of air-dry weight, of each kind of plant. The table shows the kind and percentage of understory plants expected under a canopy density that is most nearly typical of woodland in which the production of wood crops is highest.

Recreation

Mike Stellbauer, biologist, Natural Resources Conservation Service, helped prepare this section.

About 85 percent of the survey area is suited to commercial or noncommercial recreational activities. It has medium or high potential for recreational development because of the suitable soils and climate, many water areas, and abundant vegetation.

Lake Fork Reservoir, Lake Winnsboro, Lake Quitman, Lake Holbrook, and Lake Hawkins are large public bodies of water in the survey area (fig. 16). There are about 16 private club lakes and numerous other smaller lakes that provide opportunities for fishing and other water-related activities. Camping and picnic areas are available mainly around Lake Fork Reservoir. The Sabine River has many areas that are suited to recreational uses. Some of the larger streams, such as Lake Fork Creek and Big Sandy Creek, also provide opportunities for recreational activities.

White-tailed deer, squirrel, and waterfowl inhabit the county and provide many hunting opportunities.

The Winnsboro Autumn Trails, the Quitman Old Settlers Reunion, and the Quitman Dogwood Trails provide recreational opportunities in fall, spring, and summer.

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

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

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet,

Figure 16.—Lake Fork Reservoir provides recreation for many people.

are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

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

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

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have

moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Mike Stellbauer, biologist, Natural Resources Conservation Service, helped prepare this section.

Interest in wildlife management continues to increase in Wood County. In many areas special consideration is given to the improvement of habitat, especially for game species.

Squirrels, white-tailed deer, and waterfowl are the most commonly utilized wildlife resources in the county. Other wildlife species are bobwhite quail, mourning dove, raccoon, opossum, fox, striped skunk, cottontail rabbit, swamp rabbit, bobcat, coyote, armadillo, beaver, nutria, shore birds, hawks, owls, and numerous songbirds.

Forested soils on the flood plains along the Sabine River, Lake Fork Creek, and Big Sandy Creek provide excellent habitat for gray squirrels. Fox squirrels are throughout the county. Mature hardwoods help to maintain desirable squirrel habitat in which a population density of one squirrel per acre can be expected during good production years. White-tailed deer inhabit all parts of the county. Their population density is highest in the eastern half of the county, on the bottomland along the Sabine River, and along major creeks. In these areas population density is estimated at 30 to 40 deer per 1,000 acres.

In the past, good habitat for quail was abundant in the many open areas used for cropland. This habitat is gradually being reduced as the areas are converted to improved pasture or reforested. Sufficient numbers of quail for hunting are in areas that have the proper mixture of food, cover, and nesting habitat. Mourning dove inhabit weedy patches and cultivated fields where the crop residue is left on the surface. Dove numbers may fluctuate throughout the year, especially during the fall and winter migration periods.

Wood County is within the natural range of the Eastern wild turkey. Restocking of this species is currently underway in the county. The successful reintroduction of this bird depends on the proper management of bottomland hardwoods, control of illegal harvest, and prevention of disease.

Furbearers, such as raccoon, bobcat, and fox, are harvested in the county for their pelts. Beaver and nutria have become a nuisance throughout the survey area. Several hundred acres of cropland, improved pasture, and woodland are inundated each year by beaver. Nutria are not as serious a problem, but they sometimes weaken stock pond dams by burrowing.

Hunting of migratory waterfowl is common in Wood County. During fall and winter migration, wood duck, mallard, pintail, gadwall, teal, canvasback, and other ducks use area lakes and flooded bottomlands as feeding and resting areas. Wood ducks are resident ducks that inhabit sloughs, beaver ponds, and backwater areas of lakes. Small wetland areas and marshes provide additional feeding places for waterfowl.

Numerous reptiles and amphibians, such as frogs and toads, inhabit the county. Rattlesnakes, copperheads, cottonmouths, and coral snakes are the poisonous snakes in the county. Nonpoisonous snakes include water snakes, king snakes, coachwhips, rat snakes, and bull snakes. Alligators, which are a threatened species, are along the Sabine River and in other wetland areas of the county. The number of alligators has increased in some private lakes.

Several other endangered or threatened wildlife species inhabit Wood County. Bald eagles winter around Lake Fork Reservoir. Other lesser known endangered species that may be seen are the interior least tern, American peregrine falcon, and the Louisiana pine snake.

Lake Fork Reservoir and numerous smaller lakes and ponds, as well as the Sabine River and various creeks, provide good to excellent fishing. Major warm-water species are largemouth black bass, crappie, various sunfish, channel catfish, flathead catfish, bullhead catfish, buffalo, carp, bowfin, and gar. Channel catfish and fathead minnows have been stocked in many small ponds.

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

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

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

very poor indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

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

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

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are tall fescue, bahiagrass, arrowleaf clover, and crimson clover.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are florida paspalum, partridge pea, lespedeza, beaked panicum, and tick clover.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, ash, pecan, sweetgum, elm, hawthorn, dogwood, hickory, blackberry, and grape. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are yaupon, plum, and honeysuckle.

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

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

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

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

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

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

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

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the “Soil Properties” section.

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

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

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

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

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

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

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

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

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

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

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable

for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

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

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

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

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

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

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

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

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

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

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

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

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

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

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

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

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

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

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

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

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

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

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

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

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

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site

features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

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

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. The underlying material is not rated and should be evaluated during an onsite investigation. Excessive slope can affect the storage capacity of the reservoir area.

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

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

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

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

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

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

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

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

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

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

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

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

Texture is given 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 the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

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

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

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

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

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

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

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

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area.

The estimates are based on field observations and on test data for these and similar soils.

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

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

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

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

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

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

Salinity is a measure of soluble salts in the soil at saturation. It 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 nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

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

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

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

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

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

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the

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

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

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a 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.

If a soil is assigned to two hydrologic groups in table 16, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). *Common* is used when the occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

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

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched, apparent, or artesian; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. “More than 6.0”

indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

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

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

Physical, Chemical, and Mineralogical Analyses of Selected Soils

The results of physical analysis of several typical pedons in the survey area are given in table 17 and the results of chemical analysis in table 18. The clay mineralogy of selected soils is given in table 19. The data are for soils sampled at carefully selected sites. Unless otherwise indicated, the pedons are typical of the series. They are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska and the Soil Characterization Laboratory, Texas Agricultural Experiment Station, College Station, Texas.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods *(11)*.

Sand—(0.05-2.0 mm fraction) weight percentages of material less than 2 mm (3A1).

Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of material less than 2 mm (3A1).

Water retained—pressure extraction, percentage of ovendry weight of less than 2 mm material; 1/3-bar (4B1).

Bulk density—of less than 2 mm material, saran-coated clods 1/3-bar (4A1d).

Organic carbon—wet combustion. Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c).

Aluminum—potassium chloride extraction (6G9a).

Electrical conductivity—saturation extract (8A3a).

Exchangeable sodium percentage—(5B5b).

Mineralogy—X-ray diffraction (7A2i).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(9)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 20 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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

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

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

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is clayey, mixed, thermic Typic Hapludults.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(13)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(9)* and in "Keys to Soil Taxonomy" *(12)*. Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

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

Attoyac Series

The Attoyac series consists of very deep, very gently sloping, well drained, loamy soils on stream terraces. These soils are moderately permeable. They formed in loamy alluvial deposits. Slopes range from 1 to 3 percent. The soils of the Attoyac series are fine-loamy, siliceous, thermic Typic Paleudalfs.

Typical pedon of Attoyac fine sandy loam, 1 to 3 percent slopes; from the intersection of U.S. Highway 80 and Farm Road 14 in Hawkins, 1.3 miles north on Farm Road 14, 0.6 mile east on Farm Road 1795, 0.1 mile north on County Road 3500, 300 feet east on private road, and 50 feet west in wooded area:

A—0 to 8 inches; brown (7.5YR 5/4) fine sandy loam; weak

fine granular structure; soft, very friable; many fine and medium roots; slightly acid; clear smooth boundary.
Bt1—8 to 18 inches; red (2.5YR 5/8) sandy clay loam; moderate fine subangular blocky structure; hard, friable; common fine and medium roots; few distinct clay films on surfaces of peds; moderately acid; gradual wavy boundary.
Bt2—18 to 30 inches; red (2.5YR 4/6) sandy clay loam; moderate fine subangular blocky structure; hard, friable; common fine roots; few distinct clay films on surfaces of peds; moderately acid; gradual wavy boundary.
Bt3—30 to 48 inches; red (2.5YR 4/6) sandy clay loam; moderate fine subangular blocky structure; hard, friable; few fine roots; common fine distinct strong brown masses of iron accumulation; few distinct clay films on surfaces of peds; moderately acid; gradual wavy boundary.
Bt4—48 to 68 inches; red (2.5YR 5/8) sandy clay loam; moderate fine subangular blocky structure; hard, friable; few fine roots; common fine distinct strong brown masses of iron accumulation; few distinct clay films on surfaces of peds; moderately acid; gradual wavy boundary.
Bt5—68 to 80 inches; red (2.5YR 5/8) sandy clay loam; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable; few medium distinct strong brown (7.5YR 5/8) masses of iron accumulation; few distinct clay films on surfaces of peds; about 2 to 5 percent pale brown (10YR 6/3) clay depletions in the form of pockets of uncoated sand; moderately acid.

The solum is more than 80 inches thick.

The A horizon is brown, yellowish brown, dark yellowish brown, or dark brown. It has few ironstone pebbles in some pedons. Reaction is moderately acid or slightly acid.

The Bt horizon is dark red, red, or yellowish red. Masses of iron accumulation in shades of red, yellow, and brown are in the lower part of some pedons. Texture is loam or sandy clay loam. Clay depletions in the form of streaks and pockets of uncoated sand make up from none to less than 5 percentof the volume. Reaction ranges from strongly acid to slightly acid.

Bernaldo Series

The Bernaldo series consists of very deep, very gently sloping to moderately sloping, well drained, loamy soils on stream terraces. These soils are moderately permeable. They formed in loamy alluvial deposits. Slopes range from 1 to 8 percent. The soils of the Bernaldo series are fine-loamy, siliceous, thermic Glossic Paleudalfs.

Typical pedon of Bernaldo fine sandy loam, 1 to 3 percent slopes; from the intersection of State Highway 37 and Farm Road 515 in Winnsboro, 3.8 miles west on Farm Road 515, 0.5 mile north on County Road 4250, and 600 feet east in hay meadow:

A—0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; slightly hard, very friable; many very fine and fine roots; strongly acid; clear smooth boundary.
E—3 to 10 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine and medium granular structure; slightly hard, very friable; many very fine and fine roots; strongly acid; clear wavy boundary.
Bt1—10 to 35 inches; strong brown (7.5YR 5/6) loam; moderate fine and medium subangular blocky structure; hard, friable; common very fine and fine roots; common distinct clay films on surfaces of peds; very strongly acid; gradual wavy boundary.
Bt2—35 to 42 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate fine and medium subangular blocky structure; hard, friable; few very fine roots; few distinct clay films on surfaces of peds; about 8 percent fine and medium ironstone pebbles; very strongly acid; gradual wavy boundary.
Bt/E—42 to 80 inches; strong brown (7.5YR 5/6), light yellowish brown (10YR 6/4), and red (2.5YR 4/6) sandy clay loam; weak coarse prismatic structure parting to weak fine subangular blocky; hard, firm; few very fine roots; about 8 to 10 percent clay depletions in the form of vertical streaks and pockets of light brownish gray (10YR 6/2) uncoated sand (E) on surfaces of peds; very strongly acid.

The solum is more than 80 inches thick.

The A or Ap horizon is dark brown, yellowish brown, dark grayish brown, or very dark grayish brown. The E horizon is dark yellowish brown, yellowish brown, or light yellowish brown. The combined thickness of the A and E horizons is less than 20 inches. Reaction ranges from strongly acid to slightly acid.

The Bt horizon is strong brown, dark yellowish brown, yellowish brown, light yellowish brown, or brownish yellow. Some pedons have masses of iron accumulation in shades of red, yellow, and brown.. Some pedons have a matrix that is mixed with these colors. Texture is loam, sandy clay loam, or clay loam. Reaction ranges from very strongly acid to slightly acid.

The Bt/E horizon is in shades of red, yellow, brown, and gray. The content of masses of iron accumulation and iron depletions in these colors ranges from few to many. The

texture of the Bt part is loam or sandy clay loam. Clay depletions (E) make up from 5 to 15 percent, by volume, of the horizon and are in the form of vertical streaks and pockets of uncoated sand. Reaction ranges from very strongly acid to moderately acid.

Bibb Series

The Bibb series consists of very deep, nearly level, poorly drained, loamy soils on flood plains of smaller streams. These soils are moderately permeable. They formed in sandy and loamy alluvium. Slopes are 0 to 1 percent. The soils of the Bibb series are coarse-loamy, siliceous, acid, thermic Typic Fluvaquents.

Typical pedon of Bibb fine sandy loam, frequently flooded; from the intersection of U.S. Highway 69 and Farm Road 49 in Mineola, 4.2 miles northeast on Farm Road 49, 1.9 miles south on County Road 2650, and 100 feet east in flood plain:

A—0 to 6 inches; grayish brown (10YR 5/2) fine sandy loam; weak fine and medium subangular blocky structure; slightly hard, very friable; many fine and medium roots; common fine and medium distinct brownish yellow (10YR 6/8) masses of iron accumulation; common black stains along old root channels; very strongly acid; clear smooth boundary.

Ag—6 to 12 inches; gray (10YR 5/1) silt loam; weak medium and coarse subangular blocky structure; hard, friable; common fine and medium roots; common fine distinct yellowish brown masses of iron accumulation; common black and brown stains along root channels; common thin strata of fine sandy loam; very strongly acid; clear smooth boundary.

Cg1—12 to 52 inches; gray (10YR 5/1) fine sandy loam; massive; slightly hard, very friable; common fine and medium roots; common thin strata of silt loam; very strongly acid; clear smooth boundary.

Cg2—52 to 80 inches; dark gray (10YR 4/1) silt loam; massive; slightly hard, friable; few very fine roots; very strongly acid.

Soil reaction is very strongly acid or strongly acid. Average clay content of the control section ranges from 7 to 18 percent.

The A and Ag horizons are gray, grayish brown, very dark gray, or very dark grayish brown. Masses of iron accumulation in shades of yellow and brown are in most pedons.

The Cg horizon is gray, light brownish gray, dark gray, or very dark gray. Some pedons have masses of iron accumulation in shades of red, brown, and olive. Texture is fine sandy loam, loam, or silt loam and is stratified in most pedons.

Bowie Series

The Bowie series consists of very deep, gently sloping, well drained, loamy soils on uplands. These soils are moderately slowly permeable. They formed in thick beds of unconsolidated loamy sediments. Slopes range from 1 to 5 percent. The soils of the Bowie series are fine-loamy, siliceous, thermic Plinthic Paleudults.

Typical pedon of Bowie fine sandy loam, 1 to 5 percent slopes; from the intersection of Farm Road 14 and U.S. Highway 90 in Hawkins, 8.8 miles north on Farm Road 14, and 50 feet east of intersection with County Road 3860, in cropland field:

Ap—0 to 9 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine subangular blocky structure; slightly hard, very friable; common very fine and fine roots; few black masses; very strongly acid; clear smooth boundary.

Bt1—9 to 14 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate fine and medium subangular blocky structure; hard, firm; common very fine and fine roots; common fine distinct light yellowish brown masses of iron accumulation; few black masses 2 to 5 millimeters in diameter; few distinct clay films on surfaces of peds; few clay depletions in the form of light yellowish brown sand coatings on surfaces of peds; very strongly acid; clear smooth boundary.

Bt2—14 to 30 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate fine and medium subangular blocky structure; hard, firm; common very fine and fine roots; few fine prominent reddish brown masses of iron accumulation; few black masses 2 to 25 millimeters in diameter; few distinct clay films on surfaces of peds; very strongly acid; gradual smooth boundary.

Btv/E1—30 to 47 inches; yellowish brown (10YR 5/8) sandy clay loam; moderate fine and medium subangular blocky structure; hard, firm; few very fine roots; common fine prominent red and common fine distinct light yellowish brown masses of iron accumulation; few black masses 2 to 5 millimeters in diameter; about 8 to 10 percent plinthite; common distinct clay films on surfaces of peds; about 5 percent light yellowish brown (10YR 6/4) clay depletions (E); about 10 percent, by volume, moderately brittle masses; very strongly acid; gradual smooth boundary.

Btv/E2—47 to 64 inches; brownish yellow (10YR 6/6) sandy clay loam; moderate fine and medium subangular blocky structure; hard, firm; few very fine roots; common fine prominent red and common fine distinct light yellowish brown masses of iron accumulation; about 10 to 13 percent plinthite; common distinct clay films on surfaces of peds; about 10 percent light yellowish brown (10YR 6/4) clay

depletions (E); about 15 percent, by volume, moderately brittle masses; very strongly acid; clear smooth boundary.

B't—64 to 80 inches; red (2.5YR 4/6), light brownish gray (10YR 6/2), and brownish yellow (10YR 6/6) clay loam; moderate fine and medium subangular blocky structure; very hard, firm; few very fine roots; few black masses; less than 3 percent plinthite; common distinct clay films on surfaces of peds; very strongly acid.

The solum is more than 80 inches thick.

The A horizon is yellowish brown or brown. The E horizon, where present, is yellowish brown or light yellowish brown. Reaction ranges from very strongly acid to moderately acid.

The Bt horizon is strong brown, yellowish brown, or dark yellowish brown. Most pedons have few or common masses of iron accumulation in shades of red, yellow, or brown. The texture of the Bt horizon is sandy clay loam or clay loam. Some pedons have as much as 4 percent plinthite in the lower part of the horizon. Reaction ranges from very strongly acid to moderately acid.

The Btv/E horizon is yellowish brown, light yellowish brown, or brownish yellow. Some pedons have masses of iron accumulation in shades of red, yellow, and brown and iron depletions in shades of gray. Plinthite makes up about 5 to 13 percent of the volume; clay depletions (E), about 5 to 15 percent; and brittle masses, about 5 to 15 percent.

The B't horizon has many masses of iron accumulation in shades of red and brown and many iron depletions in shades of gray. The texture is sandy clay loam or clay loam. Some pedons have as much as 5 percent vertical streaks and pockets of uncoated sand. Some pedons have as much as 3 percent, by volume, plinthite.

Briley Series

The Briley series consists of very deep, gently sloping, well drained, sandy soils on uplands. These soils are moderately permeable. They formed in sandy and loamy sediments. Slopes range from 2 to 5 percent. The soils of the Briley series are loamy, siliceous, thermic Arenic Paleudults.

Typical pedon of Briley loamy fine sand, 2 to 5 percent slopes; from the intersection of Texas Highway 37 and Farm Road 515 in Winnsboro, 2.75 miles east on Farm Road 515, 0.2 mile east on Texas Highway 11, 1.85 miles south then east on County Road 4420, 0.2 mile south on County Road 4425, and 1000 feet southwest in pasture:

A—0 to 3 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak fine granular structure; soft, very friable; many very fine and fine roots; very strongly acid; clear wavy boundary.

E1—3 to 11 inches; brown (10YR 5/3) loamy fine sand; weak fine and medium subangular blocky structure; soft, very friable; common very fine and fine roots; very strongly acid; gradual wavy boundary.

E2—11 to 33 inches; pale brown (10YR 6/3) loamy fine sand; weak fine subangular blocky structure; soft, very friable; common very fine and fine roots; common fine faint light yellowish brown masses of iron accumulation; very strongly acid; clear wavy boundary.

Bt1—33 to 39 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; hard, firm; common very fine and fine roots; many medium and coarse distinct red (2.5YR 4/6) masses of iron accumulation; few distinct clay films on surfaces of peds; very strongly acid; clear wavy boundary.

Bt2—39 to 60 inches; red (2.5YR 4/8) sandy clay loam; weak medium subangular blocky structure; hard, firm; few very fine roots; few fine distinct strong brown masses of iron accumulation; few distinct clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

Bt3—60 to 80 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine subangular blocky structure; soft, very friable; many fine distinct light yellowish brown masses of iron accumulation; few distinct clay films on surfaces of peds; very strongly acid.

The solum ranges from 60 to more than 80 inches in thickness. The A and E horizons range from 20 to 40 inches thick.

The A or Ap horizon is brown, yellowish brown, dark brown, or dark grayish brown. The E horizon is brown, pale brown, yellowish brown, or light yellowish brown. Reaction of the A and E horizons ranges from very strongly acid to slightly acid.

Some pedons have a thin BE horizon in shades of yellow or brown.

The upper part of the Bt horizon is red or yellowish red. Masses of iron accumulation in shades of yellow and brown are in some pedons. In most pedons, the lower part of the Bt horizon is brownish in color with reddish, yellowish, or brownish masses of iron accumulation. The texture is loam or sandy clay loam. It is fine sandy loam in the lower part of some pedons. Some pedons contain a few streaks and pockets of sandy material in the lower part. Reaction ranges from very strongly acid to moderately acid.

Cuthbert Series

The Cuthbert series consists of soils that are moderately deep to weakly consolidated sandstone and shale (fig. 17). They are strongly sloping to steep, well

drained, loamy soils on uplands. These soils are moderately slowly permeable. Slopes range from 8 to 25 percent. The soils of the Cuthbert series are clayey, mixed, thermic Typic Hapludults.

Typical pedon of Cuthbert fine sandy loam, 8 to 25 percent slopes; from the intersection of State Highway 14 and Farm Road 2659, about 2.5 miles north of Hawkins, 0.9 mile west on a county road, 0.2 mile south on a private road, and 100 feet west of the private road:

A—0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; slightly hard, very friable; common fine and medium roots; few fine ironstone pebbles; moderately acid; clear smooth boundary.

E—3 to 7 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; slightly hard, very friable; common fine, medium, and coarse roots; few fine ironstone pebbles; moderately acid; clear wavy boundary.

Bt1—7 to 19 inches; yellowish red (5YR 4/6) clay; few medium distinct red (2.5YR 4/8) mottles; weak medium subangular blocky structure; very hard, firm; common fine, medium, and coarse roots; few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; common prominent clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

Bt2—19 to 25 inches; yellowish red (5YR 4/6) clay; common medium distinct red (2.5YR 5/8) mottles; very hard, very firm; common fine, medium, and coarse roots; common fine prominent light brownish gray (10YR 6/2) weathered shale fragments; few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; common prominent clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

BC—25 to 31 inches; yellowish red (5YR 5/8) sandy clay loam; many coarse red (2.5YR 4/8) mottles; weak medium platy structure; hard, firm; common fine and medium roots; common thin discontinuous strata of light brownish gray (10YR 6/2) weathered shale; common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation; few distinct clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

C—31 to 60 inches; stratified red (2.5YR 4/8) and yellowish red (5YR 5/8) sandstone, yellowish brown (10YR 5/6) sandy clay loam, and light brownish gray (10YR 6/2) weathered shale; massive; very strongly acid.

The solum ranges from 20 to 40 inches in thickness.

The A horizon is dark brown or dark grayish brown. The E horizon is yellowish brown or dark yellowish brown. The texture is fine sandy loam or gravelly fine sandy loam. The content of ironstone pebbles ranges from 0 to 35 percent, by volume. Reaction ranges from strongly acid to slightly acid.

The Bt horizon is red or yellowish red. Masses of iron accumulation in shades of yellow and brown are in most pedons. Grayish weathered shale fragments are in the lower part of the horizon in most pedons. The texture is sandy clay loam, clay loam, or clay. Reaction ranges from extremely acid to strongly acid.

The BC horizon is in shades of red, yellow, and brown. Some pedons have a matrix that is mixed with these colors. Most pedons contain grayish weathered shale fragments. The texture is fine sandy loam or sandy clay loam. Reaction is extremely acid or strongly acid.

The C horizon is stratified sandy clay loam, soft sandstone, and weathered shale. The loamy soil material and sandstone are in shades of red, yellow, and brown. The weathered shale is mainly grayish. Some pedons have thin layers of ironstone. Reaction is extremely acid or very strongly acid.

Darco Series

The Darco series consists of very deep, gently sloping to moderately steep, somewhat excessively drained, sandy soils on uplands. These soils are moderately permeable. They formed in sandy and loamy sediments. Slopes range from 2 to 15 percent. The soils of the Darco series are loamy, siliceous, thermic Grossarenic Paleudults.

Typical pedon of Darco fine sand, 2 to 5 percent slopes; from the intersection of Farm Road 14 and Farm Road 2869 about 4 miles north of Hawkins, 1.0 mile northeast on Farm Road 2869 to curve in road, 0.25 mile south along power line, and 30 feet east of fence in field:

A—0 to 3 inches; dark grayish brown (10YR 4/2) fine sand; weak fine granular structure; soft, very friable; many fine and medium roots; moderately acid; clear wavy boundary.

E1—3 to 41 inches; brown (10YR 5/3) fine sand; single grained; loose; common fine and medium roots; moderately acid; gradual wavy boundary.

E2—41 to 56 inches; pale brown (10YR 6/3) fine sand; single grained; loose; few fine roots; moderately acid; clear wavy boundary.

Bt—56 to 80 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; hard, friable; few fine roots; common medium prominent red (2.5YR 4/8) masses of iron accumulation and common fine distinct light brownish gray iron depletions; few distinct clay films on surfaces of peds; very strongly acid.

The solum is more than 80 inches thick.

The A or Ap horizon is yellowish brown, brown, dark

The solum is more than 80 inches thick.

The A or Ap horizon is yellowish brown, brown, dark yellowish brown, or dark grayish brown. Reaction ranges from strongly acid to slightly acid.

The E horizon is yellowish brown, light yellowish brown, pale brown, very pale brown or brown. The combined thickness of the A and E horizons ranges from 40 to 72 inches. Reaction ranges from very strongly acid to moderately acid.

The Bt horizon is red, yellowish red, strong brown, yellowish brown, dark yellowish brown, or brownish yellow. In some pedons, it has common or many masses of iron accumulation in shades of red, yellow, and brown and iron depletions in shades of gray. Some pedons have a matrix that is mixed with these colors, mainly in the lower part of the Bt. The texture is fine sandy loam or sandy clay loam. Reaction ranges from very strongly acid to moderately acid.

Derly Series

The Derly series consists of very deep, nearly level, poorly drained, loamy soils on terraces (fig. 18). These soils are very slowly permeable. They formed in clayey sediments in depressional areas. Slopes are 0 to 1 percent. The soils of the Derly series are fine, montmorillonitic, thermic Typic Glossaqualfs.

Typical pedon of Derly loam, in an area of Derly-Raino complex, 0 to 1 percent slopes; from the intersection of State Highway 182 and Farm Road 17 in Alba, 5.8 miles north on Farm Road 17, and 300 feet west in pasture:

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) loam; weak medium subangular blocky structure; hard, friable; common very fine roots; common brownish yellow (10YR 6/8) iron accumulations lining root channels; very strongly acid; clear smooth boundary.

E—4 to 9 inches; grayish brown (10YR 5/2) loam; weak fine and medium subangular blocky structure; hard, friable; common very fine roots; common brownish yellow (10YR 6/8) iron accumulations lining root channels; very strongly acid; clear wavy boundary.

Btg/E—9 to 21 inches; dark grayish brown (10YR 4/2) clay loam; weak medium subangular blocky structure; very hard, firm; common very fine roots; common brownish yellow (10YR 6/8) iron accumulations lining root channels; about 25 percent clay depletions in the form of vertical streaks of light brownish gray (10YR 6/2) loam (E) on surfaces of peds; very strongly acid; abrupt wavy boundary.

Btg1—21 to 41 inches; dark grayish brown (10YR 4/2) clay loam; moderate coarse subangular blocky structure; extremely hard, very firm; common very fine and fine roots; few fine distinct yellowish brown masses of iron accumulation; very strongly acid; gradual wavy boundary.

Btg2—41 to 54 inches; dark grayish brown (10YR 4/2) clay loam; weak medium subangular blocky structure; extremely hard, very firm; common very fine and fine roots; few fine distinct yellowish brown masses of iron accumulation; few clay depletions on surfaces of peds; moderately acid; gradual wavy boundary.

Btg3—54 to 65 inches; dark grayish brown (10YR 4/2) clay loam; weak medium subangular blocky structure; extremely hard, very firm; few very fine and fine roots; common fine distinct dark yellowish brown masses of iron accumulation; strongly acid; clear wavy boundary.

Btg4—65 to 80 inches; light brownish gray (2.5Y 6/2) clay loam; weak coarse subangular blocky structure; extremely hard, very firm; common fine distinct brownish yellow masses of iron accumulation; few fine black masses; strongly acid.

The solum is more than 80 inches thick.

The A horizon is very dark grayish brown, dark grayish brown, or grayish brown. Some pedons have few to common masses of iron accumulation in shades of yellow and brown. Reaction ranges from very strongly acid to slightly acid.

The E horizon is grayish brown, light grayish brown, or light gray. Most pedons have few to common masses of iron accumulation in shades of yellow and brown. The texture is silt loam or loam. Reaction ranges from very strongly acid to moderately acid.

The Btg/E horizon is dark grayish brown, grayish brown, or light brownish gray. Most pedons have few to common masses of iron accumulation in shades of red, yellow, and brown. Loamy materials (E) make up from 15 to 30 percent of the volume and are in the form of vertical streaks. The texture of the Btg part is clay loam or clay. Reaction is very strongly acid or strongly acid.

The Btg horizon is dark grayish brown, grayish brown, or light brownish gray. Most pedons have few to common masses of iron accumulation in shades of red, yellow, or brown. The texture is clay loam or clay. Reaction ranges from very strongly acid to neutral.

Duffern Series

The Duffern series consists of very deep, gently sloping, excessively drained, sandy soils on uplands (fig. 19). These soils are rapidly permeable. They formed in sandy sediments. Slopes range from 1 to 5 percent. The soils of the Duffern series are thermic, coated Argic Quartzipsamments.

Typical pedon of Duffern sand, 1 to 5 percent slopes; from the intersection of State Highway 37 and Farm Road

single grained; loose; many very fine and fine roots; moderately acid; gradual smooth boundary.
E1—9 to 20 inches; yellowish brown (10YR 5/4) sand; single grained; loose; common very fine and fine and few medium roots; moderately acid; gradual smooth boundary.
E2—20 to 31 inches; pale brown (10YR 6/3) sand; single grained; loose; common very fine and fine roots; few fine distinct yellowish red masses of iron accumulation; moderately acid; gradual smooth boundary.
E3—31 to 43 inches; light yellowish brown (10YR 6/4) sand; single grained; loose; common very fine and fine roots; strongly acid; gradual smooth boundary.
E4—43 to 57 inches; light yellowish brown (10YR 6/4) sand; single grained; loose; common very fine roots; few thin distinct discontinuous reddish lamellae; strongly acid; gradual smooth boundary.
E&B1—57 to 69 inches; very pale brown (10YR 7/3) sand; single grained; loose; few very fine roots; common distinct discontinuous yellowish red (5YR 4/6) lamellae 0.5 to 1 millimeter thick and 7 to 15 millimeters apart; moderately acid; gradual wavy boundary.
E&B2—69 to 80 inches; pale brown (10YR 6/3) sand; single grained; loose; few very fine roots; many continuous red (2.5YR 4/6) sandy loam lamellae that are 2 to 5 millimeters thick and 20 to 50 millimeters apart; strongly acid.

The solum is more than 80 inches thick. Reaction ranges from very strongly acid to slightly acid.

The A horizon is very dark grayish brown, dark brown, dark grayish brown, or brown.

The E horizon is dark yellowish brown, yellowish brown, light yellowish brown, pale brown, very pale brown, brown, or light brown.

In some pedons, a Bw horizon is between the E and E&B horizons. It is dark yellowish brown, yellowish brown, brownish yellow, or strong brown. Lamellae of loamy fine sand or sandy loam range from 0.2 to 1.0 centimeter in thickness and are 3 to 20 centimeters apart. The lamellae are reddish yellow or strong brown.

The E&B horizon is yellowish brown, light yellowish brown, pale brown, very pale brown, brown, or light brown. The lamellae are red, yellowish red, strong brown, or brown.

Elrose Series

The Elrose series consists of very deep, gently sloping, well drained, loamy soils on uplands. These soils are moderately permeable. They formed in marine sediments high in glauconite. Slopes range from 2 to 5 percent. The soils of the Elrose series are fine-loamy, siliceous, thermic Typic Paleudalfs.

Typical pedon of Elrose fine sandy loam, 2 to 5 percent slopes; from the intersection of U.S. Highway 80 and Farm Road 3056 about 9.2 miles east of Mineola, 2.75 miles north on Farm Road 3056, and 500 feet west in field:

Ap—0 to 6 inches; reddish brown (2.5YR 4/4) fine sandy loam; weak fine subangular blocky structure; soft, very friable; many very fine and fine roots; about 3 percent by volume fine ironstone pebbles; very strongly acid; clear smooth boundary.
Bt1—6 to 16 inches; dark red (2.5YR 3/6) clay loam; moderate fine and medium subangular blocky structure; slightly hard, friable; common very fine and fine roots; common distinct clay films on surfaces of peds; about 3 percent by volume fine ironstone pebbles; very strongly acid; gradual wavy boundary.
Bt2—16 to 29 inches; dark red (2.5YR 3/6) clay loam; moderate fine and medium subangular blocky structure; hard, firm; common very fine and fine roots; common prominent clay films on surfaces of peds; about 1 to 2 percent by volume fine ironstone pebbles; very strongly acid; gradual wavy boundary.
Bt3—29 to 42 inches; dark red (2.5YR 3/6) clay loam; moderate medium subangular blocky structure; hard, firm; common very fine and fine roots; common prominent clay films on surfaces of peds; about 3 percent by volume fine ironstone pebbles; very strongly acid; gradual wavy boundary.
Bt4—42 to 60 inches; dark red (2.5YR 3/6) clay loam; weak medium subangular blocky structure; hard, firm; common very fine and fine roots; common prominent clay films on surfaces of peds; about 2 percent by volume fine ironstone pebbles; very strongly acid; gradual wavy boundary.
Bt5—60 to 71 inches; red (2.5YR 4/6) clay loam; weak medium subangular blocky structure; hard, firm; common very fine roots; few distinct clay films on surfaces of peds; about 3 percent by volume fine ironstone pebbles; very strongly acid; gradual wavy boundary.
Bt6—71 to 80 inches; yellowish red (5YR 5/6) clay loam; weak fine and medium subangular blocky structure; hard, firm; few very fine roots; about 3 percent by volume fine ironstone pebbles; about 5 percent by volume fine nodules of brownish weathered glauconitic material; very strongly acid.

The solum ranges from 60 to more than 80 inches in thickness. The content of ironstone pebbles ranges from 0 to 10 percent, by volume, in the A horizon and the upper Bt horizon. The content of weathered glauconitic materials ranges from 2 to 10 percent, by volume, in the lower Bt horizons.

The A horizon is yellowish red, reddish brown, or brown. Reaction ranges from very strongly acid to slightly acid.

The upper part of the Bt horizon is red or dark red. The

lower part of the Bt horizon is red or yellowish red. In most pedons masses of iron accumulation are in shades of yellow or brown. The texture is sandy clay loam or clay loam. Reaction ranges from very strongly acid to moderately acid.

Estes Series

The Estes series consists of very deep, nearly level, somewhat poorly drained, clayey soils on flood plains. These soils are very slowly permeable. They formed in clayey alluvium. Slopes are 0 to 1 percent. The soils of the Estes series are fine, montmorillonitic, acid, thermic Aeric Dystraquerts.

Typical pedon of Estes silty clay, frequently flooded; from the intersection of State Highway 154 and County Road 2100 in Quitman, 1.8 miles southwest on County Road 2100, and 0.4 mile south on pasture road in flood plain of Lake Fork Creek.

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) silty clay; moderate fine and medium subangular blocky structure; hard, firm; many very fine and fine roots; common yellowish brown (10YR 5/8) iron accumulations lining root channels; very strongly acid; clear smooth boundary.

Bg1—4 to 13 inches; dark grayish brown (10YR 4/2) silty clay; moderate fine and medium subangular blocky structure; hard, firm; common fine and very fine roots; few fine distinct yellowish brown masses of iron accumulation; few fine black masses; extremely acid; clear smooth boundary.

Bg2—13 to 20 inches; grayish brown (10YR 5/2) silty clay; moderate fine and medium subangular blocky structure; hard, firm; common very fine, fine, and medium roots; few fine distinct yellowish brown and common fine and medium distinct brown (10YR 4/3) masses of iron accumulation; common fine and medium black masses; extremely acid; clear smooth boundary.

Bg3—20 to 27 inches; grayish brown (10YR 5/2) silty clay; moderate fine and medium subangular blocky structure; hard, firm; common very fine and fine roots; common fine distinct yellowish brown and common fine and medium distinct brown (10YR 4/3) masses of iron accumulation; few distinct pressure faces and slickensides; few fine black masses; extremely acid; gradual smooth boundary.

Bssg—27 to 53 inches; grayish brown (10YR 5/2) silty clay; moderate fine and medium subangular blocky structure; very hard, very firm; few very fine and fine roots; few fine distinct brown and common fine and medium distinct yellowish brown (10YR 5/8) masses of iron accumulation; few distinct pressure faces and common prominent slickensides; few black masses; few fine pockets of gypsum crystals in old root channels and along surfaces of peds; extremely acid; gradual wavy boundary.

B'g1—53 to 67 inches; grayish brown (10YR 5/2) clay; weak fine and medium subangular blocky structure; very hard, very firm; few very fine and fine roots; few fine distinct yellowish brown masses of iron accumulation; few very fine pockets and streaks of gypsum crystals in old root channels and along surfaces of peds; extremely acid; gradual wavy boundary.

B'g2—67 to 80 inches; gray (10YR 5/1) clay; weak fine and medium subangular blocky structure; very hard, very firm; few very fine roots; common fine and medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulation; few black masses; very strongly acid.

The solum is more than 80 inches thick. The textures of the Bw and Bg horizons are silty clay loam, silty clay, clay loam, and clay.

The A horizon is very dark grayish brown, dark grayish brown, or grayish brown. In some pedons masses of iron accumulation are in shades of yellow or brown. Reaction ranges from very strongly acid to moderately acid.

Some pedons have a brown Bw horizon with few to many masses of iron accumulation in shades of yellow and brown, and iron depletions in shades of gray. Some pedons have a matrix that is mixed in these colors.

The Bg horizon is dark grayish brown or grayish brown. The content of masses of iron accumulation in shades of red, yellow, and brown ranges from few to many. Reaction is extremely acid or very strongly acid.

The Bssg and B'g horizons are dark grayish brown, grayish brown, dark gray, gray, or light brownish gray. The content of masses of iron accumulation in shades of red, yellow, and brown ranges from few to many. Reaction is extremely acid or very strongly acid.

Freestone Series

The Freestone series consists of very deep, very gently sloping, moderately well drained, loamy soils on terraces and uplands. They formed in loamy and clayey sediments. Slopes range from 1 to 3 percent. The soils of the Freestone series are fine-loamy, siliceous, thermic Glossaquic Paleudalfs.

Typical pedon of Freestone fine sandy loam, 1 to 3 percent slopes; from the intersection of Texas Highway 154 and Farm Road 515, about 9.5 miles northwest of Quitman, 1.4 miles west on Farm Road 515, 1.2 miles south, 0.45

mile east, 0.65 mile south all on County Road 1970, and 200 feet west in pasture:

Ap—0 to 3 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; slightly hard, very friable; many very fine and fine roots; strongly acid; clear smooth boundary.

E—3 to 10 inches; brown (10YR 5/3) fine sandy loam; weak fine and medium subangular blocky structure; slightly hard, very friable; common fine roots; common fine distinct dark yellowish brown masses of iron accumulation; few fine brownish iron accumulations lining root channels; few fine black masses; strongly acid; gradual wavy boundary.

Bt—10 to 21 inches; yellowish brown (10YR 5/4) sandy clay loam; moderate medium subangular blocky structure; hard, friable; common fine roots; common fine pores; common fine faint dark yellowish brown masses of iron accumulation and common fine distinct grayish brown iron depletions; few fine black masses; few distinct clay films on surfaces of peds; strongly acid; clear wavy boundary.

Bt/E1—21 to 27 inches; yellowish brown (10YR 5/6) clay loam; moderate coarse prismatic structure parting to medium subangular blocky; hard, friable; common fine roots; common fine and medium prominent red (2.5YR 4/6) masses of iron accumulation and many medium distinct grayish brown (10YR 5/2) iron depletions; common faint clay films on surfaces of peds; about 6 to 8 percent clay depletions in the form of streaks and pockets of light gray (10YR 7/2) loamy materials (E) on surfaces of peds; strongly acid; clear wavy boundary.

Bt/E2—27 to 38 inches; dark red (2.5YR 3/6), light brownish gray (10YR 6/2), and yellowish brown (10YR 5/4) clay; moderate coarse prismatic structure parting to medium subangular blocky; very hard, firm; few fine roots; common faint clay films on surfaces of peds; about 10 to 12 percent clay depletions in the form of streaks and pockets of light gray (10YR 7/2) loamy materials (E) mainly on surfaces of prisms; very strongly acid; gradual wavy boundary.

B't1—38 to 50 inches; gray (10YR 5/1), dark red (2.5YR 3/6), and yellowish brown (10YR 5/4) clay; moderate coarse prismatic structure parting to medium subangular blocky; very hard, firm; few very fine roots; very strongly acid; clear wavy boundary.

B't2—50 to 80 inches; gray (10YR 5/1 and 10YR 6/1) clay; moderate coarse prismatic structure parting to medium subangular blocky; very hard, firm; few very fine roots; common fine distinct yellowish brown and common fine and medium prominent dark red (2.5YR 3/6) masses of iron accumulation; very strongly acid.

The solum is 60 to more than 80 inches thick.

The A or Ap horizon is very dark grayish brown, dark brown, dark yellowish brown, yellowish brown, or dark grayish brown. The E horizon is dark yellowish brown, yellowish brown, brown, pale brown, or light yellowish brown. The content of masses of iron accumulation in shades of brown and iron depletions in shades of gray ranges from none to common in the A and E horizons. Reaction ranges from strongly acid to slightly acid.

The Bt horizon is yellowish brown, brown, brownish yellow, or light brownish yellow. The content of masses of iron accumulation in shades of red and brown and iron depletions in shades of gray ranges from few to many. The texture is loam or sandy clay loam. Reaction ranges from very strongly acid to slightly acid.

The Bt/E horizon has the same colors as the Bt horizon or it has a matrix that is mixed with these colors. The texture is sandy clay loam, clay loam, or clay. Clay depletions (E) make up 5 to 15 percent by volume and are in the form of vertical streaks and pockets of uncoated sand or silt. Reaction ranges from very strongly acid to moderately acid.

The B't horizon has grayish matrix colors with yellowish and reddish masses of iron accumulation. The matrix of some pedons is mixed with these colors. Clay depletions make up from none to 5 percent, by volume, and are in the form of streaks and pockets of uncoated sand or silt. Reaction ranges from very strongly acid to slightly acid.

Gallime Series

The Gallime series consists of very deep, very gently sloping, well drained, loamy soils on terraces. Theses soils are moderately permeable. They formed in loamy sediments. Slopes range from 1 to 3 percent. The soils of the Gallime series are fine-loamy, siliceous, thermic Glossic Paleudalfs.

Typical pedon of Gallime fine sandy loam, 1 to 3 percent slopes; from the intersection of State Highway 154 and Farm Road 2100 on the west side of Quitman, 1.6 miles southwest on Farm Road 2100, and 0.25 mile south in pasture:

Ap—0 to 8 inches; dark brown (10YR 4/3) fine sandy loam; weak fine and medium subangular blocky structure; slightly hard, very friable; common very fine, fine, and medium roots; strongly acid; clear smooth boundary.

E1—8 to 20 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; slightly hard, very friable; common fine roots; strongly acid; gradual wavy boundary.

E2—20 to 34 inches; yellowish brown (10YR 5/4) fine sandy loam; weak coarse subangular blocky structure; slightly hard, very friable; common very fine roots; strongly acid; clear wavy boundary.

Bt—34 to 50 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate fine and medium subangular blocky structure; hard, friable; few very fine roots; common fine distinct yellowish red and brown masses of iron accumulation; common distinct clay films on surfaces of peds; very strongly acid; clear wavy boundary.

Bt/E1—50 to 58 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium subangular blocky structure; hard, friable; few very fine roots; common fine distinct yellowish red and brown masses of iron accumulation; common distinct clay films on surfaces of peds; about 5 percent clay depletions (E) in the form of streaks of uncoated sand on surfaces of peds; strongly acid; gradual wavy boundary.

Bt/E2—58 to 80 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; hard, friable; few very fine roots; common fine distinct yellowish red masses of iron accumulation and common fine distinct grayish brown iron depletions; common faint clay films on surfaces of peds; about 10 to 12 percent clay depletions in the form of streaks and pockets of light brownish gray (10YR 6/2) uncoated sand (E) on surfaces of peds; strongly acid.

The solum is more than 80 inches thick.

The A or Ap horizon is dark brown, dark yellowish brown, or dark grayish brown. The E horizon is dark yellowish brown or yellowish brown. The combined thickness of the A and E horizons is 20 to 40 inches. Reaction ranges from strongly acid to slightly acid.

The Bt horizon is yellowish brown or strong brown. In some pedons there are few to common masses of iron accumulation in shades of red and brown. The texture is sandy clay loam or clay loam. Reaction ranges from very strongly acid to moderately acid.

The Bt/E horizon is yellowish brown or brownish yellow with few to common iron accumulations in shades of red, yellow, or brown and iron depletions in shades of gray. Some pedons have a matrix that is mixed with these colors. The texture is loam, sandy clay loam, or clay loam. Clay depletions (E) make up 5 to 15 percent of the horizon and are in the form of vertical streaks and pockets of light brownish gray, pale brown, or light yellowish brown uncoated sand. Reaction ranges from very strongly acid to moderately acid.

Gladewater Series

The Gladewater series consists of very deep, nearly level, somewhat poorly drained, clayey soils on flood plains (fig. 20). These soils are very slowly permeable. They formed in clayey alluvium. Slopes are 0 to 1 percent. The soils of the Gladewater series are very-fine, montmorillonitic, thermic Chromic Endoaquerts.

Typical pedon of Gladewater clay, frequently flooded; from the intersection of U.S. Highway 69 and U.S. Highway 80 in Mineola, 2.5 miles south on U.S. Highway 69, and 300 feet west in Sabine River flood plain:

A—0 to 8 inches; very dark gray (10YR 3/1) clay; moderate very fine angular blocky structure; extremely hard, very firm; many fine and few medium roots; few coarse faint dark gray (10YR 4/1) iron depletions; slightly acid; abrupt wavy boundary.

Bg—8 to 17 inches; dark gray (10YR 4/1) clay; moderate medium and coarse angular blocky structure; extremely hard, very firm; common fine and few medium roots; few fine and medium pores; common fine distinct dark yellowish brown masses of iron accumulation; few distinct slickensides; common distinct pressure faces; dark yellowish brown (10YR 4/6) iron accumulations lining pores and root channels and few thin very dark gray (10YR 3/1) iron depletions lining cracks; few fine concretions of iron-manganese; strongly acid; gradual wavy boundary.

Bgss1—17 to 37 inches; dark grayish brown (10YR 4/2) clay; moderate medium and coarse angular blocky structure; extremely hard, very firm; few fine roots; few fine and medium pores; few fine distinct dark yellowish brown masses of iron accumulation; common prominent slickensides tilted 45 degrees from horizontal; dark yellowish brown (10YR 4/6) iron accumulations lining pores and root channels and few thin very dark gray (10YR 3/1) iron depletions lining cracks; common fine concretions of iron-manganese; very strongly acid; gradual boundary.

Bgss2—37 to 48 inches; grayish brown (10YR 5/2) clay; moderate medium and coarse angular blocky structure; extremely hard, very firm; few fine roots; few fine and medium pores; few fine distinct dark yellowish brown masses of iron accumulation; common prominent slickensides tilted 45 degrees from horizontal; dark yellowish brown (10YR 4/6) iron accumulations lining pores and root channels; few thin very dark gray (10YR 3/1) iron depletions lining cracks; common fine concretions of iron-manganese; very strongly acid; gradual boundary.

Bgss3—48 to 60 inches; grayish brown (10YR 5/2) clay; weak medium and coarse angular blocky structure; extremely hard, very firm; few fine roots; few fine and medium pores; few fine and medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; common prominent slickensides tilted 45 degrees from horizontal; dark yellowish brown (10YR 4/6) iron accumulations lining pores and root channels; common fine concretions of iron-manganese; very strongly acid; gradual boundary.

Bgss4—60 to 73 inches; light brownish gray (10YR 6/2) clay; weak medium and coarse angular blocky

structure; extremely hard, firm; few fine roots; few fine pores; common fine and medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; common prominent slickensides tilted 45 degrees from horizontal; few fine concretions of iron-manganese; few fine clusters of gypsum crystals; very strongly acid; clear smooth boundary.

BCg—73 to 83 inches; gray (10YR 5/1) clay loam; weak coarse prismatic structure parting to weak medium angular blocky structure; hard, firm; few fine roots; few fine prominent yellowish red and many medium and coarse distinct yellowish brown (10YR 5/6) masses of iron accumulation; common fine clusters of gypsum crystals; very strongly acid.

The solum is more than 80 inches thick. Clay content ranges from 40 to 60 percent. The content of iron-manganese concretions ranges from none to common in the A horizon and few to common in the horizons below.

Cracks 1/2 to 2 inches wide extend from the surface to a depth of more than 20 inches when the soil is dry. The cracks remain open for less than 90 cumulative days in most years. Slickensides begin at a depth of 10 to 24 inches and extend throughout the solum.

The A horizon is very dark gray, very dark grayish brown, or dark grayish brown. Masses of iron accumulation in shades of brown and iron depletions in shades of gray are in some pedons. Reaction ranges from strongly acid to slightly acid.

The Bg horizon is dark gray, dark grayish brown, or grayish brown. The content of masses of iron accumulation in shades of yellow and brown and iron depletions in shades of gray ranges from few to many. Reaction ranges from very strongly acid to moderately acid.

The Cg horizon is gray, grayish brown, or dark grayish brown. Masses of iron accumulation in shades of yellow, brown, and red are in most pedons. Some pedons have a matrix that is mixed with these colors. Also, some pedons have thin strata of loamy material. Reaction ranges from very strongly acid to neutral.

Hainesville Series

The Hainesville series consists of very deep, nearly level, somewhat excessively drained, sandy soils on stream terraces. These soils are rapidly permeable. They formed in sandy alluvium. Slopes range from 0 to 2 percent. The soils of the Hainesville series are thermic, coated Argic Quartzipsamments.

Typical pedon of Hainesville loamy fine sand, 0 to 2 percent slopes; from the intersection of State Highway 37 and Farm Road 2088 in Quitman, 7.75 miles east on Farm Road 2088, and 200 feet south in pasture:

Ap—0 to 4 inches; dark brown (10YR 4/3) loamy fine sand; single grained; loose; many fine and few medium roots; very strongly acid; clear smooth boundary.

A—4 to 11 inches; brown (7.5YR 5/4) loamy fine sand; single grained; loose; many fine roots; very strongly acid; clear wavy boundary.

E—11 to 37 inches; light yellowish brown (10YR 6/4) loamy fine sand; single grained; loose; common fine roots; few fine distinct strong brown masses of iron accumulation; very strongly acid; gradual wavy boundary.

E&Bw1—37 to 48 inches; light yellowish brown (10YR 6/4) loamy fine sand (E); single grained; loose; common fine roots; about 10 to 15 percent discontinuous yellowish red (5YR 5/6) and strong brown (7.5YR 5/6) lamellae (Bw) 5 to 10 millimeters thick; very strongly acid; gradual wavy boundary.

E&Bw2—48 to 65 inches; light yellowish brown (10YR 6/4) loamy fine sand (E); single grained; loose; few fine roots; about 5 percent discontinuous yellowish red (5YR 5/6) lamellae (Bw) 1 to 2 millimeters thick; strongly acid; gradual wavy boundary.

E/B—65 to 80 inches; pale brown (10YR 6/3) and light yellowish brown (10YR 6/4) loamy fine sand (E); single grained; loose; about 10 percent pockets of yellowish red fine sandy loam (B); strongly acid.

The solum is more than 80 inches thick.

The A or Ap horizon is dark brown, brown, dark grayish brown, or very dark grayish brown. Reaction ranges from very strongly acid to moderately acid.

The E horizon is yellowish brown, light yellowish brown, dark yellowish brown, or strong brown. Masses of iron accumulation in shades of brown are present in some pedons. Reaction ranges from very strongly acid to moderately acid.

The E&Bw horizon is light yellowish brown or yellowish brown (E part). The Bw part is 5 to 15 percent by volume discontinuous yellowish red or strong brown lamellae 1 to 10 millimeters thick. Reaction ranges from very strongly acid to moderately acid.

The E/B horizon is pale brown, very pale brown, light yellowish brown, yellowish brown, or strong brown (E part). The B part is yellowish red or strong brown bodies or lamellae of loamy fine sand or fine sandy loam. Reaction ranges from very strongly acid to moderately acid.

Some pedons have a Bw horizon that is yellowish red or strong brown.

Iulus Series

The Iulus series consists of very deep, nearly level, moderately well drained, loamy soils on flood plains. These soils are moderately permeable. They formed in loamy alluvium. Slope are 0 to 1 percent. The soils of the Iulus series are coarse-loamy, siliceous, thermic Fluvaquentic Dystrochrepts.

Figure 17.— Profile of Cuthbert fine sandy loam. The thin loamy surface layer of this soil rests abruptly on a clayey subsoil at a depth of 7 inches.

Figure 18.—Profile of Derly loam. The gray areas in this poorly drained soil are an indication of wetness. Depth is marked in feet.

Figure 19.—Profile of Duffern sand. Because of the sandy texture throughout this soil, the available water holding capacity is low. Depth is marked in feet.

Figure 20.—Profile of Gladewater clay. A portion of a slickenside is visible at 28 inches. This is an indicator of high shrink-swell characteristics.

Figure 21.—Profile of Oakwood very fine sandy loam. The reddish material in the lower part of this soil is plinthite. Depth is marked in feet.

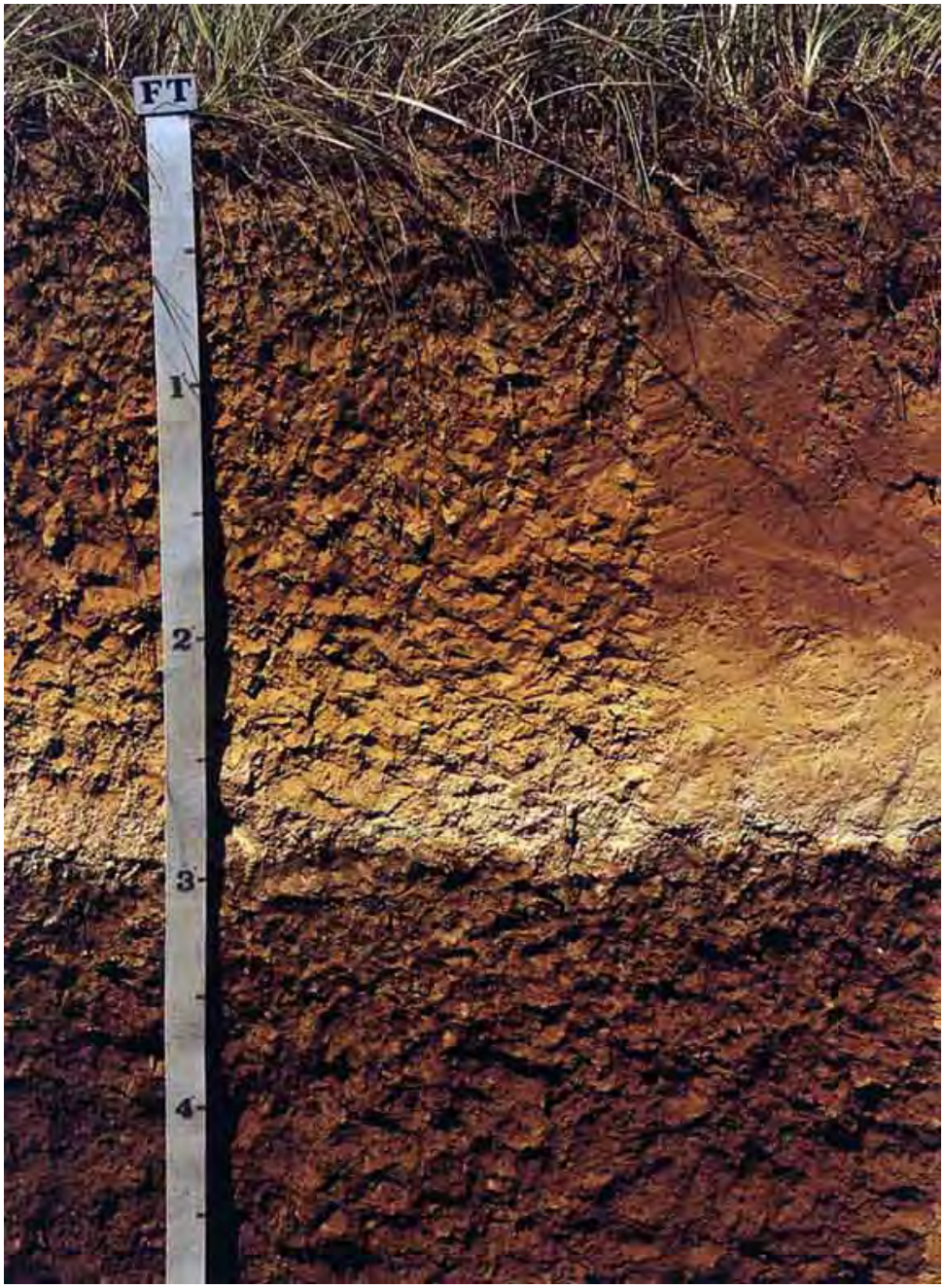

Figure 22.—A profile of Raino loam. This soil has a horizon of loamy albic materials underlain at a depth of 35 inches by a dense clayey subsoil.

Typical pedon of Iulus fine sandy loam, frequently flooded; from the intersection of State Highway 37 and Farm Road 2088 in Quitman, 9.8 miles east on Farm Road 2088, 700 feet north on pasture road, 1200 feet east along levee, and 400 feet north in flood plain of creek:

A—0 to 7 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; very friable, soft; many fine and few medium roots; common fine distinct dark yellowish brown masses of iron accumulation and few medium faint grayish brown (10YR 5/2) iron depletions; very strongly acid; clear wavy boundary.

Bw1—7 to 17 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine and medium subangular blocky structure; very friable, soft; many fine and few medium roots; common medium faint yellowish brown (10YR 5/6) masses of iron accumulation and common fine faint grayish brown iron depletions; few fine black masses; very strongly acid; gradual wavy boundary.

Bw2—17 to 25 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; very friable, soft; many fine roots; many fine pores; common medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulation and many fine distinct grayish brown iron depletions; common gray (10YR 5/1) and grayish brown (10YR 5/2) iron depletions lining root channels; few fine black masses; very strongly acid; gradual wavy boundary.

Bw3—25 to 34 inches; yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and light brownish gray (10YR 6/2) loam; weak fine subangular blocky structure; friable, slightly hard; few fine roots; many fine and few medium pores; few fine black masses; extremely acid; gradual wavy boundary.

Bw4—34 to 45 inches; light brownish gray (10YR 6/2), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/6) loam; weak fine subangular blocky structure; friable, slightly hard; few fine roots; common fine and few medium pores; few fine black masses; extremely acid; gradual wavy boundary.

Bw5—45 to 56 inches; light brownish gray (10YR 6/2), yellowish brown (10YR 5/6), and yellowish red (5YR 5/8) loam; weak fine subangular blocky structure; friable, slightly hard; few fine roots; light gray (10YR 6/1) iron depletions lining root channels; few thin lenses of light brownish gray (10YR 6/2) and pale brown (10YR 6/3) fine sandy loam up to 1 centimeter thick; extremely acid; gradual wavy boundary.

Bg—56 to 80 inches; stratified light brownish gray (10YR 6/2) clay loam and fine sandy loam; massive; friable, slightly hard; few fine prominent yellowish red and common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; few fine black masses; few black concretions; extremely acid.

The solum is more than 80 inches thick. The clay content of the 10- to 40-inch control section ranges from 10 to 18 percent. Gravel content ranges from 0 to 5 percent by volume. Iron depletions are in the upper 20 inches.

The A horizon is dark brown, brown, or dark yellowish brown. The content of masses of iron accumulation in shades of brown and iron depletions in shades of gray is few or common. Reaction is very strongly acid or strongly acid, except where the soil has been limed.

The Bw horizon is brown, yellowish brown, light yellowish brown, or dark yellowish brown. The content of masses of iron accumulation in shades of red or brown and iron depletions in shades of gray ranges from few to many. Some pedons have a matrix that is mixed with these colors. The texture is fine sandy loam, loam, or silt loam. Reaction is extremely acid or very strongly acid.

Some pedons have a Bg horizon. It is light brownish gray or grayish brown with few to many masses of iron accumulation in shades of yellow or brown. The texture is loamy fine sand or fine sandy loam. Reaction ranges from extremely acid to strongly acid.

The C horizon is light brownish gray, grayish brown, yellowish brown, or gray. The content of masses of iron accumulation in shades of red, yellow, or brown and iron depletions in shades of gray ranges from few to many. Some pedons have a matrix that is mixed with these colors. The texture is loamy fine sand or fine sandy loam. Reaction ranges from extremely acid to strongly acid.

Kirvin Series

The Kirvin series consists of soils that are deep to stratified sandstone and shale. They are gently sloping and moderately sloping, well drained, loamy soils on uplands. These soils are moderately slowly permeable. Slopes range from 2 to 8 percent. The soils of the Kirvin series are clayey, mixed, thermic Typic Hapludults.

Typical pedon of Kirvin very fine sandy loam, 2 to 5 percent slopes; from the intersection of Farm Road 852 and Farm Road 2088 in Perryville, 2.1 miles north on Farm Road 852 and 0.5 mile northeast on a private road in a wooded area:

A—0 to 4 inches; dark grayish brown (10YR 4/2) very fine sandy loam; weak fine granular structure; soft, very friable; common very fine and fine and few coarse roots; about 5 to 8 percent, by volume, fine ironstone pebbles; strongly acid; clear wavy boundary.

E—4 to 11 inches; brown (7.5YR 5/4) very fine sandy loam; weak fine subangular blocky structure; soft, very friable; common very fine and fine and few coarse roots; few fine distinct yellowish brown masses of iron accumulation; about 3 to 5 percent fine ironstone pebbles; strongly acid; abrupt smooth boundary.

Bt1—11 to 23 inches; red (2.5YR 4/6) clay; moderate fine and medium subangular blocky structure; very hard, very firm; common very fine and fine roots; many distinct clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

Bt2—23 to 37 inches; red (2.5YR 4/6) clay; moderate fine and medium subangular blocky structure; very hard, very firm; common very fine and fine roots; common fine distinct strong brown masses of iron accumulation; many distinct clay films on surfaces of peds; about 5 percent light brownish gray (10YR 6/2) weathered shale fragments; very strongly acid; gradual wavy boundary.

Bt3—37 to 43 inches; red (2.5YR 4/8) clay; moderate fine and medium subangular blocky structure; very hard, very firm; common very fine and fine roots; common fine distinct strong brown masses of iron accumulation; common distinct clay films on surfaces of peds; about 10 percent light brownish gray (10YR 6/2) weathered shale fragments; very strongly acid; gradual wavy boundary.

BC—43 to 50 inches; light brownish gray (10YR 6/2), red (2.5YR 4/8), and strong brown (7.5YR 5/6) clay and soft sandstone; weak medium subangular blocky structure; very hard, very firm; few very fine roots; few faint clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

C—50 to 70 inches; strata of strong brown (7.5YR 5/6) soft sandstone and gray (10YR 6/1) weathered shale that has clay texture; soft sandstone layers ranging from 1 to 3 inches thick; layers of shale ranging from 0.15 inch to 2 inches thick; discontinuous red (2.5YR 4/6) clay flows along fractures; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. The content of ironstone pebbles is as much as 35 percent, by volume, in the A and E horizons and as much as 10 percent, by volume, in the B and C horizons in some pedons.

The A horizon is brown, dark brown, or dark grayish brown. The E horizon is yellowish brown, strong brown, or brown. The texture of the A and E horizons is very fine sandy loam or gravelly fine sandy loam.

The Bt horizon is red or yellowish red. In some pedons it has few or common masses of iron accumulation in shades of yellow or brown. There are gray weathered shale fragments in the lower part of the Bt horizon in most pedons. Reaction is extremely acid or very strongly acid.

The BC horizon is in shades of red, yellow, and brown. Some pedons have a matrix that is mixed with these colors. The number of thin strata and fragments of soft sandstone and weathered shale ranges from none to common. Reaction is extremely acid or very strongly acid.

The C horizon is stratified weakly consolidated sandy clay loam, sandy loam, weakly cemented sandstone, and weathered shale. The loamy materials and the sandstone are in shades of red, yellow, and brown. The weathered shale is mainly in shades of gray. The amount of sandstone and shale varies. Roots penetrate the materials but are concentrated along fractures or cleavage planes. In most pedons this horizon has clay flows along some vertical fractures. In some pedons it has a discontinuous, thin stone line. Reaction is extremely acid or very strongly acid.

Kullit Series

The Kullit series consists of very deep, very gently sloping, moderately well drained, loamy soils on uplands. These soils are moderately slowly permeable. They formed in loamy and clayey sediments. Slopes range from 1 to 3 percent. The soils of the Kullit series are fine-loamy, siliceous, thermic Aquic Paleudults.

Typical pedon of Kullit very fine sandy loam, 1 to 3 percent slopes; from the intersection of Farm Road 1647 and Farm Road 852, about 1.0 mile north of Perryville, 0.5 mile north on Farm Road 1647, and 700 feet west in hay meadow:

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

E—5 to 13 inches; light yellowish brown (0YR 6/4) very fine sandy loam; weak fine subangular blocky structure; slightly hard, very friable; many fine and medium roots; common fine faint brownish yellow masses of iron accumulation; strongly acid; gradual wavy boundary.

Bt1—13 to 24 inches; yellowish brown (10YR 5/6) loam; moderate fine subangular blocky structure; hard, friable; common fine roots; few fine prominent red and common fine distinct strong brown masses of iron accumulation and few fine distinct light brownish gray iron depletions; few faint clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

Bt2—24 to 40 inches; yellowish brown (10YR 5/6) clay loam; moderate fine subangular blocky structure; hard, firm; common fine roots; common medium prominent red (2.5YR 5/6) and common medium distinct strong brown (7.5YR 5/6) masses of iron accumulation and common medium distinct light brownish gray (10YR 6/2) iron depletions; common prominent clay films on surfaces of peds; very strongly acid; clear smooth boundary.

Btg1—40 to 53 inches; light gray (10YR 6/1) clay; moderate fine and medium subangular blocky structure; very hard, very firm; few very fine roots; common medium prominent dark red (2.5YR 3/6) and common medium distinct strong brown (7.5YR 5/6) masses of iron

accumulation and many fine faint light brownish gray iron depletions; common prominent clay films on surfaces of peds; about 10 to 15 percent clay depletions in the form of uncoated sand on surfaces of peds; common fine white masses; very strongly acid; gradual wavy boundary.

Btg2—53 to 80 inches; light gray (10YR 6/1) clay loam; moderate fine and medium subangular blocky structure; few fine prominent dark red and common coarse distinct strong brown (7.5YR 5/6) masses of iron accumulation; common prominent clay films on surfaces of peds; about 10 to 15 percent clay depletions in the form of uncoated sand on surfaces of peds; common fine white masses; very strongly acid.

The solum is more than 60 inches thick.

The A or Ap horizon is dark grayish brown or brown. Reaction ranges from strongly acid to slightly acid.

The E horizon is brown, pale brown, yellowish brown, or light yellowish brown. Reaction is strongly acid or moderately acid.

The Bt horizon is yellowish brown or brownish yellow with masses of iron accumulation in shades of red or brown and iron depletions in shades of gray. The texture is loam, sandy clay loam, or clay loam. Reaction is very strongly acid or strongly acid.

The Btg horizon is gray or light gray. The content of masses of iron accumulation in shades of red, yellow, or brown and iron depletions in shades of gray ranges from few to many. Some pedons have a matrix that is mixed with these colors. The texture is sandy clay, clay loam, or clay.

Latch Series

The Latch series consists of very deep, nearly level, moderately well drained, sandy soils on terraces. These soils are moderately permeable. They formed in sandy alluvial sediments. Slopes are 0 to 1 percent. The soils of the Latch series are loamy, siliceous, thermic Grossarenic Paleudalfs.

Typical pedon of Latch loamy fine sand, from an area of Latch-Mollville complex, 0 to 1 percent slopes; from the intersection of Farm Road 49 and Farm Road 2869 about 5.4 miles east of Pine Mills, 2.3 miles south on Farm Road 2869, 0.9 mile east on County Road 3540, 0.75 mile north on private road to woods, and 40 feet east in woods:

A—0 to 7 inches; brown (10YR 5/3) loamy fine sand; weak fine granular structure; loose; many fine and medium roots; strongly acid; clear wavy boundary.

E1—7 to 28 inches; very pale brown (10YR 7/3) loamy fine sand; weak medium subangular blocky structure; loose; many fine and medium roots; common very fine pores; strongly acid; gradual wavy boundary.

E2—28 to 44 inches; very pale brown (10YR 7/3) loamy fine sand; weak fine subangular blocky structure; loose; many fine and medium roots; common very fine pores; common fine and medium distinct brownish yellow (10YR 6/6) masses of iron accumulation and common fine faint light brownish gray iron depletions; moderately acid; clear wavy boundary.

Bt1—44 to 52 inches; yellowish brown (10YR 5/6) sandy clay loam; weak fine and medium subangular blocky structure; slightly hard, friable; common fine and medium roots; few fine pores; common fine prominent yellowish red masses of iron accumulation and many coarse distinct light brownish gray (10YR 6/2) iron depletions; few faint clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

Bt2—52 to 65 inches; yellowish brown (10YR 5/6) sandy clay loam; weak fine and medium subangular blocky structure; slightly hard, friable; common fine and few medium roots; few fine pores; many coarse prominent yellowish red (5YR 5/8) masses of iron accumulation and common coarse distinct light brownish gray (10YR 6/2) iron depletions; few faint clay films on surfaces of peds; extremely acid; clear smooth boundary.

2C1—65 to 73 inches; light gray (10YR 7/2) fine sand; single grained; loose; few fine roots; common fine distinct brownish yellow masses of iron accumulation; extremely acid; gradual wavy boundary.

2C2—73 to 80 inches; yellowish brown (10YR 5/4) sand; single grained; loose; common medium distinct light gray (10YR 7/2) iron depletions; very strongly acid.

The solum ranges from 60 to more than 80 inches in thickness.

The A or Ap horizon is dark grayish brown or brown. The E horizon is brown, yellowish brown, pale brown, light yellowish brown, or very pale brown. The content of masses of iron accumulation in shades of yellow or iron depletions in shades of gray is few or common. Reaction of the A and E horizons ranges from very strongly acid to slightly acid.

The Bt horizon is strong brown, yellowish brown, grayish brown, or light grayish brown. The content of masses of iron accumulation in shades of red or brown and iron depletions in shades of gray is common or many. The texture is fine sandy loam or sandy clay loam. Clay content ranges from 18 to 35 percent. Reaction ranges from extremely acid to moderately acid.

The 2C horizon is in shades of gray or brown. The content of masses of iron accumulation in shades of red or yellow is few or common. The texture is sand, loamy sand, or loamy fine sand. Reaction ranges from very strongly acid to moderately acid.

Leagueville Series

The Leagueville series consists of very deep, nearly level to very gently sloping, poorly drained, sandy soils on uplands. These soils are moderately permeable. They formed in sandy and loamy sediments. Slopes range from 0 to 3 percent. The soils of the Leagueville series are loamy, siliceous, thermic Arenic Paleaquults.

Typical pedon of Leagueville loamy fine sand, 0 to 3 percent slopes; from the intersection of Texas Highway 154 and Farm Road 312 about 11.5 miles east of Quitman, 3.6 miles west on Texas Highway 154, and 2000 feet south in woods:

A—0 to 8 inches; very dark grayish brown (10YR 3/2) loamy fine sand; weak fine granular structure; soft, very friable; many very fine and fine roots; extremely acid; clear smooth boundary.

E1—8 to 19 inches; gray (10YR 5/1) loamy fine sand; single grained; loose; common very fine and fine roots; extremely acid; gradual wavy boundary.

E2—19 to 27 inches; gray (10YR 6/1) loamy fine sand; single grained; loose; common very fine and few fine roots; extremely acid; clear smooth boundary.

Btg/E1—27 to 38 inches; gray (10YR 6/1) sandy clay loam; moderate coarse prismatic structure parting to weak fine and medium subangular blocky; hard, firm; few very fine and fine roots; common fine and medium distinct yellowish brown (10YR 5/8) masses of iron accumulation; about 30 percent clay depletions in the form of streaks and pockets of light gray (10YR 7/1) sandy material (E) 5 to 20 millimeters thick on surfaces of prisms; extremely acid; gradual wavy boundary.

Btg/E2—38 to 49 inches; gray (10YR 6/1) sandy clay loam; moderate coarse prismatic structure parting to fine and medium subangular blocky; hard, firm; few very fine roots; many fine and medium distinct yellowish brown (10YR 5/8) masses of iron accumulation; about 15 percent clay depletions in the form of streaks and pockets of light gray (10YR 7/1) sandy materials (E) 5 to 15 millimeters thick on surfaces of prisms; very strongly acid; gradual wavy boundary.

E/Bt1g—49 to 61 inches; light gray (10YR 7/1) fine sandy loam; weak fine granular structure; soft, very friable; about 15 percent gray (10YR 6/1) sandy clay loam (Btg material); very strongly acid; gradual wavy boundary.

E/Bt2g—61 to 80 inches; light gray (10YR 7/1) fine sand; single grained; loose; about 25 percent yellow (10YR 7/8) and gray (10YR 6/1) fine sandy loam (Btg material); common very fine black specks; very strongly acid.

The solum ranges from 60 to more than 80 inches in thickness.

The A horizon is very dark grayish brown, dark gray, or dark grayish brown. The E horizon is gray, grayish brown, light brownish gray, light gray, or pale brown. The combined thickness of the A and E horizons is 20 to 40 inches. Reaction ranges from extremely acid to moderately acid in the A and E horizons.

The Btg part of the Btg/E horizon is in shades of red, yellow, brown, or gray. Some pedons have a matrix that is mixed with these colors. Masses of iron accumulation are in shades of brown, and iron depletions are in shades of gray. Clay depletions (E) make up 15 to 30 percent of the horizon and are in the form of vertical streaks and pockets of gray sandy material.

The E/Btg horizon has the same colors as above. The E material makes up 65 to 80 percent of the horizon. Masses of iron accumulation are in shades of brown and iron depletions are in shades of gray. The texture of the Btg part is fine sandy loam or sandy clay loam. The texture of the E material is fine sand, loamy fine sand, or fine sandy loam. Reaction ranges from extremely acid to strongly acid.

Lilbert Series

The Lilbert series consists of very deep, gently sloping, well drained, sandy soils on uplands. These soils are moderately slowly permeable. They formed in sandy and loamy sediments. Slopes range from 2 to 5 percent. The soils of the Lilbert series are loamy, siliceous, thermic Arenic Plinthic Paleudults.

Typical pedon of Lilbert loamy fine sand, 2 to 5 percent slopes; from the intersection of Farm Road 852 and Farm Road 1647 about 0.8 mile north of Perryville, 2.2 miles northwest on Farm Road 852, 1.5 miles west on County Road 4570, 0.9 mile south on County Road 4545, and 20 feet west of road in a roadcut:

Ap—0 to 9 inches; brown (10YR 5/3) loamy fine sand; weak fine granular structure; soft, very friable; many fine and common medium roots; about 1 percent fine ironstone pebbles; strongly acid; clear smooth boundary.

E1—9 to 23 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; soft, very friable; many fine roots and common medium roots; about 1 percent fine ironstone pebbles; very strongly acid; gradual wavy boundary.

E2—23 to 32 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine subangular blocky structure; soft, very friable; common fine and few medium roots; common fine faint brownish yellow masses of iron accumulation; about 1 percent fine

ironstone pebbles; about 1 percent fine concretions of iron-manganese; very strongly acid; clear wavy boundary.

Bt—32 to 44 inches; yellowish brown (10YR 5/8) sandy clay loam; moderate fine and medium subangular blocky structure; hard, friable; many fine and few medium roots; many fine pores; common medium prominent red (2.5YR 4/8) masses of iron accumulation and few fine distinct light brownish gray iron depletions; about 3 to 4 percent nodular plinthite; common faint clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

Btv—44 to 60 inches; yellowish brown (10YR 5/8) sandy clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; hard, friable; many fine roots mainly along vertical surfaces of peds; common medium prominent red (2.5YR 4/8) and many coarse prominent yellowish red (5YR 5/8) masses of iron accumulation and many medium distinct light brownish gray (10YR 6/2) iron depletions; about 5 to 6 percent nodular plinthite; common faint clay films on surfaces of peds; clay depletions in the form of light brownish gray (10YR 6/2) coatings on surfaces of peds and about 3 to 4 percent pockets of pale brown (10YR 6/3) uncoated sand; about 15 percent, by volume, moderately brittle masses; very strongly acid; gradual wavy boundary.

B't—60 to 80 inches; red (2.5YR 4/6), yellowish red (5YR 5/8), yellowish brown (10YR 5/8), and light brownish gray (10YR 6/2) sandy clay loam; weak medium and coarse prismatic structure parting to weak fine and medium subangular blocky; hard, friable; about 3 percent nodular plinthite; common faint clay films on surfaces of peds; few streaks of very pale brown (10YR 7/3) and pale brown (10YR 6/3) uncoated sand; extremely acid.

The solum is 60 to more than 80 inches in thickness.

The A horizon is dark brown or brown. The E horizon is yellowish brown or light yellowish brown. The combined thickness of the A and E horizons ranges from 20 to 40 inches. Reaction ranges from very strongly acid to slightly acid.

The Bt horizon is yellowish red, yellowish brown, or strong brown. The content of masses of iron accumulation in shades of red, yellow, and brown ranges from few to many. In most pedons iron depletions are below a depth of 30 inches. Reaction ranges from very strongly acid to moderately acid.

The Btv horizon is in shades of red, yellow, brown, or gray and some pedons have a matrix that is mixed with these colors. There are few to many masses of iron accumulation in shades of red, yellow, or brown and iron depletions in shades of gray. The texture is sandy clay loam. Nodular plinthite makes up 5 to 8 percent, by volume. Most pedons have up to 4 percent, by volume, clay depletions in the form of streaks, pockets, or coatings of uncoated sand on surfaces of peds. Brittle masses make up 5 to 20 percent of the volume. Reaction ranges from extremely acid to moderately acid.

Some pedons have a B't horizon. It is similar to the Btv horizon except it has less than 5 percent plinthite.

Manco Series

The Manco series consists of very deep, nearly level, somewhat poorly drained, loamy soils on flood plains. These soils are moderately permeable. They formed in loamy alluvial sediments. Slopes are 0 to 1 percent. The soils of the Manco series are fine-silty, siliceous, acid, thermic Aeric Fluvaquents.

Typical pedon of Manco loam, frequently flooded; from the intersection of State Highway 37 and Farm Road 2088 in Quitman, 9.8 miles east on Farm Road 2088, 700 feet north on pasture road, 800 feet east along levee, and 150 feet north in flood plain of creek:

A—0 to 3 inches; dark grayish brown (10YR 4/2) loam; moderate fine subangular blocky structure; friable, slightly hard; many very fine and fine roots; few fine pores; many fine distinct yellowish red and reddish brown iron accumulations lining root channels; extremely acid; abrupt smooth boundary.

Bw—3 to 11 inches; grayish brown (10YR 5/2) loam; weak medium subangular blocky structure; friable, slightly hard; common very fine and fine and few coarse roots; few fine pores; common fine and medium distinct strong brown (7.5YR 5/8) masses of iron accumulation; common fine yellowish red iron accumulations lining root channels; few discontinuous strata of sandier material; extremely acid; abrupt smooth boundary.

Bg1—11 to 19 inches; gray (10YR 5/1) loam; moderate medium and coarse prismatic structure parting to weak medium subangular blocky; friable, slightly hard; common very fine and fine roots; few fine pores; many medium distinct reddish brown (5YR 3/4) masses of iron accumulation; few fine black and few fine dark reddish brown iron accumulations lining root channels; common discontinuous strata of sandier material; very strongly acid; abrupt smooth boundary.

Bg2—19 to 27 inches; dark gray (10YR 4/1) silt loam; moderate medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; friable, slightly hard; few very fine and fine roots; common fine pores; common medium distinct brown (10YR 4/3) masses of iron accumulation; common reddish brown (5YR 4/4) iron accumulations lining root channels; very strongly acid; clear smooth boundary.

Bg3—27 to 42 inches; gray (10YR 5/1) silty clay loam; moderate medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; firm, very hard; few very fine and fine roots; few fine pores; many medium distinct strong brown (7.5YR 5/6) and common medium distinct reddish brown (5YR 4/4) masses of iron accumulation; few fine iron-manganese nodules; common fine reddish brown iron accumulations lining root channels; few faint clay films on vertical surfaces of peds around pores; common crawfish krotovinas; extremely acid; gradual smooth boundary.

Bg4—42 to 63 inches; gray (10YR 5/1) clay loam; moderate medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; firm, very hard; few very fine and fine roots; common fine and medium pores; common medium and coarse distinct yellowish brown (10YR 5/4) masses of iron accumulation; common reddish brown (5YR 4/4) iron accumulations lining root channels; few fine iron-manganese nodules; common crawfish krotovinas; few faint clay films on vertical surfaces of peds and along krotovinas; extremely acid; clear smooth boundary.

Bg5—63 to 80 inches; gray (10YR 6/1) clay loam; moderate medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; firm, very hard; few very fine and fine roots; common fine pores; common fine and medium distinct yellowish brown (10YR 5/6) and many medium prominent dark red (10R 3/6) masses of iron accumulation, some being brittle in the center; common fine dark yellowish brown (10YR 4/6) iron accumulations lining pores; common distinct clay films on vertical surfaces of peds; common crawfish krotovinas; extremely acid.

The solum is more than 80 inches thick.

The A horizon is dark brown, dark grayish brown, or very dark grayish brown. Most pedons contain few to common masses of iron accumulation in shades of yellow or brown and iron depletions in shades of gray. Reaction ranges from extremely acid to strongly acid.

The Bw horizon is dark grayish brown, grayish brown, or brown. Most horizons have few to many masses of iron accumulation in shades of red, yellow, or brown and iron depletions in shades of gray. Some pedons have a matrix that is mixed with these colors. The texture is loam, silt loam, or sandy clay loam. Reaction ranges from extremely acid to strongly acid.

The Bg horizon is dark gray, gray, light brownish gray, or grayish brown. Most pedons have masses of iron accumulation in shades of red, yellow, or brown. The texture is loam, silt loam, silty clay loam, sandy clay loam, or clay loam. Some pedons contain strata of sandier material. Most pedons have few to common black masses. Reaction is extremely acid or very strongly acid.

Mollville Series

The Mollville series consists of very deep, nearly level, poorly drained, loamy soils on terraces. These soils are slowly permeable. They formed in sandy and loamy sediments. Slopes are 0 to 1 percent. The soils of the Mollville series are fine-loamy, siliceous, thermic Typic Glossaqualfs.

Typical pedon of Mollville loam, 0 to 1 percent slopes; from the intersection of U.S. Highway 80 and Farm Road 14 in Hawkins, 1.6 miles south on Farm Road 14, 0.5 mile east on County Road 3750, and 100 feet north in pasture:

A—0 to 5 inches; grayish brown (10YR 5/2) loam; weak fine granular structure; hard, friable; many very fine and fine roots; common fine pores; common fine distinct dark yellowish brown masses of iron accumulation; many fine black masses; strongly acid; clear smooth boundary.

E—5 to 11 inches; light brownish gray (10YR 6/2) loam; moderate fine and medium subangular blocky structure; hard, friable; many very fine and fine roots; common fine pores; many fine distinct dark yellowish brown masses of iron accumulation; few black masses; moderately acid; clear smooth boundary.

Btg/E1—11 to 23 inches; grayish brown (10YR 5/2) clay loam; moderate medium subangular blocky structure; very hard, firm; common very fine and fine roots; few fine pores; few fine distinct dark yellowish brown masses of iron accumulation; about 20 percent vertical streaks and pockets of light gray (10YR 7/1) loamy material (E) up to 15 millimeters thick; common distinct clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

Btg/E2—23 to 36 inches; gray (10YR 5/1) clay loam; moderate medium subangular blocky structure; very hard, firm; common very fine roots; few fine pores; few fine distinct dark yellowish brown masses of iron accumulation; about 15 percent vertical streaks and pockets of light gray (10YR 7/1) loamy material (E) up to 12 millimeters thick; common distinct clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

Btg1—36 to 49 inches; grayish brown (10YR 5/2) clay loam; moderate medium subangular blocky structure; very hard, firm; few very fine roots; few fine distinct yellowish brown masses of iron accumulation and common medium faint light brownish gray (10YR 6/2) iron depletions; common distinct clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

Btg2—49 to 65 inches; gray (10YR 5/1) and strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; very hard, firm; few very fine roots; common distinct clay films on surfaces of peds; strongly acid; gradual wavy boundary.
BCg—65 to 74 inches; light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) clay loam; weak coarse subangular blocky structure; very hard, firm; few very fine roots; strongly acid; gradual wavy boundary.
Cg—74 to 80 inches; grayish brown, (10YR 5/2), strong brown (7.5YR 4/6), and light gray (10YR 7/2) clay loam; massive; very hard, firm; strongly acid.

The solum ranges from about 45 to 75 inches in thickness.

The A horizon is very dark grayish brown, dark grayish brown, grayish brown, or gray. The E horizon is grayish brown, light brownish gray, or light gray. The content of masses of iron accumulation in shades of yellow or brown ranges from few to many. Reaction ranges from very strongly acid to moderately acid.

The Btg/E horizon is grayish brown, light brownish gray, gray, or light gray. There are few to many masses of iron accumulation in shades of red, yellow, or brown and iron depletions in shades of gray. In some pedons the lower part of the Btg/E horizon has a matrix that is mixed with these colors. Loamy materials (E) make up 15 to 30 percent of this horizon and are in the form of vertical streaks and pockets. The texture is loam, sandy clay loam, or clay loam. Reaction ranges from very strongly acid to moderately acid.

The Btg horizon is grayish brown, light brownish gray, or light gray. Masses of iron accumulation are in shades of red, yellow, or brown and iron depletions are in shades of gray. Some pedons have a matrix that is mixed with these colors. Reaction ranges from very strongly acid to slightly acid.

The Cg horizon, is light brownish gray, grayish brown, light gray, pale brown, or yellowish brown. Some pedons have a matrix that is mixed with these colors. There are few to common masses of iron accumulation in shades of red, yellow, or brown and iron depletions in shades of gray. The texture is loamy fine sand, fine sandy loam, sandy clay loam, or clay loam. Reaction ranges from strongly acid to slightly acid.

Oakwood Series

The Oakwood series consists of very deep, gently sloping, moderately well drained, loamy soils on uplands (fig. 21). These soils are moderately slowly permeable. They formed in thick beds of unconsolidated loamy sediments. Slopes range from 1 to 5 percent. The soils of the Oakwood series are fine-loamy, siliceous, thermic Fragic Glossudalfs.

Typical pedon of Oakwood very fine sandy loam, 1 to 5 percent slopes; from the intersection of State Highway 37 and Farm Road 2966 in Quitman, 6.0 miles north on Farm Road 2966, 0.8 mile east on County Road 1460, 0.4 mile north on private road, and 700 feet west in pasture:

Ap—0 to 6 inches; brown (10YR 4/3) very fine sandy loam; weak medium subangular blocky structure; soft, very friable; many very fine and fine roots; very strongly acid; clear smooth boundary.
A—6 to 12 inches; brown (10YR 5/3) very fine sandy loam; weak fine and medium subangular blocky structure; soft, very friable; many fine and very fine roots; few very fine pores; common fine distinct dark yellowish brown masses of iron accumulation; moderately acid; clear smooth boundary.
E—12 to 19 inches; light yellowish brown (10YR 6/4) very fine sandy loam; weak fine and medium subangular blocky structure; soft, very friable; common very fine and fine roots; few fine pores; common fine distinct dark yellowish brown masses of iron accumulation; common fine faint pale brown iron accumulations lining root channels; few fine root channels filled with brown (10YR 5/3) A material; moderately acid; clear smooth boundary.
Bt—19 to 34 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; hard, friable; common very fine and fine roots; few fine pores; few fine prominent red masses of iron accumulation and few fine faint dark yellowish brown iron depletions; common distinct brown (10YR 4/3) clay films on surfaces of peds; common pale brown (10YR 6/3) iron accumulations lining root channels; very strongly acid; clear irregular boundary.
Btv—34 to 48 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium subangular blocky structure; hard, friable; few very fine and fine roots; common fine pores; common fine and medium prominent red (10R 4/6) masses of iron accumulation and common fine distinct light brownish gray iron depletions; about 7 percent red (10R 4/6) plinthite; common distinct clay films on surfaces of peds; extremely acid; clear smooth boundary.
Btvx/E—48 to 61 inches; yellowish brown (10YR 5/8) sandy clay loam; moderate coarse prismatic structure parting to moderate medium subangular blocky; few very fine roots; common fine pores; many medium prominent red (2.5YR 4/6) masses of iron accumulation and many medium distinct light brownish gray (10YR 6/2) iron depletions; about 10 percent red (10R 4/6) plinthite; common distinct clay films on surfaces of

peds; about 20 percent vertical streaks and pockets of gray (10YR 7/2) fine sandy loam materials (E) that are 2 to 30 millimeters thick; about 30 percent slightly brittle masses; extremely acid; clear smooth boundary.

B't—61 to 80 inches; yellowish brown (10YR 5/8) sandy clay loam; moderate medium and coarse prismatic structure parting to moderate medium subangular blocky; hard, friable; few very fine roots; common fine and medium pores; common medium prominent red (2.5YR 4/6) masses of iron accumulation and many medium and coarse distinct gray (10YR 6/1) and light brownish gray (10YR 6/2) iron depletions; common distinct clay films on surfaces of peds; extremely acid.

The solum is 60 to more than 80 inches in thickness. The combined thickness of the A and E horizons is less than 20 inches.

The A horizon is dark grayish brown, yellowish brown, or brown. The E horizon is brown, yellowish brown, or light yellowish brown. The content of masses of iron accumulation in shades of brown is few or common. Reaction of the A and E horizons ranges from very strongly acid to moderately acid.

The Bt horizon is dark yellowish brown, yellowish brown, light yellowish brown, or strong brown. The content of masses of iron accumulation in shades of red, yellow, or brown ranges from none to common. The texture is loam or sandy clay loam. Reaction ranges from very strongly acid to moderately acid.

The Btv and Btv/E horizons are yellowish brown, brownish yellow, or strong brown. Some pedons have a matrix that is mixed with these colors. There are few to many masses of iron accumulation in shades of red or brown and iron depletions in shades of gray. The texture is sandy clay loam or clay loam. Plinthite makes up 5 to about 10 percent of the volume. Streaks and pockets of light gray, uncoated very fine sandy loam or fine sandy loam (E) make up 15 to 30 percentof the volume. Reaction ranges from extremely acid to strongly acid.

Some pedons have a B't horizon. It has colors in shades of red, yellow, or gray. Masses of iron accumulation in shades of red and yellow and iron depletions in shades of gray are present. Some pedons have a matrix that is mixed with these colors. The texture is sandy clay loam, clay loam, or clay. Reaction is extremely acid or very strongly acid.

Some pedons have a BC or C horizon. Horizon colors are in shades of red, yellow, and gray or some pedons have a matrix that is mixed with these colors.. The texture is fine sandy loam, sandy clay loam, or clay. Typically, the BC or C horizon is stratified with layers that have these textures and soft sandstone. Reaction is extremely acid or very strongly acid.

Pickton Series

The Pickton series consists of very deep, gently sloping to moderately steep, well drained, sandy soils on uplands. These soils are moderately permeable. They formed in thick beds of sandy material. Slopes range from 2 to 15 percent. The soils of the Pickton series are loamy, siliceous, thermic Grossarenic Paleudalfs.

Typical pedon of Pickton loamy fine sand, 2 to 5 percent slopes; from the intersection of State Highway 37 and State Highway 154 in Quitman, 4.7 miles north on State Highway 154, 0.25 mile east on County Road 1214, and 900 feet north in coastal bermudagrass field:

Ap—0 to 6 inches; dark brown (10YR 4/3) loamy fine sand; weak fine granular structure; loose; common fine and medium roots; very strongly acid; clear smooth boundary.

E1—6 to 25 inches; yellowish brown (10YR 5/4) loamy fine sand; weak fine granular structure; loose; common very fine and fine roots; very strongly acid; gradual wavy boundary.

E2—25 to 56 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; loose; common fine and very fine roots; few fine distinct yellowish brown masses of iron accumulation; strongly acid; gradual wavy boundary.

Bt1—56 to 69 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; slightly hard, friable; few very fine and fine roots; common medium distinct red (2.5YR 4/6) and light yellowish brown (10YR 6/4) masses of iron accumulation; common faint clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

Bt2—69 to 80 inches; yellowish brown (10YR 5/8), brown (10YR 5/4), and gray (10YR 6/1) sandy clay loam; weak medium subangular blocky structure; slightly hard, friable; few very fine roots; common faint clay films on surfaces of peds; very strongly acid.

The solum is more than 80 inches thick. The combined thickness of the A and E horizons is 40 to 72 inches.

The A horizon is dark brown, dark yellowish brown, dark grayish brown, or pale brown. The E horizon is yellowish brown, light yellowish brown, pale brown, or very pale brown. Some pedons have few masses of iron accumulation in shades of yellow or brown. Reaction ranges from very strongly acid to moderately acid.

The Bt horizon is yellowish brown or strong brown. Some pedons have few to common masses of iron accumulation in shades of red, yellow, and brown. The texture is fine sandy loam or sandy clay loam. Reaction ranges from very strongly acid to moderately acid.

Raino Series

The Raino series consists of very deep, nearly level, moderately well drained, loamy soils on terraces (fig. 22). These soils are very slowly permeable. They formed in loamy and clayey sediments. Slope are 0 to 1 percent. The soils of the Raino series are fine-loamy over clayey, siliceous, thermic Aquic Glossudalfs.

Typical pedon of Raino loam, in an area of Derly-Raino complex, 0 to 1 percent slopes; from the intersection of State Highway 182 and Farm Road 17 in Alba, 5.8 miles north on Farm Road 17, and 300 feet west in pasture:

Ap—0 to 10 inches; dark brown (10YR 4/3) loam; weak fine subangular blocky structure; slightly hard, very friable; many very fine and fine and few medium roots; common fine pores; few fine iron-manganese nodules; very strongly acid; clear smooth boundary.

BE—10 to 25 inches; brown (7.5YR 5/4) loam; weak fine subangular blocky structure; slightly hard, friable; many very fine and fine roots; common fine and medium pores; few faint strong brown iron accumulations coating some peds; few fine iron-manganese nodules; very strongly acid; clear smooth boundary.

Bt/E—25 to 35 inches; light yellowish brown (10YR 6/4) loam; weak medium subangular blocky structure; slightly hard, friable; common very fine and fine roots; common fine and medium pores; few fine faint grayish brown iron depletions; few fine iron-manganese nodules; about 30 percent clay depletions in the form of sandy material (E) 5 to 10 millimeters thick on surfaces of peds that is very pale brown (10YR 7/3) in the upper part of the horizon and light brownish gray (10YR 6/2) in the lower part; very strongly acid; abrupt smooth boundary.

Btssg1—35 to 45 inches; light brownish gray (10YR 6/2) clay; weak coarse subangular blocky structure; very hard, very firm; few very fine roots; many prominent red (2.5YR 4/6) masses of iron accumulation; few iron-manganese nodules; common fine pressure faces; common distinct slickensides up to 2 centimeters across; very strongly acid; gradual smooth boundary.

Btssg2—45 to 58 inches; light brownish gray (10YR 6/2) and brown (7.5YR 5/4) clay; weak coarse subangular blocky structure; very hard, very firm; few very fine roots; few fine pores; few fine iron-manganese nodules; common fine pressure faces; common distinct slickensides up to 2 centimeters across; very strongly acid; gradual smooth boundary.

Btg—58 to 72 inches; light brownish gray (10YR 6/2), brown (7.5YR 5/4), and red (2.5YR 4/6) clay; weak coarse prismatic structure parting to weak coarse subangular blocky; very hard, very firm; few very fine roots; few fine pores; common fine pressure faces; common fine masses of barite; very strongly acid; gradual smooth boundary.

BCg—72 to 80 inches; light brownish gray (2.5Y 6/2) clay loam; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; hard, firm; few very fine roots; common fine and medium distinct strong brown (7.5YR 5/6) and common medium distinct brownish yellow (10YR 6/6) masses of iron accumulation; very strongly acid.

The solum is more than 80 inches thick.

The A or Ap horizon is brown or dark brown. In some pedons there are masses of iron accumulation in shades of brown and yellow. Reaction ranges from very strongly acid to slightly acid.

The BE horizon is brown, yellowish brown, or dark yellowish brown. Masses of iron accumulation in shades of yellow or brown and iron depletions in shades of gray are in some pedons. The texture is very fine sandy loam or loam. Reaction ranges from very strongly acid to slightly acid.

The Bt/E horizon is in shades of yellow or brown. The content of masses of iron accumulation in shades of red and brown and iron depletions in shades of gray ranges from few to many. Some pedons have a matrix that is mixed with these colors. The texture is loam, clay loam, or clay. Clay depletions (E) make up from 15 to 30 percentof the volume. These are in the form of vertical streaks and pockets of light brownish gray or light gray sandy or silty material. Reaction is very strongly acid or strongly acid.

The Btg horizon is in shades of gray with reddish, yellowish, or brownish masses of iron accumulation. Some pedons have a matrix that is mixed with these colors. The texture is clay loam or clay. Reaction is very strongly acid or strongly acid.

The BC horizon is in shades of gray with brownish or yellowish masses of iron accumulation. The texture is clay loam. Reaction is very strongly acid or strongly acid.

Redsprings Series

The Redsprings series consists of soils that are deep to mixed marine sediments, mainly glauconitic. They are gently sloping to steep, well drained, loamy soils on uplands. These soils are moderately slowly permeable. Slopes range from 2 to 25 percent. The soils of the Redsprings series are fine, kaolinitic, thermic Ultic Hapludalfs.

Typical pedon of Redsprings very gravelly fine sandy loam, 8 to 25 percent slopes; from the intersection of Farm Road 778 and Farm Road 49 in Hainesville, 4.2 miles southeast on Farm Road 778, 0.9 mile east on County Road 3860, and 0.5 mile north in woods:

A—0 to 7 inches; dark reddish brown (5YR 3/4) very gravelly fine sandy loam; weak fine granular structure;

slightly hard, very friable; common very fine, fine, and medium roots; about 50 percent ironstone pebbles 5 to 50 millimeters across; moderately acid; clear smooth boundary.

Bt1—7 to 11 inches; red (2.5YR 4/6) clay; moderate fine and medium subangular blocky structure; hard, firm; common very fine and fine roots; common prominent clay films on surfaces of peds; about 15 percent ironstone pebbles 5 to 50 millimeters across; moderately acid; clear smooth boundary.

Bt2—11 to 19 inches; red (2.5YR 4/8) clay; weak fine and medium subangular blocky structure; very hard, very firm; common very fine and fine roots; common distinct clay films on surfaces of peds; common fine and medium brownish yellow (10YR 6/8) weathered glauconitic fragments; strongly acid; clear wavy boundary.

Bt3—19 to 27 inches; red (2.5YR 4/8) clay; weak fine and medium subangular blocky structure; very hard, very firm; few very fine roots; few distinct clay films on surfaces of peds; common brownish yellow (10YR 6/8) brittle weathered glauconitic fragments; very strongly acid; clear wavy boundary.

B/C—27 to 42 inches; red (2.5YR 4/8) clay; weak fine and medium subangular blocky structure; very hard, very firm; few fine roots; few faint clay films; common brownish yellow (10YR 6/8) weathered glauconitic material occurring as pockets and coatings between peds; few light brownish gray (10YR 6/2) fragments of weathered shale; very strongly acid; gradual wavy boundary.

C—42 to 65 inches; stratified dark red (2.5YR 3/6) and red (2.5YR 4/8) clay with brownish yellow (10YR 6/8) weathered glauconitic material and light brownish gray (10YR 6/2) weathered shale; very hard, very firm; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. Glauconitic ironstone fragments are 0.5 inch to 3 inches thick and 3 to 10 inches across the long axis. They make up as much as 10 percent of the volume of the solum and the C horizon of some pedons.

The A horizon is dark reddish brown or reddish brown. The content of ironstone gravel ranges from 35 to 60 percent, by volume. Reaction ranges from strongly acid to slightly acid.

The Bt horizon is red or dark red. The texture is clay loam or clay. Some pedon have up to 10 percent, by volume, ironstone gravel and up to 10 percent weathered glauconitic fragments. Reaction ranges from very strongly acid to moderately acid.

The B/C horizon is reddish in color. It is clay loam or clay. The horizon contains up to 40 percent weathered glauconitic material. Some pedons have up to 10 percent grayish weathered shale fragments. Reaction ranges from very strongly acid to moderately acid.

The C horizon is brownish weathered glauconitic material with or without interbedded layers of red sandy clay loam, clay loam, clay, grayish weathered shale, or glauconitic ironstone fragments. Reaction is very strongly acid or strongly acid.

Sacul Series

The Sacul series consists of very deep, gently sloping, moderately well drained, loamy soils on uplands. These soils are slowly permeable. They formed in clayey and loamy sediments. Slopes range from 1 to 5 percent. The soils of the Sacul series are clayey, mixed, thermic Aquic Hapludults.

A typical pedon of Sacul very fine sandy loam, 1 to 3 percent slopes; from the intersection of State Highway 37 and Farm Road 515 in Winnsboro, 2.0 miles west on Farm Road 515, and 700 feet south in pasture:

Ap—0 to 9 inches; yellowish brown (10YR 5/4) very fine sandy loam; weak fine and medium subangular blocky structure; soft, very friable; common fine roots; moderately acid; clear wavy boundary.

Bt1—9 to 18 inches; red (2.5YR 4/6) clay; moderate fine and medium subangular blocky structure; very hard, very firm; common fine roots; few fine prominent brownish yellow masses of iron accumulation; common prominent red (2.5YR 3/6) clay films on surfaces of peds; very strongly acid; clear wavy boundary.

Bt2—18 to 31 inches; red (2.5YR 4/6), yellowish red (5YR 5/6), brownish yellow (10YR 6/6), and gray (10YR 6/1) clay; moderate fine and medium subangular blocky structure; very hard, very firm; common fine roots; common distinct clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

Bt3—31 to 41 inches; gray (10YR 6/1), brownish yellow (10YR 6/8), and red (2.5YR 5/6) clay; weak fine and medium subangular blocky structure; very hard, very firm; common fine roots; common distinct clay films on surfaces of peds; very strongly acid; gradual wavy boundary.

BC—41 to 80 inches; light grayish brown (10YR 6/2) silty clay loam; medium coarse prismatic structure parting to moderate fine subangular blocky; very hard, firm; common fine and medium prominent red (2.5YR 4/6) and common fine and medium distinct strong brown (10YR 6/8) masses of iron accumulation; few faint clay films on surfaces of peds; very strongly acid.

The solum ranges from 40 to 78 inches in thickness. Reaction ranges from extremely acid to strongly acid, except for surface layers that have been limed.

The A or Ap horizon is brown, yellowish brown, or dark

yellowish brown. Some pedons have an E horizon. It is brown or yellowish brown.

The upper part of the Bt horizon is red with brownish or yellowish masses of iron accumulation. The lower part of the Bt horizon is red with yellowish and brownish iron accumulations and grayish iron depletions. Some pedons have a matrix that is mixed with these colors or the grayish colors are dominant.

The BC horizon is grayish with reddish, yellowish, or brownish masses of iron accumulation. In some pedons there are interbedded layers of weathered shale. The texture is clay loam or silty clay loam.

Tenaha Series

The Tenaha series consists of soils that are deep to weathered stratified sandstone and shale. They are strongly sloping to moderately steep, well drained, sandy soils on uplands. These soils are moderately permeable. Slopes range from 8 to 20 percent. The soils of the Tenaha series are loamy, siliceous, thermic Arenic Hapludults.

Typical pedon of Tenaha loamy fine sand, 8 to 20 percent slopes; from the intersection of Farm Road 49 and Farm Road 778 in Hainesville, 4.3 miles southeast on Farm Road 778, 1.2 miles northeast on County Road 3860, and 0.5 mile south on pasture road:

A—0 to 3 inches; very dark grayish brown (10YR 3/2) loamy fine sand; weak fine granular structure; soft, very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

E1—3 to 9 inches; dark yellowish brown (10YR 4/4) loamy fine sand; weak medium granular structure; soft, very friable; many very fine and fine roots; very strongly acid; clear smooth boundary.

E2—9 to 32 inches; yellowish brown (10YR 5/4) loamy fine sand; weak medium subangular blocky structure; soft, very friable; common very fine and fine roots; strongly acid; clear wavy boundary.

Bt—32 to 37 inches; yellowish red (5YR 5/8) sandy clay loam; common fine distinct very pale brown mottles; weak fine and medium subangular blocky structure; very hard, firm; few very fine roots; few faint clay films on surfaces of peds; extremely acid; clear smooth boundary.

BC—37 to 42 inches; yellowish red (10YR 5/8) sandy clay loam; common fine prominent red and common fine distinct light yellowish brown mottles; weak fine and medium subangular blocky structure; very hard, firm; about 15 percent discontinuous strata of very pale brown (10YR 7/3) weathered shale and yellowish red (5YR 5/8), brownish yellow (10YR 6/8), and red (2.5YR 4/8) soft sandstone; extremely acid; clear smooth boundary.

C—42 to 60 inches; stratified yellowish red (5YR 5/8), brownish yellow (10YR 6/8), and red (2.5YR 4/8) soft sandstone and very pale brown (10YR 7/3) weathered shale up to 1/2 inch thick; massive; very hard, friable; extremely acid.

The solum ranges from 40 to 55 inches in thickness. The combined thickness of the A and E horizons ranges from 20 to 40 inches.

The A horizon is very dark grayish brown, dark grayish brown, dark brown, or brown. The E horizon is dark yellowish brown, yellowish brown, light yellowish brown, or pale brown. Reaction ranges from very strongly acid to moderately acid.

The Bt horizon is yellowish red, yellowish brown, or strong brown. The number of mottles in shades of red, yellow, or brown ranges from few to many. The texture is sandy clay loam or clay loam. Reaction ranges from extremely acid to strongly acid.

Some pedons have a BC horizon. It has colors in shades of red, yellow, and brown or is mottled in these colors. Up to 15 percent discontinuous strata or pockets of grayish or brownish weathered shale are in this horizon. The texture is fine sandy loam or sandy clay loam. Reaction is extremely acid or very strongly acid.

The C horizon is stratified reddish, yellowish, and brownish soft sandstone and brownish or grayish weathered shale. Reaction is extremely acid or very strongly acid.

Wolfpen Series

The Wolfpen series consists of very deep, gently sloping to moderately steep, well drained, sandy soils on uplands. These soils are moderately permeable. They formed in loamy sediments. Slopes range from 2 to 15 percent. The soils of the Wolfpen series are loamy, siliceous, thermic Arenic Paleudalfs.

Typical pedon of Wolfpen loamy fine sand, 2 to 5 percent slopes; from the intersection of Farm Road 2966 and County Road 1468 about 7.5 miles north of Quitman, 0.4 mile north on Farm Road 2966, and 200 feet east in pasture:

Ap—0 to 4 inches; dark brown (10YR 4/3) loamy fine sand; weak fine granular structure; soft, very friable; common fine and medium roots; strongly acid; clear smooth boundary.

E1—4 to 15 inches; dark yellowish brown (10YR 4/4) loamy fine sand; weak fine and medium subangular blocky

structure; soft, very friable; common fine roots; moderately acid; clear wavy boundary.
E2—15 to 28 inches; yellowish brown (10YR 5/4) loamy fine sand; weak fine and medium subangular blocky structure; soft, very friable; common fine roots; moderately acid; clear wavy boundary.
Bt1—28 to 43 inches; yellowish brown (10YR 5/6) sandy clay loam; common fine prominent yellowish red mottles; weak medium subangular blocky structure; hard, friable; few fine roots; few faint clay films on surfaces of peds; strongly acid; clear wavy boundary.
Bt2—43 to 80 inches; brownish yellow (10YR 6/8) sandy clay loam; common coarse prominent light brownish gray (10YR 6/2) and many coarse prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; hard, friable; few fine roots; few faint clay films on surfaces of peds; about 3 percent clay depletions in the form of streaks and pockets of uncoated sand on surfaces of peds; very strongly acid.

The solum is more than 80 inches thick. The combined thickness of the A and E horizons is 20 to 40 inches.

The A or Ap horizon is dark brown, brown, dark yellowish brown, or yellowish brown. The E horizon is dark yellowish brown, yellowish brown, brown, or light yellowish brown. Reaction ranges from strongly acid to slightly acid.

The Bt horizon is yellowish brown or brownish yellow. In most pedons there are reddish and brownish mottles. In some pedons grayish iron depletions are in the lower part. Reaction ranges from very strongly acid to moderately acid.

In some pedons there is a Bt/E horizon. It is yellowish brown or brownish yellow. There are common to many masses of iron accumulation in shades of red or brown and iron depletions in shades of gray. Some pedons have a matrix that is mixed with these colors. Clay depletions (E) make up 5 to 15 percent of the horizon and are in the form of streaks and pockets of grayish or brownish uncoated sand. Reaction is very strongly acid or strongly acid.

Woodtell Series

The Woodtell series consists of soils that are deep to stratified shale and loamy materials. They are gently sloping to moderately steep, well drained, loamy soils on uplands. These soils are very slowly permeable. Slopes range from 2 to 15 percent. The soils of the Woodtell series are fine, montmorillonitic, thermic Vertic Hapludalfs.

Typical pedon of Woodtell loam, 5 to 15 percent slopes; from the intersection of Texas Highway 154 and Farm Road 182 about 1.75 miles west of Quitman, 1.5 miles west on Farm Road 182, and 20 feet north of road in roadcut:

A—0 to 3 inches; brown (10YR 4/3) loam; weak fine subangular blocky structure; slightly hard, very friable; many fine and medium roots; few fine pebbles; slightly acid; clear wavy boundary.
E—3 to 7 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; slightly hard, very friable; many fine and medium roots; common pebbles; moderately acid; clear wavy boundary.
Bt1—7 to 17 inches; red (2.5YR 4/8) clay; moderate fine subangular blocky structure; very hard, firm; few fine roots; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation; common distinct clay films on surfaces of peds; few pebbles; strongly acid; gradual wavy boundary.
Bt2—17 to 31 inches; red; (2.5YR 4/8) clay; moderate medium and fine subangular blocky structure; very hard, very firm; few fine roots; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation and common medium prominent light brownish gray (10YR 6/2) iron depletions; common pressure faces; few distinct slickensides; strongly acid; gradual wavy boundary.
Bt3—31 to 43 inches; red (2.5YR 5/8) clay; moderate medium subangular blocky structure; very hard, very firm; many coarse prominent yellowish brown (10YR 5/8) masses of iron accumulation and many medium prominent light brownish gray (10YR 6/2) iron depletions; common pressure faces; few distinct slickensides; strongly acid; gradual wavy boundary.
BC—43 to 57 inches; light brownish gray (10YR 6/2), yellowish brown (10YR 5/6), and yellowish red (5YR 5/8) weathered shale that has clay texture; weak medium platy structure; extremely hard, very firm; few fine roots; strongly acid; gradual wavy boundary.
C—57 to 67 inches; light yellowish brown (2.5Y 6/4) and light gray (10YR 7/2) weathered shale that has clay texture; massive; extremely hard, very firm; very strongly acid.

The solum ranges from 40 to 57 inches in thickness. In some part of the solum, there are up to 10 percent, by volume, ironstone pebbles.

The A horizon is dark grayish brown or brown. Reaction is moderately acid or slightly acid.

In some pedons there is an E horizon. It is brown or yellowish brown. The texture is fine sandy loam or loam. Reaction ranges from very strongly acid to slightly acid.

The Bt horizon is red, yellowish red, or reddish yellow. The content of masses of iron accumulation in shades of red or brown and iron depletions in shades of gray ranges from none to common in the upper part and is common or many in the lower part. Some pedons have a matrix that is mixed with these colors. Grayish colors increase depth. Reaction ranges from very strongly acid to moderately acid.

In some pedons there is a BC horizon. It has a matrix that is mixed with colors in shades of red, brown, and gray. The BC horizon can also be grayish with masses of iron accumulation in shades of red and brown. The texture is clay or sandy clay loam. Reactiion is very strongly acid or stongly acid.

The C horizon has a matrix that is mixed with colors in shades of red, brown, and gray or is grayish with mottles in shades of red or brown. The texture is clay or sandy clay loam. Some pedons are stratified with weathered shale and soft sandstone. Reaction range from very strongly acid to slightly acid.

Formation of the Soils

In this section the factors of soil formation are related to the soils in Wood County. In addition, the surface geology of the county is described.

Factors of Soil Formation

Soil forms through processes acting on geologic material over time. The characteristics of a soil are determined by: (1) the physical and mineral composition of the parent material; (2) the climate under which the parent material accumulated and has existed since accumulation; (3) the plant and animal life on and in the soil; (4) the relief, or topography; and (5) the amount of time that the forces of soil formation have acted on the soil material. All five factors are important in soil formation, but their relative influence varies from place to place.

Parent Material

Parent material is the unconsolidated mass from which a soil forms. It has a major influence on the chemical and mineral composition of the soil. In Wood County, the parent material consists of sediments deposited by waters of the Eocene, Pleistocene, and Holocene (Recent) Epochs.

The relationship between parent material and the different soils in the county is described in detail under the heading “Surface Geology.”

Climate

Wood County has a warm, moist, humid, subtropical climate that is characterized by heavy rains. Summers are hot and humid. Winters are usually mild. Seasonal changes are gradual.

The climate greatly influenced the development of the soils in the county. The high humidity and rainfall caused most of the loamy soils on uplands to be strongly weathered, leached, and acidic. As a result, most of the soils in the county are very deep. Most differences among the soils in the county cannot be attributed to the climate, which is relatively uniform throughout the county.

Plant and Animal Life

Plants, burrowing animals, earthworms, micro-organisms, and humans have directly influenced the formation of soils. Soils that form under trees accumulate organic matter in the upper few inches of the surface layer. Cultivation, however, quickly destroys the organic matter in soils, as is evident in most cultivated areas of Bernaldo fine sandy loam, 1 to 3 percent slopes.

Earthworms, crawfish, and burrowing rodents help to mix the material within the soil. Earthworms enhance the movement of air, water, and plant nutrients in the soil. Crawfish are most numerous in soils that have clayey layers and a slow runoff rate. They bring soil material from the lower layers to the surface. Gophers and other burrowing animals help to mix and aerate loamy soils, such as the Freestone soils, and sandy soils, such as the Wolfpen soils.

Relief

Relief affects the formation of soils by influencing drainage, infiltration, and plant cover. It also helps to determine how much water percolates through the soil. Nearly level soils on terraces, such as Derly soils, have poor drainage. Cuthbert soils, which are strongly sloping to steep, have a thinner solum than the nearby Bowie soils, which are gently sloping. On the steeper slopes, water runs off the surface at a faster rate, less moisture infiltrates the soils, and there is less plant cover.

Although most of the soils in the county are gently sloping to moderately steep, shallow soils are not common. The abundant rainfall and long warm periods have overcome most of the effects of relief. Nearly all of the soils in the county are deep or very deep.

Time

The length of time that climate, living organisms, and relief act upon the parent material affects the kind of soil that forms. The effects of time are modified by the other four factors of soil formation. In general, soils with no definite horizons are young, or immature. Soils that have well defined horizons are old, or mature.

In Wood County the soils range from young to old. Manco, Iulus, Gladewater, and Estes soils are on flood plains and have faint horizons. Bowie, Cuthbert, and Kirvin soils on uplands are mature soils that have distinct horizons having little resemblance to the original parent material.

Surface Geology

Geologic outcrops in Wood County are of Eocene, Pleistocene, and Holocene (Recent) age. Eocene-age strata, in ascending order, are the Wilcox Group, Carrizo Sand, the Reklaw Formation, Queen City Sand, the Weches Formation, and Sparta Sand *(14)*. The depositional environments of Eocene strata ranged from continental to marine. Pleistocene and Holocene sediments are fluviatile terraces and alluvium, respectively.

Eocene-age strata crop out across Wood County in northwestward-trending belts. Their dip is southeastward at about 30 to 40 feet per mile. The general southeastward dip and surface exposure delineations are the result of extensive structural down-warping, which formed the East Texas Embayment. The embayment is a geologic basin in which the long axis trends northeastward across the southeastern corner of Wood County. Each outcrop is successively overlain by a younger outcrop in a southeasterly down-dip direction.

The Wilcox Group crops out in northwestern Wood County. The outcrop is generally characterized by gently undulating to rolling land surfaces. The Wilcox Group in Wood County is about 250 to 900 feet thick and consists of interbedded sand, silt, clay, and some lignite, with local secondary seams and concretions of limonite deposited at or near the surface. Medium to very fine quartz sand generally constitutes 30 to 50 percent of the Wilcox Group. Individual beds of sand generally are thin and discontinuous; however, some may attain a thickness of 100 feet. The Wilcox Group yields moderate amounts of water *(7)*. The main soils that developed over the Wilcox Group are Woodtell, Freestone, Wolfpen, and Pickton soils.

Carrizo Sand, which unconformably overlies the Wilcox Group, crops out in a narrow belt in the northwestern part of the county and in a small area in the northeastern corner. The Carrizo Sand outcrop generally is expressed by a gently undulating to rolling surface. The thickness of the Carrizo Sand in Wood County ranges from about 100 to 200 feet. Typically, the unit consists mainly of massive to crossbedded coarse to fine sand, but it has lenses and laminae of silt and clay. Carrizo Sand yields moderate to large quantities of water. The main soils that developed over this formation are Oakwood, Kirvin, Cuthbert, and Wolfpen soils.

The Recklaw Formation conformably overlies the Carrizo Sand and crops out in a belt about 1 mile wide in the northwestern part of the county. The outcrop is characterized by gently undulating to rolling surface slopes. The Recklaw Formation is mostly glauconitic clay with lesser amounts of sand and lignite. Also, limonitic seams and concretions at or near the surface are common. The thickness of the formation is fairly uniform, ranging from about 50 feet to a maximum of 70 feet. The Recklaw Formation yields only small quantities of water in the outcrop area. The main soils that developed over this formation have red, clayey subsoils. They are the Cuthbert and Kirvin soils and their gravelly phases.

The Queen City Formation conformably overlies the Recklaw Formation and crops out in the southeastern part of the county. In contrast to the more gentle relief of the Recklaw Formation, relief of the Queen City Formation ranges from gently undulating to hilly. The outcrop of the Queen City Formation roughly defines the westward extent of the pine-timber belt in Wood County. The Queen City Formation in Wood County is mostly massive to crossbedded fluvial sediments. It generally consists of about 80 percent medium- to fine-grained quartz sand and about 20 percent silt and clay with minor amounts of lignite. The maximum thickness of the formation is approximately 400 feet. The Queen City Formation yields small to moderate quantities of water. The main soils that developed over this formation are Bowie, Cuthbert, Kirvin, Lilbert, and Darco soils.

The Weches Formation crops out in a narrow, irregular belt in the southeastern part of the county. The formation consists principally of stratified glauconitic clay and sand with common secondary deposits of limonite. Surface slopes on the outcrop range from gently undulating to steep. The Weches Formation is not known to yield water in Wood County. The main soils that developed over this formation are Redsprings and Elrose soils.

Sparta Sand overlies the Weches Formation on a high northwestward-trending ridge between the lower reaches of Lake Fork Creek and Big Sandy Creek. Sparta Sand generally lacks the compaction of the older geologic units, and it mostly weathers to a deep, sandy soil. The maximum thickness of the Sparta Sand in Wood County is about 250 feet. This formation consists of about 70 percent medium- to fine-grained quartz sand and about 30 percent sandy clay. Sparta Sand is known to yield only small quantities of water. The main soils that developed over this formation are Darco, Duffern, and Lilbert soils.

Pleistocene fluvial terrace deposits are in extreme southern and southeastern Wood County. Two isolated deposits, laid down by the Sabine River, are made up of unconsolidated clay, silt, sand, and gravel. These deposits do not yield significant and reliable quantities of water because of the isolation and limited area of the deposits. The main soils that developed in these sediments are Derly, Raino, and Bernaldo soils.

Holocene alluvial sediments are made up of clay, silt, sand, and lesser amounts of gravel. These sediments have been deposited on the flood plains along the Sabine River,

Lake Fork Creek, Sandy Creek, and their major tributaries. Holocene alluvial sediments are not known to yield water in Wood County but are potential sources of small quantities. The main soils that developed in these alluvial sediments are Gladewater, Estes, Manco, and Iulus soils.

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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.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

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

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

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottomland. The normal flood plain of a stream, subject to flooding.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a

nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

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 depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse textured soil. Sand or loamy sand.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

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.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

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. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Gleyed soil. Soil that formed under poor drainage,

resulting in the reduction of iron and other elements in the profile and in gray colors.

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 as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

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 overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which

water can infiltrate into a soil under a given set of conditions.

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.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Lamella. A thin, discontinuous or continuous, generally horizontal layer of fine material (especially clay and iron oxides) that has been illuviated within a coarser, eluviated layer.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

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-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

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. 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).

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of

organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

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

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on 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. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5

Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly 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

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have

similar conservation needs or management requirements for the major land uses in the survey area.

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.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

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

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

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

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 E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. Technically, the A horizon in mineral soils. Generally refers to the uppermost mineral layer of soil. Includes the Ap horizon or "plow layer."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is 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.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1961-90 at Mineola, Texas)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	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-----	54.3	30.6	42.4	79	9	58	2.99	1.21	4.49	5	0.9
February----	59.0	34.0	46.5	82	13	79	3.42	1.90	4.76	5	0.5
March-------	67.7	42.3	55.0	86	20	221	4.29	2.43	5.93	5	0.0
April-------	75.6	50.3	63.0	90	28	396	3.94	1.60	5.91	5	0.0
May---------	81.9	58.6	70.3	92	40	629	5.35	2.30	7.94	7	0.0
June--------	88.9	66.2	77.6	98	49	827	3.81	1.39	5.83	5	0.0
July--------	93.0	69.3	81.1	103	56	966	2.76	1.06	4.17	4	0.0
August------	94.0	68.6	81.3	104	56	970	2.21	0.95	3.28	3	0.0
September---	86.9	62.2	74.5	99	41	736	3.96	1.62	5.93	5	0.0
October-----	77.8	50.2	64.0	93	30	429	4.71	2.11	6.94	5	0.0
November----	67.1	40.9	54.0	85	19	191	3.89	1.82	5.66	5	0.0
December----	58.2	33.2	45.7	79	10	79	3.95	1.65	5.89	5	0.4
Yearly:											
Average---	75.4	50.6	63.0	---	---	---	---	---	---	---	---
Extreme---	107	1	---	107	7	---	---	---	---	---	---
Total-----	---	---	---	---	---	5581	45.26	23.87	58.35	59	1.9

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minumum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F)

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1961-90 at Mineola, Texas)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 22	April 5	April 14
2 years in 10 later than--	March 14	March 31	April 10
5 years in 10 later than--	February 27	March 20	April 1
First freezing temperature in fall:			
1 year in 10 earlier than--	November 8	October 31	October 19
2 years in 10 earlier than--	November 15	November 5	October 25
5 years in 10 earlier than--	Novemer 28	November 15	November 4

TABLE 3.--GROWING SEASON

(Recorded in the period 1961-90 at Mineola, Texas)

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	245	217	196
8 years in 10	255	225	203
5 years in 10	275	239	216
2 years in 10	295	253	230
1 year in 10	306	260	237

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AtB	Attoyac fine sandy loam, 1 to 3 percent slopes	1,308	0.3
BeB	Bernaldo fine sandy loam, 1 to 3 percent slopes	12,509	2.8
BeD	Bernaldo fine sandy loam, 5 to 8 percent slopes	1,185	0.3
Bf	Bibb fine sandy loam, frequently flooded	3,939	0.9
BoC	Bowie fine sandy loam, 1 to 5 percent slopes	16,017	3.6
ByC	Briley loamy fine sand, 2 to 5 percent slopes	2,908	0.7
CfE	Cuthbert fine sandy loam, 8 to 25 percent slopes	41,048	9.2
CgE	Cuthbert gravelly fine sandy loam, 8 to 25 percent slopes	9,831	2.2
DaC	Darco fine sand, 2 to 5 percent slopes	23,709	5.3
DaE	Darco fine sand, 8 to 15 percent slopes	18,001	4.0
DrA	Derly-Raino complex, 0 to 1 percent slopes	14,386	3.2
DuC	Duffern sand, 1 to 5 percent slopes	17,847	4.0
ErC	Elrose fine sandy loam, 2 to 5 percent slopes	1,477	0.3
Es	Estes silty clay, frequently flooded	9,555	2.1
FrB	Freestone fine sandy loam, 1 to 3 percent slopes	38,911	8.7
GaB	Gallime fine sandy loam, 1 to 3 percent slopes	3,708	0.8
Gw	Gladewater clay, frequently flooded	13,293	3.0
HaA	Hainesville loamy fine sand, 0 to 2 percent slopes	1,354	0.3
Iu	Iulus fine sandy loam, frequently flooded	5,985	1.3
KfC	Kirvin very fine sandy loam, 2 to 5 percent slopes	10,247	2.3
KgC	Kirvin gravelly fine sandy loam, 3 to 8 percent slopes	10,155	2.3
KsC	Kirvin soils, graded, 3 to 8 percent slopes	2,031	0.5
KuB	Kullit very fine sandy loam, 1 to 3 percent slopes	9,924	2.2
LaA	Latch-Mollville complex, 0 to 1 percent slopes	2,785	0.6
LgB	Leagueville loamy fine sand, 0 to 3 percent slopes	1,000	0.2
LtC	Lilbert loamy fine sand, 2 to 5 percent slopes	18,909	4.3
Ma	Manco loam, frequently flooded	32,141	7.2
MoA	Mollville loam, 0 to 1 percent slopes	985	0.2
OkB	Oakwood very fine sandy loam, 1 to 5 percent slopes	16,232	3.7
Ow	Oil wasteland	723	0.2
PkC	Pickton loamy fine sand, 2 to 5 percent slopes	5,016	1.1
PkE	Pickton loamy fine sand, 8 to 15 percent slopes	1,754	0.4
RdC	Redsprings very gravelly fine sandy loam, 2 to 5 percent slopes	1,523	0.4
RdE	Redsprings very gravelly fine sandy loam, 8 to 25 percent slopes	5,200	1.2
RsD	Redsprings soils, graded, 3 to 8 percent slopes	615	0.1
SaB	Sacul very fine sandy loam, 1 to 3 percent slopes	2,723	0.6
TeE	Tenaha loamy fine sand, 8 to 20 percent slopes	9,093	2.1
WoC	Wolfpen loamy fine sand, 2 to 5 percent slopes	10,878	2.5
WoD	Wolfpen loamy fine sand, 5 to 15 percent slopes	3,108	0.7
WtC	Woodtell loam, 2 to 5 percent slopes	10,385	2.3
WtD	Woodtell loam, 5 to 15 percent slopes	25,510	5.7
WxB	Woodtell-Raino complex, 1 to 3 percent slopes	1,631	0.4
	Water (greater than 40 acres in size)	25,863	5.8
	Total	445,402	100.0

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Sweet potatoes	Watermelons	Improved bermudagrass	Common bermudagrass	Bahiagrass
		Bu	Bu	Tons	AUM*	AUM*	AUM*
AtB---------- Attoyac	IIe	95	---	12.0	8.0	6.0	7.0
BeB---------- Bernaldo	IIe	90	450	11.0	10.0	7.0	8.0
BeD---------- Bernaldo	IVe	---	---	---	9.0	6.0	7.0
Bf---------- Bibb	Vw	---	---	---	---	---	---
BoC---------- Bowie	IIIe	80	450	11.0	7.0	5.0	6.0
ByC---------- Briley	IIIe	60	350	12.0	6.0	3.0	4.0
CfE, CgE-------- Cuthbert	VIIe	---	---	---	4.0	2.0	2.0
DaC---------- Darco	IIIs	55	---	11.0	5.0	---	---
DaE---------- Darco	VIe	---	---	---	4.0	---	---
DrA:							
Derly----------	IVw	---	---	---	---	---	2.0
Raino----------	IIIs	---	---	---	10.0	7.0	9.0
DuC---------- Duffern	IVs	---	---	8.0	4.0	---	---
ErC---------- Elrose	IIIe	75	---	8.0	8.0	5.0	6.0
Es---------- Estes	Vw	---	---	---	---	2.0	2.5
FrB---------- Freestone	IIe	80	350	---	8.0	5.0	6.0
GaB---------- Gallime	IIe	90	450	11.0	8.0	5.0	6.0
Gw---------- Gladewater	Vw	---	---	---	---	1.0	1.0
HaA---------- Hainesville	IIIs	80	---	10.0	6.0	---	---

See footnote at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Sweet potatoes	Watermelons	Improved bermudagrass	Common bermudagrass	Bahiagrass
		Bu	Bu	Tons	AUM*	AUM*	AUM*
Iu Iulus	Vw	---	---	---	8.0	6.0	7.0
KfC Kirvin	IIIe	75	250	---	5.0	3.0	4.0
KgC Kirvin	IVe	50	---	---	4.0	2.0	3.0
KsC Kirvin	VIe	---	---	---	1.0	1.0	1.0
KuB Kullit	IIe	70	300	---	9.0	6.0	7.0
LaA:							
Latch	IIIs	70	---	11.0	7.0	---	6.0
Mollville	IVw	---	---	---	---	4.0	4.0
LgB Leagueville	IVw	---	---	---	3.0	1.0	3.0
LtC Lilbert	IIIe	80	350	10.0	6.0	---	4.0
Ma Manco	Vw	---	---	---	1.0	2.0	2.0
MoA Mollville	IVw	---	---	---	---	2.0	2.0
OkB Oakwood	IIIe	85	450	11.0	7.0	4.0	5.0
Ow** Oil-waste land	VIIIs	---	---	---	---	---	---
PkC Pickton	IIIs	65	250	10.0	5.0	---	---
PkE Pickton	VIe	---	---	---	4.0	---	---
RdC Redsprings	IIIe	50	---	---	3.0	1.0	1.0
RdE Redsprings	VIIe	---	---	---	2.0	---	---
RsD Redsprings	VIe	---	---	---	1.0	---	---
SaB Sacul	IIIe	65	250	---	5.0	2.0	3.0

See footnote at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Sweet potatoes	Watermelons	Improved bermudagrass	Common bermudagrass	Bahiagrass
		Bu	Bu	Tons	AUM*	AUM*	AUM*
TeE--Tenaha	VIe	---	---	---	5.0	1.0	3.0
WoC--Wolfpen	IIIe	80	350	12.0	6.0	---	4.0
WoD--Wolfpen	VIe	---	---	---	5.0	---	3.0
WtC--Woodtell	IVe	50	---	---	5.0	3.0	3.0
WtD--Woodtell	VIe	---	---	---	3.0	3.0	3.0
WxB:							
Woodtell	IIIe	70	---	---	5.0	3.0	4.0
Raino	IIIs	95	---	---	10.0	7.0	9.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume	
AtB---------- Attoyac	10A	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	95	395	Loblolly pine.
							Shortleaf pine------	87	340	
BeB, BeD---------- Bernaldo	10A	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	94	395	Loblolly pine, sweetgum.
							Shortleaf pine------	84	340	
							Sweetgum-----------	---	---	
							Southern red oak----	---	---	
Bf---------- Bibb	11W	Slight	Severe	Severe	Moderate	Severe	Loblolly pine-------	100	460	Loblolly pine, sweetgum, eastern cottonwood.
							Sweetgum-----------	90	210	
							Water oak----------	90	---	
							Blackgum-----------	---	---	
BoC---------- Bowie	9A	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	86	280	Loblolly pine.
							Shortleaf pine------	80	270	
ByC---------- Briley	8S	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine-------	80	230	Loblolly pine, slash pine.
							Shortleaf pine------	70	170	
CfE, CgE---------- Cuthbert	8R	Severe	Moderate	Slight	Slight	Slight	Loblolly pine-------	80	230	Loblolly pine.
							Shortleaf pine------	75	210	
DaC, DaE---------- Darco	8S	Slight	Severe	Moderate	Slight	Moderate	Loblolly pine-------	81	230	Loblolly pine, shortleaf pine.
							Shortleaf pine------	76	210	
DrA**:										
Derly----------	4W	Slight	Moderate	Moderate	Slight	Severe	Water oak----------	70	---	Water oak, willow oak, sweetgum.
							Willow oak----------	72	---	
Raino----------	9W	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine-------	88	330	Loblolly pine, shortleaf pine.
							Shortleaf pine------	80	270	
							Water oak----------	90	---	
DuC---------- Duffern	7S	Slight	Severe	Severe	Slight	Severe	Loblolly pine-------	65	180	Loblolly pine.
							Shortleaf pine------	75	180	

See footnote at end of table.

TABLE 6.--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	Windthrow hazard	Plant competition	Common trees	Site index	Volume	
ErC---------- Elrose	10A	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	92	330	Loblolly pine, shortleaf pine.
							Shortleaf pine------	85	340	
							Sweetgum-----------	90	210	
							Southern red oak----	---	---	
Es---------- Estes	8W	Slight	Severe	Moderate	Slight	Moderate	Sweetgum-----------	93	260	Sweetgum, American sycamore, water oak, loblolly pine.
							Willow oak----------	86	---	
							Water oak-----------	93	---	
							Green ash-----------	---	---	
FrB---------- Freestone	8W	Slight	Slight	Slight	Slight	Moderate	Loblolly pine-------	80	230	Loblolly pine, shortleaf pine.
							Shortleaf pine------	70	170	
							Sweetgum-----------	80	120	
GaB---------- Gallime	9A	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	90	330	Loblolly pine, sweetgum.
							Shortleaf pine------	80	270	
							Sweetgum-----------	---	---	
							Southern red oak----	---	---	
Gw---------- Gladewater	6W	Slight	Severe	Severe	Slight	Moderate	Water oak-----------	85	---	Water oak.
							Willow oak----------	85	---	
HaA---------- Hainesville	10S	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine-------	96	395	Loblolly pine, shortleaf pine.
							Shortleaf pine------	88	410	
Iu---------- Iulus	10A	Slight	Slight	Slight	Slight	Slight	Sweetgum-----------	100	310	Loblolly pine, sweetgum.
							Water oak-----------	100	---	
KfC---------- Kirvin	8A	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	85	280	Loblolly pine, slash pine.
							Shortleaf pine------	75	210	
KgC---------- Kirvin	8A	Moderate	Slight	Slight	Slight	Slight	Loblolly pine-------	83	280	Loblolly pine.
							Shortleaf pine------	72	170	
KsC**---------- Kirvin	6C	Moderate	Moderate	Moderate	Slight	Slight	Loblolly pine-------	70	130	Loblolly pine.
							Shortleaf pine------	57	90	
KuB---------- Kullit	9W	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine-------	90	330	Loblolly pine, sweetgum.
							Southern red oak----	---	---	
							White oak-----------	---	---	
							Sweetgum-----------	---	---	

See footnote at end of table.

TABLE 6.--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	Windthrow hazard	Plant competition	Common trees	Site index	Volume	
LaA**:										
Latch	10W	Slight	Severe	Moderate	Slight	Moderate	Loblolly pine	98	460	Loblolly pine, water oak, southern red oak.
							Water oak	---	---	
							Willow oak	---	---	
							Southern red oak	---	---	
							Sweetgum	---	---	
							Post oak	---	---	
							Winged elm	---	---	
Mollville	8W	Slight	Severe	Moderate	Slight	Severe	Loblolly pine	82	230	Water oak, sweetgum, loblolly pine.
							Water oak	80	---	
							Willow oak	80	---	
							Sweetgum	80	120	
LgB	8W	Slight	Severe	Moderate	Slight	Severe	Loblolly pine	80	230	Loblolly pine, sweetgum, southern red oak.
Leagueville							Sweetgum	80	120	
							Water oak	80	---	
							Southern red oak	70	80	
LtC	9S	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine	88	330	Loblolly pine.
Lilbert							Shortleaf pine	74	210	
							Longleaf pine	70	---	
							Sweetgum	---	---	
							Southern red oak	---	---	
Ma	8W	Slight	Severe	Moderate	Slight	Moderate	Sweetgum	92	210	Green ash, cherrybark oak.
Manco							Water oak	90	---	
							Willow oak	90	---	
MoA	8W	Slight	Severe	Moderate	Slight	Severe	Loblolly pine	82	230	Water oak, sweetgum, loblolly pine.
Mollville							Water oak	80	---	
							Willow oak	80	---	
							Sweetgum	80	120	
OkB	9A	Slight	Slight	Slight	Slight	Moderate	Loblolly pine	91	330	Loblolly pine.
Oakwood							Shortleaf pine	---	---	
							Sweetgum	---	---	
							Southern red oak	---	---	
PkC, PkE	8S	Slight	Severe	Moderate	Slight	Moderate	Loblolly pine	80	230	Loblolly pine.
Pickton							Shortleaf pine	70	170	
							Southern red oak	70	80	

See footnote at end of table.

TABLE 6.--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	Windthrow hazard	Plant competition	Common trees	Site index	Volume	
RdC---------- Redsprings	8F	Slight	Slight	Moderate	Slight	Slight	Loblolly pine-------	79	230	Loblolly pine.
							Shortleaf pine------	69	170	
RdE---------- Redsprings	8R	Severe	Moderate	Moderate	Slight	Slight	Loblolly pine-------	79	230	Loblolly pine.
							Shortleaf pine------	69	170	
RsD**---------- Redsprings	6C	Moderate	Moderate	Moderate	Slight	Slight	Loblolly pine-------	70	130	Loblolly pine.
							Shortleaf pine------	60	90	
SaB---------- Sacul	8C	Slight	Moderate	Slight	Moderate	Moderate	Loblolly pine-------	84	280	Loblolly pine,
							Shortleaf pine------	74	210	shortleaf pine.
TeE---------- Tenaha	9S	Moderate	Moderate	Moderate	Slight	Slight	Loblolly pine-------	87	330	Loblolly pine.
							Shortleaf pine------	77	340	
WoC, WoD---------- Wolfpen	9S	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine-------	90	330	Loblolly pine,
							Shortleaf pine------	78	270	shortleaf pine.
WtC---------- Woodtell	8C	Slight	Moderate	Slight	Slight	Slight	Loblolly pine-------	80	230	Loblolly pine.
							Shortleaf pine------	70	170	
WtD---------- Woodtell	8C	Moderate	Moderate	Slight	Slight	Slight	Loblolly pine-------	78	230	Loblolly pine.
							Shortleaf pine------	70	170	
WxB**:										
Woodtell----------	8C	Slight	Moderate	Slight	Slight	Slight	Loblolly pine-------	80	230	Loblolly pine.
							Shortleaf pine------	70	170	
Raino----------	9W	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine-------	88	330	Loblolly pine,
							Shortleaf pine------	80	270	shortleaf pine.
							Water oak-----------	90	---	

* Volume is the yield in board feet (Doyle Rule) per acre per year calculated over a 50 year period for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--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
AtB---------- Attoyac	Favorable	1,300	Pinehill bluestem	55
	Normal	1,050	Slender bluestem	5
	Unfavorable	800	Longleaf uniola	5
			Splitbeard bluestem	5
			Southern bayberry	5
			Carolina jessamine	5
			Greenbrier	5
			Yaupon	5
			American beautyberry	5
BeB, BeD---------- Bernaldo	Favorable	1,300	Pinehill bluestem	55
	Normal	1,050	Slender bluestem	5
	Unfavorable	800	Longleaf uniola	5
			Splitbeard bluestem	5
			Southern bayberry	5
			Carolina jessamine	5
			Yaupon	5
			American beautyberry	5
Bf---------- Bibb	Favorable	1,500	Pinehill bluestem	25
	Normal	1,200	Cutover muhly	17
	Unfavorable	900	Longleaf uniola	17
			Grassleaf goldaster	13
			Beaked panicum	7
BoC---------- Bowie	Favorable	3,500	Pinehill bluestem	50
	Normal	3,000	Pineywoods dropseed	10
	Unfavorable	2,000	Longleaf uniola	10
			Big bluestem	10
			Indiangrass	5
ByC---------- Briley	Favorable	1,500	Pinehill bluestem	50
	Normal	1,200	Longleaf uniola	10
	Unfavorable	900	Fineleaf bluestem	10
			Pineywoods dropseed	10
CfE, CgE---------- Cuthbert	Favorable	2,200	Pinehill bluestem	50
	Normal	1,700	Longleaf uniola	10
	Unfavorable	1,200	Fineleaf bluestem	10
			Big bluestem	5
			Pineywoods dropseed	5
DaC, DaE---------- Darco	Favorable	1,650	Pinehill bluestem	50
	Normal	1,350	Longleaf uniola	10
	Unfavorable	1,000	Indiangrass	5
			Fineleaf bluestem	5
			Splitbeard bluestem	5
			Pineywoods dropseed	5
			Purple lovegrass	5
			Fringeleaf paspalum	5

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
DrA*:				
Derly	Favorable	4,500	Florida paspalum	15
	Normal	3,500	Virginia wildrye	15
	Unfavorable	2,000	Little bluestem	10
			Beaked panicum	10
			Giant cane	10
			Panicum	10
			Redtop panicum	10
			Carolina jointtail	5
Raino	Favorable	2,000	Little bluestem	25
	Normal	1,600	Pinehill bluestem	25
	Unfavorable	1,250	Beaked panicum	10
			Longleaf uniola	10
			Spreading panicum	5
			Brownseed paspalum	5
			Cutover muhly	5
DuC	Favorable	1,500	Pinehill bluestem	30
Duffern	Normal	1,200	Longleaf uniola	10
	Unfavorable	1,000	Arrowfeather threeawn	10
			Indiangrass	5
			Fineleaf bluestem	5
			Purple lovegrass	5
			Grape	5
			Bluejack oak	5
			Sassafras	5
			Tickclover	5
ErC	Favorable	1,500	Longleaf uniola	10
Elrose	Normal	1,200	Pineywoods dropseed	10
	Unfavorable	900	Big bluestem	10
			Pinehill bluestem	10
Es	Favorable	1,900	Longleaf uniola	15
Estes	Normal	1,700	Pinehill bluestem	15
	Unfavorable	1,500	Sedge	10
			Beaked panicum	10
			Panicum	5
			Greenbrier	5
			Alabama supplejack	5
FrB	Favorable	2,500	Little bluestem	15
Freestone	Normal	1,750	Beaked panicum	15
	Unfavorable	1,000	Longleaf uniola	15
			Purpletop	10
			Panicum	10
GaB	Favorable	3,000	Pinehill bluestem	20
Gallime	Normal	2,500	Beaked panicum	20
	Unfavorable	2,000	Longleaf uniola	20
			Purpletop	5
			Panicum	5
			American beautyberry	5
			Greenbrier	5

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
Gw---------- Gladewater	Favorable	3,500	Sedge----------	20
	Normal	2,000	Paspalum----------	15
	Unfavorable	1,500	Virginia wildrye----------	10
			Panicum----------	10
			Beaked panicum----------	5
			Purpletop----------	5
			Pinehill bluestem----------	5
HaA---------- Hainesville	Favorable	1,200	Longleaf uniola----------	10
	Normal	1,000	Purpletop----------	5
	Unfavorable	600	Indiangrass----------	5
			Greenbrier----------	5
Iu---------- Iulus	Favorable	1,800	Pinehill bluestem----------	50
	Normal	1,500	Beaked panicum----------	10
	Unfavorable	1,200	Spreading panicum----------	10
			Brownseed paspalum----------	10
			Longleaf uniola----------	10
KfC---------- Kirvin	Favorable	2,000	Pinehill bluestem----------	50
	Normal	1,300	Longleaf uniola----------	10
	Unfavorable	1,000	Pineywoods dropseed----------	5
			American beautyberry----------	5
			Purpletop----------	5
			Indiangrass----------	5
			Brownseed paspalum----------	5
KgC---------- Kirvin	Favorable	2,400	Pinehill bluestem----------	50
	Normal	1,900	Longleaf uniola----------	10
	Unfavorable	1,500	American beautyberry----------	5
			Indiangrass----------	5
			Brownseed paspalum----------	5
			Fineleaf bluestem----------	5
KsC*---------- Kirvin	Favorable	2,300	Pinehill bluestem----------	50
	Normal	1,800	Fineleaf bluestem----------	10
	Unfavorable	1,200	Longleaf uniola----------	10
			Big bluestem----------	10
			Splitbeard bluestem----------	5
KuB---------- Kullit	Favorable	2,500	Beaked panicum----------	10
	Normal	2,000	Sedge----------	10
	Unfavorable	1,600	Switchgrass----------	10
			Canada wildrye----------	10
			Greenbrier----------	10
			Broadleaf uniola----------	5
LaA*:				
Latch----------	Favorable	1,800	Little bluestem----------	25
	Normal	1,500	Pinehill bluestem----------	25
	Unfavorable	1,000	Brownseed paspalum----------	10
			Longleaf uniola----------	10
			Beaked panicum----------	10
			Greenbrier----------	5
			Spreading panicum----------	5
			Southern bayberry----------	5

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
LaA*:				
Mollville	Favorable	2,000	Pinehill bluestem	35
	Normal	1,750	Switchgrass	10
	Unfavorable	1,400	Longleaf uniola	10
			Cutover muhly	10
			Switchcane	5
			Beaked panicum	5
			Blackgum	5
			Spreading panicum	5
LgB	Favorable	2,000	Longleaf uniola	15
Leagueville	Normal	1,500	Pinehill bluestem	10
	Unfavorable	1,000	Panicum	10
			Southern bayberry	10
			Broomsedge bluestem	5
			Sedge	5
			Common buttonbush	5
			Greenbrier	5
LtC	Favorable	1,500	Pinehill bluestem	50
Lilbert	Normal	1,200	Fineleaf bluestem	10
	Unfavorable	900	Longleaf uniola	10
			Pineywoods dropseed	10
			Indiangrass	5
Ma	Favorable	1,600	Longleaf uniola	15
Manco	Normal	1,200	Sedge	15
	Unfavorable	1,000	Panicum	5
			Beaked panicum	5
			Greenbrier	5
			Poison ivy	5
			Cedar elm	5
			Southern bayberry	5
MoA	Favorable	2,000	Pinehill bluestem	35
Mollville	Normal	1,750	Switchgrass	10
	Unfavorable	1,400	Longleaf uniola	10
			Cutover muhly	10
			Switchcane	5
			Beaked panicum	5
			Blackgum	5
			Spreading panicum	5
OkB	Favorable	1,200	Pinehill bluestem	40
Oakwood	Normal	800	Longleaf uniola	10
	Unfavorable	500	Beaked panicum	5
			Purpletop	5
			Indiangrass	5
			Panicum	5
			Paspalum	5
			Sedge	5
			Yaupon	5

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
PkC, PkE	Favorable	3,000	Little bluestem	20
Pickton	Normal	2,500	Panicum	15
	Unfavorable	2,000	Purpletop	10
			Big bluestem	10
			Indiangrass	5
			Longleaf uniola	5
			Beaked panicum	5
RdC, RdE	Favorable	2,300	Pinehill bluestem	50
Redsprings	Normal	1,800	Fineleaf bluestem	10
	Unfavorable	1,200	Longleaf uniola	10
			Big bluestem	10
			Pineywoods dropseed	5
			Indiangrass	5
			Cutover muhly	5
RsD*	Favorable	2,300	Pinehill bluestem	50
Redsprings	Normal	1,800	Longleaf uniola	10
	Unfavorable	1,200	Big bluestem	10
			Fineleaf bluestem	10
			Splitbeard bluestem	5
			Purpletop	5
SaB	Favorable	3,000	Bluestem	25
Sacul	Normal	2,200	Beaked panicum	15
	Unfavorable	1,500	Uniola	10
			Plumegrass	8
			Panicum	7
			Sedge	5
TeE	Favorable	2,500	Pinehill bluestem	50
Tenaha	Normal	2,000	Fineleaf bluestem	10
	Unfavorable	1,250	Longleaf uniola	10
			Indiangrass	5
			Slender bluestem	5
			Pineywoods dropseed	5
			Dogwood	5
			Yaupon	5
WoC, WoD	Favorable	3,500	Little bluestem	20
Wolfpen	Normal	2,500	Purpletop	15
	Unfavorable	2,000	Panicum	15
			Longleaf uniola	10
			Beaked panicum	10
			Indiangrass	5
WtC, WtD	Favorable	2,500	Pinehill bluestem	20
Woodtell	Normal	2,000	Panicum	10
	Unfavorable	1,500	Sedge	10
			Brownseed paspalum	10
			Indiangrass	5
			Longleaf uniola	5
			Purpletop	5
			Carolina jointtail	5
			Knotroot bristlegrass	5
			Splitbeard bluestem	5

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
WxB*:				
Woodtell	Favorable	2,500	Pinehill bluestem	20
	Normal	2,000	Panicum	10
	Unfavorable	1,500	Sedge	10
			Brownseed paspalum	10
			Indiangrass	5
			Longleaf uniola	5
			Purpletop	5
			Carolina jointtail	5
			Knotroot bristlegrass	5
			Splitbeard bluestem	5
WxB*:				
Raino	Favorable	2,000	Little bluestem	25
	Normal	1,600	Pinehill bluestem	25
	Unfavorable	1,250	Beaked panicum	10
			Longleaf uniola	10
			Spreading panicum	5
			Brownseed paspalum	5
			Cutover muhly	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--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	Golf fairways
AtB Attoyac	Slight	Slight	Moderate: slope.	Slight	Slight.
BeB Bernaldo	Slight	Slight	Moderate: slope.	Slight	Slight.
BeD Bernaldo	Slight	Slight	Severe: slope.	Slight	Slight.
Bf Bibb	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
BoC Bowie	Slight	Slight	Moderate: slope.	Slight	Slight.
ByC Briley	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
CfE Cuthbert	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Moderate: droughty.
CgE Cuthbert	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Moderate: small stones, droughty.
DaC Darco	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
DaE Darco	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope.
DrA*: Derly	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
Raino	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Slight.
DuC Duffern	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
ErC Elrose	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Es Estes	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness, flooding.	Severe: wetness, too clayey.	Severe: wetness, flooding, too clayey.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FrB Freestone	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight.
GaB Gallime	Slight	Slight	Moderate: slope.	Slight	Slight.
Gw Gladewater	Severe: flooding, percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey, flooding, percs slowly.	Severe: too clayey.	Severe: flooding, too clayey.
HaA Hainesville	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Severe: droughty.
Iu Iulus	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.
KfC Kirvin	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
KgC Kirvin	Severe: small stones.	Severe: small stones.	Severe: small stones.	Slight	Severe: small stones.
KsC* Kirvin	Moderate: small stones, percs slowly.	Moderate: small stones, percs slowly.	Severe: small stones.	Slight	Moderate: small stones.
KuB Kullit	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight	Slight.
LaA*:					
Latch	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: droughty.
Mollville	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
LgB Leagueville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
LtC Lilbert	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
Ma Manco	Severe: flooding, wetness, too acid.	Severe: too acid.	Severe: wetness, flooding, too acid.	Moderate: wetness, flooding.	Severe: too acid, flooding.
MoA Mollville	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
OkB Oakwood	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
Ow* Oil-waste land	Severe: excess salt.	Severe: excess salt.	Severe: excess salt.	Slight	Severe: excess salt.
PkC Pickton	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
PkE Pickton	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: droughty, slope.
RdC Redsprings	Severe: small stones.	Severe: small stones.	Severe: small stones.	Slight	Severe: small stones.
RdE Redsprings	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope.
RsD* Redsprings	Moderate: small stones, percs slowly.	Moderate: small stones, percs slowly.	Severe: small stones.	Slight	Moderate: small stones.
SaB Sacul	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, small stones, wetness.	Slight	Slight.
TeE Tenaha	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: droughty, slope.
WoC Wolfpen	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
WoD Wolfpen	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: droughty, slope.
WtC Woodtell	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Slight.
WtD Woodtell	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: slope.
WxB*: Woodtell	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Slight.
Raino	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

(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
AtB---- Attoyac	Good	Good	Good	---	Good	Poor	Very poor.	Good	Good	Very poor.
BeB---- Bernaldo	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BeD---- Bernaldo	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Bf---- Bibb	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
BoC---- Bowie	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ByC---- Briley	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
CfE, CgE---- Cuthbert	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
DaC---- Darco	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
DaE---- Darco	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
DrA*:										
Derly----	Fair	Fair	Good	Fair	Fair	Good	Good	Fair	Fair	Good.
Raino----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
DuC---- Duffern	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
ErC---- Elrose	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Es---- Estes	Very poor.	Poor	Fair	Good	---	Fair	Fair	Poor	Fair	Fair.
FrB---- Freestone	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
GaB---- Gallime	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Gw---- Gladewater	Poor	Fair	Fair	Fair	---	Poor	Good	Fair	Fair	Fair.
HaA---- Hainesville	Fair	Fair	Good	Poor	Poor	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Iu Iulus	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
KfC Kirvin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KgC Kirvin	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KsC* Kirvin	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
KuB Kullit	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
LaA*:										
Latch	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
Mollville	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
LgB Leagueville	Poor	Fair	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Fair.
LtC Lilbert	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Ma Manco	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
MoA Mollville	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
OkB Oakwood	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ow* Oil-waste land	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
PkC, PkE Pickton	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
RdC Redsprings	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
RdE Redsprings	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RsD* Redsprings	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
SaB Sacul	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
TeE Tenaha	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--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
WoC, WoD---------- Wolfpen	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
WtC---------- Woodtell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Poor.
WtD---------- Woodtell	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WxB*: Woodtell----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Poor.
Raino----------	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 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. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AtB Attoyac	Slight	Slight	Slight	Slight	Moderate: low strength.	Slight.
BeB Bernaldo	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
BeD Bernaldo	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
Bf Bibb	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
BoC Bowie	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Moderate: low strength.	Slight.
ByC Briley	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
CfE Cuthbert	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Moderate: droughty.
CgE Cuthbert	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Moderate: small stones, droughty.
DaC Darco	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
DaE Darco	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
DrA*:						
Derly	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
Raino	Severe: wetness.	Moderate: wetness.	Severe: wetness, shrink-swell.	Moderate: wetness.	Moderate: wetness.	Slight.
DuC Duffern	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
ErC Elrose	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.

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	Lawns and landscaping
Es Estes	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding, too clayey.
FrB Freestone	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight.
GaB Gallime	Moderate: wetness.	Slight	Moderate: wetness, shrink-swell.	Slight	Slight	Slight.
Gw Gladewater	Severe: cutbanks cave, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: flooding, too clayey.
HaA Hainesville	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
Iu Iulus	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.
KfC Kirvin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
KgC Kirvin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Severe: small stones.
KsC* Kirvin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.
KuB Kullit	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.	Slight.
LaA*: Latch	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
Mollville	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
LgB Leagueville	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
LtC Lilbert	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.

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	Lawns and landscaping
Ma Manco	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Severe: too acid, flooding.
MoA Mollville	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
OkB Oakwood	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Moderate: low strength.	Slight.
Ow* Oil-waste land	---	---	---	---	---	---
PkC Pickton	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
PkE Pickton	Severe: cutbanks cave.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
RdC Redsprings	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Severe: small stones.
RdE Redsprings	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
RsD* Redsprings	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Moderate: small stones.
SaB Sacul	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
TeE Tenaha	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
WoC Wolfpen	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
WoD Wolfpen	Severe: cutbanks cave.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
WtC Woodtell	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
WtD Woodtell	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.

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	Lawns and landscaping
WxB*:						
Woodtell	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
Raino	Severe: wetness.	Moderate: wetness.	Severe: wetness, shrink-swell.	Moderate: wetness.	Moderate: wetness.	Slight.

* 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," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AtB Attoyac	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
BeB, BeD Bernaldo	Moderate: wetness, percs slowly.	Severe: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Bf Bibb	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: small stones, wetness.
BoC Bowie	Severe: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Moderate: wetness, too clayey.	Slight	Fair: too clayey.
ByC Briley	Moderate: percs slowly.	Severe: seepage.	Slight	Severe: seepage.	Good.
CfE, CgE Cuthbert	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope.
DaC Darco	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: too sandy.
DaE Darco	Severe: poor filter.	Severe: seepage, slope.	Severe: too sandy.	Severe: seepage.	Poor: too sandy.
DrA*:					
Derly	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Raino	Severe: wetness, percs slowly.	Severe: wetness.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
DuC Duffern	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
ErC Elrose	Moderate: percs slowly.	Severe: seepage.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.

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
Es Estes	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
FrB Freestone	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
GaB Gallime	Moderate: wetness, percs slowly.	Severe: seepage.	Moderate: too clayey.	Severe: seepage.	Fair: too clayey.
Gw Gladewater	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
HaA Hainesville	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
Iu Iulus	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Fair: wetness.
KfC, KgC, KsC* Kirvin	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
KuB Kullit	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness, thin layer.
LaA*: Latch	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
Mollville	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: ponding.	Poor: ponding.
LgB Leagueville	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too acid.	Severe: seepage, wetness.	Poor: wetness, too acid.
LtC Lilbert	Severe: percs slowly.	Severe: seepage.	Slight	Severe: seepage.	Good.
Ma Manco	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, too acid.	Severe: flooding, wetness.	Poor: wetness, too acid.

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
MoA---- Mollville	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
OkB---- Oakwood	Severe: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Severe: too acid.	Slight----	Poor: thin layer.
Ow*---- Oil-waste land	---	---	---	---	---
PkC---- Pickton	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: too sandy.
PkE---- Pickton	Severe: poor filter.	Severe: seepage, slope.	Severe: too sandy.	Severe: seepage.	Poor: too sandy.
RdC---- Redsprings	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight----	Fair: too clayey, hard to pack.
RdE---- Redsprings	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
RsD*---- Redsprings	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight----	Fair: too clayey, hard to pack.
SaB---- Sacul	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
TeE---- Tenaha	Severe: percs slowly, poor filter.	Severe: seepage, slope.	Severe: too acid.	Severe: seepage.	Poor: thin layer.
WoC---- Wolfpen	Severe: poor filter.	Severe: seepage.	Moderate: too clayey.	Severe: seepage.	Fair: too clayey.
WoD---- Wolfpen	Severe: poor filter.	Severe: seepage, slope.	Moderate: slope, too clayey.	Severe: seepage.	Fair: too clayey, slope.
WtC---- Woodtell	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight----	Poor: too clayey, hard to pack.
WtD---- Woodtell	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.

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
WxB*:					
Woodtell	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Raino	Severe: wetness, percs slowly.	Severe: wetness.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.

* 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 other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AtB Attoyac	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
BeB, BeD Bernaldo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Bf Bibb	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
BoC Bowie	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
ByC Briley	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
CfE Cuthbert	Fair: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
CgE Cuthbert	Fair: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
DaC, DaE Darco	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too sandy.
DrA*:				
Derly	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Raino	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
DuC Duffern	Good	Probable	Improbable: too sandy.	Poor: too sandy.
ErC Elrose	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Es Estes	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
FrB Freestone	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
GaB Gallime	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Gw Gladewater	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
HaA Hainesville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Iu Iulus	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
KfC, KgC, KsC* Kirvin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
KuB Kullit	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
LaA*:				
Latch	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too sandy.
Mollville	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
LgB Leagueville	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
LtC Lilbert	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
Ma Manco	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too acid.
MoA Mollville	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
OkB Oakwood	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, thin layer.
Ow* Oil-waste land	---	---	---	---
PkC, PkE Pickton	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
RdC Redsprings	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
RdE Redsprings	Fair: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
RsD* Redsprings	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
SaB Sacul	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
TeE Tenaha	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones, slope.
WoC, WoD Wolfpen	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
WtC, WtD Woodtell	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
WxB*: Woodtell	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Raino	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.

* 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. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
AtB---------- Attoyac	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable------	Favorable------	Favorable.
BeB---------- Bernaldo	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable------	Favorable------	Favorable.
BeD---------- Bernaldo	Moderate: seepage.	Moderate: piping.	Deep to water	Slope----------	Favorable------	Favorable.
Bf---------- Bibb	Moderate: seepage.	Severe: piping, wetness.	Flooding-------	Wetness--------	Erodes easily, wetness.	Wetness, erodes easily.
BoC---------- Bowie	Moderate: seepage.	Moderate: piping.	Deep to water	Slope----------	Favorable------	Favorable.
ByC---------- Briley	Severe: seepage.	Moderate: piping.	Deep to water	Slope, droughty, fast intake.	Soil blowing---	Droughty.
CfE---------- Cuthbert	Moderate: seepage.	Moderate: piping.	Deep to water	Slope, droughty, soil blowing.	Slope, erodes easily, percs slowly.	Slope, erodes easily, droughty.
CgE---------- Cuthbert	Moderate: seepage.	Moderate: piping.	Deep to water	Slope, droughty.	Slope, percs slowly.	Slope, droughty.
DaC---------- Darco	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty, rooting depth.
DaE---------- Darco	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty, rooting depth.
DrA*:						
Derly----------	Slight---------	Severe: ponding.	Ponding, percs slowly.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
Raino----------	Slight---------	Severe: hard to pack.	Percs slowly---	Wetness, soil blowing, percs slowly.	Erodes easily, wetness, soil blowing.	Erodes easily, percs slowly.
DuC---------- Duffern	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
ErC---------- Elrose	Moderate: seepage, slope.	Moderate: piping, hard to pack.	Deep to water	Slope----------	Soil blowing---	Favorable.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Es Estes	Slight	Severe: wetness.	Percs slowly, flooding.	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
FrB Freestone	Slight	Severe: hard to pack.	Percs slowly	Wetness	Wetness, percs slowly.	Percs slowly.
GaB Gallime	Severe: seepage.	Moderate: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.
Gw Gladewater	Slight	Severe: hard to pack.	Percs slowly, flooding.	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Percs slowly.
HaA Hainesville	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Iu Iulus	Moderate: seepage.	Severe: piping.	Flooding	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Erodes easily.
KfC Kirvin	Slight	Severe: hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
KgC Kirvin	Slight	Severe: hard to pack.	Deep to water	Slope, droughty.	Favorable	Favorable.
KsC* Kirvin	Slight	Severe: hard to pack.	Deep to water	Slope, percs slowly.	Favorable	Favorable.
KuB Kullit	Moderate: seepage.	Moderate: thin layer, piping, wetness.	Favorable	Wetness, soil blowing.	Erodes easily, wetness, soil blowing.	Erodes easily.
LaA*: Latch	Severe: seepage.	Severe: seepage, piping.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
Mollville	Severe: seepage.	Severe: ponding.	Ponding, percs slowly.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
LgB Leagueville	Severe: seepage.	Severe: piping, wetness.	Too acid	Wetness, droughty.	Wetness	Wetness, droughty.
LtC Lilbert	Severe: seepage.	Moderate: piping.	Deep to water	Slope, droughty, fast intake.	Soil blowing	Droughty.
Ma Manco	Moderate: seepage.	Severe: wetness.	Flooding, too acid.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
MoA---------- Mollville	Slight---------	Severe: ponding.	Ponding, percs slowly.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
OkB---------- Oakwood	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope, soil blowing, too acid.	Soil blowing---	Favorable.
Ow*---------- Oil-waste land	---	---	---	---	---	---
PkC---------- Pickton	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
PkE---------- Pickton	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty.
RdC---------- Redsprings	Slight---------	Moderate: hard to pack.	Deep to water	Slope, percs slowly.	Favorable------	Favorable.
RdE---------- Redsprings	Slight---------	Moderate: hard to pack.	Deep to water	Slope, percs slowly.	Slope----------	Slope.
RsD*---------- Redsprings	Slight---------	Moderate: hard to pack.	Deep to water	Slope, percs slowly.	Favorable------	Favorable.
SaB---------- Sacul	Slight---------	Moderate: hard to pack, wetness.	Percs slowly---	Wetness--------	Wetness--------	Percs slowly.
TeE---------- Tenaha	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, soil blowing.	Slope, droughty.
WoC---------- Wolfpen	Severe: seepage.	Severe: thin layer.	Deep to water	Slope, droughty, fast intake.	Soil blowing---	Droughty.
WoD---------- Wolfpen	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, droughty, fast intake.	Slope, soil blowing.	Slope, droughty.
WtC---------- Woodtell	Slight---------	Severe: hard to pack.	Deep to water	Slope, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
WtD---------- Woodtell	Slight---------	Severe: hard to pack.	Deep to water	Slope, percs slowly.	Slope, erodes easily.	Slope, erodes easily.
WxB*: Woodtell---------	Slight---------	Severe: hard to pack.	Deep to water	Percs slowly---	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Raino----------	Slight---------	Severe: hard to pack.	Percs slowly---	Wetness, soil blowing, percs slowly.	Erodes easily, wetness, soil blowing.	Erodes easily, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

(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		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AtB---------- Attoyac	0-8	Fine sandy loam	SC-SM, CL-ML, ML, SM	A-4	0	98-100	95-100	70-100	40-65	<23	NP-7
	8-80	Fine sandy loam, sandy clay loam, loam.	CL, SC	A-4, A-6	0	98-100	95-100	80-100	45-75	23-40	7-24
BeB---------- Bernaldo	0-10	Fine sandy loam	SM, ML	A-4	0	100	95-100	90-100	40-60	<25	NP-4
	10-42	Loam, sandy clay loam, clay loam.	CL	A-6	0	99-100	98-100	90-100	51-75	26-40	12-24
	42-80	Fine sandy loam, loam, sandy clay loam.	CL, SC, ML, SM	A-4, A-6, A-2-4	0	100	95-100	90-100	28-65	20-40	3-22
BeD---------- Bernaldo	0-10	Fine sandy loam	SM, ML	A-4	0	100	95-100	90-100	40-60	<25	NP-4
	10-34	Loam, sandy clay loam, clay loam.	CL	A-6	0	99-100	98-100	90-100	51-75	26-40	12-24
	34-80	Fine sandy loam, loam, sandy clay loam.	CL, SC, ML, SM	A-4, A-6, A-2-4	0	100	95-100	90-100	28-65	20-40	3-22
Bf---------- Bibb	0-6	Fine sandy loam	SM, SC-SM, ML, CL-ML	A-2, A-4	0-5	95-100	90-100	60-90	30-60	<25	NP-7
	6-80	Sandy loam, loam, silt loam.	SM, SC-SM, ML, CL-ML	A-2, A-4	0-10	60-100	50-100	40-100	30-90	<30	NP-7
BoC---------- Bowie	0-9	Fine sandy loam	SM, SC-SM, ML, CL-ML	A-2-4, A-4	0	97-100	94-100	90-100	30-55	<25	NP-6
	9-64	Sandy clay loam, clay loam, fine sandy loam.	SC, CL	A-4, A-6	0	90-100	87-100	80-100	40-72	20-40	8-25
	64-80	Sandy clay loam, clay loam, sandy clay.	CL	A-6, A-7	0	95-100	90-100	75-100	51-80	31-49	14-30
ByC---------- Briley	0-3	Loamy fine sand	SM, SC-SM	A-2-4, A-4	0	95-100	95-100	80-100	17-45	16-25	NP-7
	3-33	Loamy fine sand	SM, SC-SM	A-2-4, A-4	0	97-100	95-100	80-100	17-45	16-25	NP-7
	33-80	Fine sandy loam, loam, sandy clay loam.	SC, CL	A-4, A-6	0	95-100	95-100	85-100	36-65	22-39	8-22
CfE---------- Cuthbert	0-7	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2-4, A-4	0-1	85-100	78-100	75-98	20-55	<32	NP-7
	7-25	Sandy clay loam, sandy clay, clay.	SC, CL, CH	A-6, A-7-6	0-1	85-100	75-100	65-100	45-98	37-64	19-40
	25-31	Fine sandy loam, sandy clay loam, clay loam.	SC, CL	A-6, A-7, A-2-6	0-1	85-100	80-100	75-100	28-84	29-45	11-26
	31-60	Stratified fine sandy loam to clay.	SC, CL	A-6, A-7, A-2-6	0-3	85-100	80-100	75-100	28-84	21-45	7-26

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CgE---------- Cuthbert	0-12	Gravelly fine sandy loam.	SM, GM, GM-GC, SC-SM	A-1-B, A-2-4, A-4	0-5	60-88	50-80	35-75	20-49	<32	NP-7
	12-20	Sandy clay loam, sandy clay, clay.	SC, CL, CH	A-6, A-7-6	0-1	85-100	75-100	65-100	45-98	37-64	19-40
	20-31	Fine sandy loam, sandy clay loam, clay loam.	SC, CL	A-6, A-7, A-2-6	0-1	85-100	80-100	75-100	28-84	29-45	11-26
	31-60	Stratified fine sandy loam to clay.	SC, CL	A-6, A-7, A-2-6	0-3	85-100	80-100	75-100	28-84	21-45	7-26
DaC---------- Darco	0-3	Fine sand--------	SM	A-2-4	0-2	95-100	95-100	70-100	15-30	16-20	NP-3
	3-56	Loamy fine sand, fine sand.	SM	A-2-4	0-2	95-100	95-100	75-100	15-30	16-20	NP-3
	56-80	Sandy clay loam, fine sandy loam.	SC, CL	A-6, A-7-6, A-2-4	0	95-100	95-100	80-100	23-55	25-45	9-28
DaE---------- Darco	0-8	Fine sand--------	SM	A-2-4	0-2	95-100	95-100	70-100	15-30	16-20	NP-3
	8-50	Loamy fine sand, fine sand.	SM	A-2-4	0-2	95-100	95-100	75-100	15-30	16-20	NP-3
	50-80	Sandy clay loam, fine sandy loam.	SC, CL	A-6, A-7-6, A-2-4	0	95-100	95-100	80-100	23-55	25-45	9-28
DrA*:											
Derly----------	0-9	Silt loam, loam.	ML, CL, CL-ML	A-4	0	100	100	85-100	55-90	16-30	NP-10
	9-21	Clay loam, silty clay loam.	CL, CH	A-7, A-6	0	100	100	90-100	70-95	35-60	20-36
	21-80	Loam, clay loam, clay.	CH, CL	A-7, A-6	0	100	100	90-100	56-95	34-60	20-36
Raino----------	0-10	Fine sandy loam, loam.	ML, CL, CL-ML	A-4	0	95-100	95-100	80-100	51-80	<30	NP-10
	10-25	Loam, fine sandy loam, very fine sandy loam.	ML, CL, CL-ML	A-4	0	95-100	95-100	80-100	51-80	<30	NP-10
	25-35	Loam, sandy clay loam, clay loam.	CL, SC, SC-SM, CL-ML	A-6, A-4	0	95-100	95-100	80-100	40-72	20-40	5-20
	35-80	Clay, sandy clay, clay loam.	CH, CL	A-7	0	95-100	95-100	80-100	55-90	46-74	24-45
DuC---------- Duffern	0-9	Sand----------	SP-SM, SM	A-3, A-2-4	0	98-100	98-100	75-90	5-15	<25	NP-4
	9-57	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	98-100	98-100	80-100	5-15	<25	NP-4
	57-80	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	98-100	98-100	80-100	5-20	<25	NP-4

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
ErC--- Elrose	0-6	Fine sandy loam	SM, SC-SM	A-2-4, A-4	0	85-100	78-100	70-99	30-47	16-25	NP-7
	6-16	Sandy clay loam, clay loam, loam.	SC, CL	A-4, A-6	0	90-100	85-100	80-99	36-65	20-39	8-23
	16-80	Clay loam, sandy clay, clay.	CL, CH	A-6, A-7	0	90-100	80-100	80-100	50-97	32-55	13-27
Es--- Estes	0-4	Silty clay-------	CL, CH	A-7-6	0	100	100	95-100	69-100	41-55	23-35
	4-53	Clay loam, silty clay loam, silty clay.	CL, CH	A-7-6, A-6	0	100	100	95-100	65-95	30-55	14-32
	53-80	Silty clay, clay	CL, CH	A-7-6	0	100	100	95-100	75-100	41-60	25-40
FrB--- Freestone	0-10	Fine sandy loam	SM, SC-SM, CL-ML, ML	A-4	0	95-100	95-100	90-100	36-62	15-26	NP-7
	10-27	Sandy clay loam, loam, clay loam.	CL, CL-ML	A-6, A-7, A-4	0	95-100	95-100	90-100	55-85	24-46	7-23
	27-80	Clay, clay loam	CL, CH	A-7	0	95-100	95-100	90-100	65-95	42-70	21-44
GaB--- Gallime	0-8	Fine sandy loam	SM, SC, CL, ML	A-4	0	95-100	95-100	90-100	45-65	15-28	3-10
	8-34	Fine sandy loam, very fine sandy loam, loam.	SM, SC, CL, ML	A-4	0	95-100	95-100	90-100	45-65	15-28	3-10
	34-80	Sandy clay loam, clay loam, loam.	CL, SC	A-6, A-4	0	95-100	95-100	90-100	45-80	25-40	8-20
Gw--- Gladewater	0-8	Clay-------------	CH, CL	A-7	0	100	100	90-100	80-95	48-75	25-50
	8-73	Clay-------------	CH	A-7	0	100	100	95-100	90-100	51-75	30-50
	73-80	Clay loam, loam	CH, CL	A-7	0	100	100	90-100	70-80	41-56	20-33
HaA--- Hainesville	0-11	Loamy fine sand	SM, SC-SM	A-2-4	0	98-100	95-100	85-100	15-35	<25	NP-7
	11-80	Fine sand, loamy fine sand.	SM, SC-SM	A-2-4, A-4	0	98-100	95-100	80-100	13-45	<25	NP-7
Iu--- Iulus	0-7	Fine sandy loam	CL-ML, ML	A-4	0	95-100	95-100	85-95	51-75	16-25	NP-6
	7-56	Fine sandy loam, loam.	CL-ML, SC-SM, SM, ML	A-4	0	95-100	85-100	80-95	45-75	16-25	NP-6
	56-80	Fine sandy loam, loam, sandy clay loam.	CL-ML, CL, ML, SC	A-4, A-6	0	95-100	90-100	80-95	45-75	16-32	3-15
KfC--- Kirvin	0-11	Very fine sandy loam.	SM, ML, CL, SC	A-4	0-2	95-100	95-98	90-95	36-70	<30	NP-8
	11-43	Clay loam, sandy clay, clay.	CL, CH	A-7	0-1	95-100	90-100	85-100	53-95	42-67	24-43
	43-50	Sandy clay loam, clay loam, clay.	CL, CH	A-6, A-7	0-1	95-100	90-100	75-100	51-90	32-59	16-32
	50-70	Stratified fine sandy loam to clay.	SC, CL, CH	A-4, A-6, A-7	0-1	95-100	90-100	50-90	36-80	25-52	9-32

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
KgC---------- Kirvin	0-7	Gravelly fine sandy loam.	SM, GM, SC, GM-GC	A-2-4, A-4	0-5	55-92	47-80	40-75	25-49	<30	NP-8
	7-41	Clay loam, sandy clay, clay.	CL, CH	A-7	0-1	95-100	90-100	85-100	53-95	42-67	24-43
	41-48	Sandy clay loam, clay loam, clay.	CL, CH	A-6, A-7	0-1	95-100	90-100	75-100	51-90	32-59	16-32
	48-80	Stratified fine sandy loam to clay.	SC, CL, CH	A-4, A-6, A-7	0-1	95-100	90-100	50-90	36-80	25-52	9-32
KsC*---------- Kirvin	0-2	Gravelly fine sandy loam.	SM, GM	A-2-4, A-4	0-5	55-78	50-78	35-70	26-49	<25	NP-4
	2-42	Clay, sandy clay, clay loam.	CL, CH	A-7	0-2	95-100	88-100	84-99	51-95	45-67	24-43
	42-65	Stratified sandy clay loam to clay.	SC, CL, CH	A-4, A-6, A-7	0-1	95-100	90-100	50-90	36-80	25-52	9-32
KuB---------- Kullit	0-13	Very fine sandy loam.	ML, CL-ML	A-4	0	100	100	94-100	51-80	15-28	NP-7
	13-40	Fine sandy loam, very fine sandy loam, loam.	SM, CL-ML, ML, SC-SM	A-4	0	100	98-100	94-100	36-60	15-26	NP-7
	40-80	Loam, sandy clay loam, clay loam.	CL	A-4, A-6	0	100	98-100	90-100	55-85	25-40	8-21
	54-72	Sandy clay, clay	CL, CH	A-7-6	0	100	98-100	85-100	55-95	44-71	20-42
LaA*:											
Latch----------	0-7	Loamy fine sand	SM, SC-SM	A-2-4, A-4	0	95-100	95-100	80-100	15-40	<25	NP-6
	7-44	Loamy fine sand, fine sand.	SM, SC-SM	A-2-4, A-4	0	95-100	95-100	80-100	15-40	<25	NP-6
	44-65	Sandy clay loam, loam, fine sandy loam.	SC, CL	A-4, A-6	0	95-100	95-100	80-100	40-55	25-39	7-20
	65-80	Loamy fine sand, fine sand, sand.	SM, SP-SM, SC-SM	A-3, A-2-4	0	95-100	95-100	65-95	5-25	<22	NP-6
Mollville-------	0-9	Loam----------	ML, CL-ML, CL	A-4, A-6	0	100	100	85-100	50-80	20-35	3-15
	9-43	Sandy clay loam, loam, clay loam.	CL, SC	A-6, A-4	0	100	100	90-100	45-75	25-40	8-22
	43-75	Clay loam, sandy clay loam, loam.	CL, SC	A-6	0	100	100	90-100	45-80	30-40	11-20
	75-80	Loamy fine sand, fine sandy loam.	SM, ML, SC-SM, CL-ML	A-2-4, A-4	0	95-100	95-100	70-95	15-68	<25	NP-6
LgB---------- Leagueville	0-8	Loamy fine sand	SM	A-2	0	100	100	90-100	20-30	16-20	NP-4
	8-27	Fine sand, loamy fine sand.	SM	A-2	0	100	100	85-100	15-30	16-20	NP-4
	27-49	Sandy clay loam, fine sandy loam, sandy loam.	SC, CL, SC-SM, CL-ML	A-4, A-6	0	100	95-100	85-100	36-60	20-35	5-15
	49-80	Fine sand, sandy clay loam, fine sandy loam.	SM, SC, SC-SM	A-2, A-4	0	100	95-100	85-100	15-50	16-30	NP-10

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
LtC---------- Lilbert	0-9	Loamy fine sand	SM	A-2-4, A-4	0	95-100	95-100	80-100	17-40	<20	NP-3
	9-32	Loamy fine sand	SM	A-2-4, A-4	0	95-100	95-100	80-100	17-40	<20	NP-3
	32-80	Fine sandy loam, sandy clay loam.	SC, CL	A-6, A-4	0	95-100	95-100	85-100	36-55	23-39	8-22
Ma---------- Manco	0-4	Loam----------	CL-ML, CL	A-4, A-6	0	100	100	85-95	60-75	20-30	4-11
	4-80	Loam, silt loam, clay loam.	CL	A-4, A-6	0	100	100	90-100	85-90	28-39	9-18
MoA---------- Mollville	0-11	Loam----------	ML, CL-ML, CL	A-4, A-6	0	100	100	85-100	50-80	20-35	3-15
	11-36	Loam, sandy clay loam, clay loam.	CL, SC	A-6, A-4	0	100	100	90-100	45-75	25-40	8-22
	36-80	Loam, sandy clay loam, clay loam.	CL	A-6	0	100	100	90-100	70-80	30-40	11-20
OkB---------- Oakwood	0-19	Very fine sandy loam.	SM, ML, SC-SM, CL-ML	A-4	0	95-100	95-100	85-100	36-55	<25	NP-7
	19-34	Fine sandy loam, sandy clay loam, clay loam.	SC, CL	A-4, A-6	0	95-100	95-100	85-100	40-75	20-40	8-22
	34-80	Fine sandy loam, sandy clay loam, clay loam.	SC, CL	A-4, A-6	0	95-100	90-100	80-95	40-75	20-40	8-22
Ow*---------- Oil-waste land	0-80	Variable---------	---	---	---	---	---	---	---	---	---
PkC---------- Pickton	0-6	Loamy fine sand	SM, SC-SM	A-2-4	0	100	95-100	85-100	15-30	16-28	NP-7
	6-56	Loamy fine sand, fine sand.	SM, SC-SM	A-2-4	0	100	95-100	85-100	15-30	16-28	NP-7
	56-80	Sandy clay loam, clay loam, fine sandy loam.	SC, CL, CL-ML, SC-SM	A-4, A-6, A-2-6, A-2-4	0	100	95-100	85-100	25-75	23-35	5-14
PkE---------- Pickton	0-12	Loamy fine sand	SM, SC-SM	A-2-4	0	100	95-100	85-100	15-30	16-28	NP-7
	12-47	Loamy fine sand, fine sand.	SM, SC-SM	A-2-4	0	100	95-100	85-100	15-30	16-28	NP-7
	47-80	Sandy clay loam, clay loam, fine sandy loam.	SC, CL, CL-ML, SC-SM	A-4, A-6, A-2-6, A-2-4	0	100	95-100	85-100	25-75	23-35	5-14
RdC---------- Redsprings	0-7	Very gravelly fine sandy loam.	SC, SC-SM, GM, GM-GC	A-2-4, A-4, A-2-7	0-7	49-80	40-65	30-65	18-45	20-42	3-20
	7-41	Clay loam, clay	CL, CH	A-7-6	0-2	70-100	70-98	65-90	51-75	41-60	18-35
	41-60	Stratified sandy clay loam to clay.	SC, CL, CH	A-4, A-6, A-7-6	0-7	90-100	75-100	50-90	36-80	25-57	9-31

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
RdE--------- Redsprings	0-7	Very gravelly fine sandy loam.	SC, SC-SM, GM, GM-GC	A-2-4, A-4, A-2-7	0-7	49-80	40-65	30-65	18-45	20-42	3-20
	7-42	Clay loam, clay	CL, CH	A-7-6	0-2	70-100	70-98	65-90	51-75	41-60	18-35
	42-65	Stratified sandy clay loam to clay.	SC, CL, CH	A-4, A-6, A-7-6	0-7	90-100	75-100	50-90	36-80	25-57	9-31
RsD*--------- Redsprings	0-2	Gravelly fine sandy loam.	SC, CL-ML, CL, SC-SM	A-2-4, A-4, A-2-7	0-3	80-95	65-80	60-80	25-55	20-42	4-20
	2-43	Clay loam, clay	CL, CH	A-7-6	0-7	70-100	70-98	65-85	51-75	41-60	18-30
	43-62	Stratified sandy clay loam to clay.	SC, CL, CH	A-4, A-6, A-7-6	0-7	90-100	75-100	50-90	36-80	25-57	9-31
SaB--------- Sacul	0-9	Very fine sandy loam.	SC-SM, SC, CL-ML, CL	A-4	0	75-100	75-100	65-95	40-75	15-30	4-10
	9-41	Clay, silty clay, clay loam.	CH, CL, SC	A-7	0	85-100	85-100	70-100	40-95	45-70	20-40
	41-80	Silty clay loam, clay loam, loam.	CL, SC	A-6, A-7, A-4, A-2	0	85-100	85-100	65-100	30-95	25-48	8-25
TeE--------- Tenaha	0-3	Loamy fine sand	SM, SC-SM	A-2-4, A-4	0	95-100	95-100	70-95	15-40	16-20	NP-4
	3-32	Loamy fine sand	SM, SC-SM	A-2-4, A-4	0	95-100	78-100	70-95	15-40	16-20	NP-4
	32-42	Fine sandy loam, sandy clay loam, clay loam.	SC, CL	A-6, A-4, A-7-6	0	95-100	95-100	80-100	36-66	25-46	8-26
	42-60	Stratified fine sandy loam to clay.	SC, CL	A-6, A-7, A-2-6	0-3	89-100	85-100	80-100	28-84	25-45	11-26
WoC--------- Wolfpen	0-4	Loamy fine sand	SM, SC-SM	A-2-4	0	95-100	95-100	85-100	15-35	16-22	NP-5
	4-28	Loamy fine sand, fine sand.	SM, SC-SM	A-2-4	0	95-100	95-100	85-100	15-35	16-22	NP-5
	28-43	Fine sandy loam, sandy clay loam, clay loam.	SC, CL	A-6, A-4, A-2	0	95-100	95-100	85-100	26-55	25-40	8-20
	43-80	Fine sandy loam, sandy clay loam, clay loam.	SC, SM, CL, ML	A-4, A-6, A-2, A-7	0	95-100	95-100	85-100	25-55	16-45	2-27
WoD--------- Wolfpen	0-7	Loamy fine sand	SM, SC-SM	A-2-4	0	95-100	95-100	85-100	15-35	16-22	NP-5
	7-29	Loamy fine sand, fine sand.	SM, SC-SM	A-2-4	0	95-100	95-100	85-100	15-35	16-22	NP-5
	29-44	Fine sandy loam, sandy clay loam, clay loam.	SC, CL	A-6, A-4, A-2	0	95-100	95-100	85-100	26-55	25-40	8-20
	44-80	Fine sandy loam, sandy clay loam, clay loam.	SC, SM, CL, ML	A-4, A-6, A-2, A-7	0	95-100	95-100	85-100	25-55	16-45	2-27

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
WtC---------- Woodtell	0-5	Loam----------	CL, SC-SM, CL-ML, ML	A-4, A-6	0-2	95-100	90-100	75-100	40-75	20-33	3-13
	5-47	Sandy clay loam, clay loam, clay.	CL, CH	A-6, A-7-6	0	100	80-100	75-100	51-98	35-65	15-45
	47-65	Stratified sandy clay loam to clay.	CL, CH, SC	A-6, A-7-5, A-7-6	0	85-100	80-100	60-100	36-95	32-76	13-45
WtD---------- Woodtell	0-7	Loam----------	CL, SC-SM, CL-ML, ML	A-4, A-6	0-2	95-100	90-100	75-100	40-75	20-33	3-13
	7-57	Sandy clay loam, clay loam, clay.	CL, CH	A-6, A-7-6	0	100	80-100	75-100	51-98	35-65	15-45
	57-67	Stratified sandy clay loam to clay.	CL, CH, SC	A-6, A-7-5, A-7-6	0	85-100	80-100	60-100	36-95	32-76	13-45
WxB*: Woodtell--------	0-10	Loam----------	CL, SC-SM, CL-ML, ML	A-4, A-6	0-2	95-100	90-100	75-100	40-75	20-33	3-13
	10-52	Sandy clay loam, clay loam, clay.	CL, CH	A-6, A-7-6	0	100	80-100	75-100	51-98	35-65	15-45
	52-70	Stratified sandy clay loam to clay.	CL, CH, SC	A-6, A-7-5, A-7-6	0	85-100	80-100	60-100	36-95	32-76	13-45
WxB*: Raino----------	0-6	Fine sandy loam	ML, CL, CL-ML	A-4	0	95-100	95-100	80-100	51-80	<30	NP-10
	6-16	Loam, fine sandy loam, very fine sandy loam.	ML, CL, CL-ML	A-4	0	95-100	95-100	80-100	51-80	<30	NP-10
	16-30	Loam, sandy clay loam, clay loam.	CL, SC, SC-SM, CL-ML	A-6, A-4	0	95-100	95-100	80-100	40-72	20-40	5-20
	30-80	Clay, sandy clay, clay loam.	CH, CL	A-7	0	95-100	95-100	80-100	55-90	46-74	24-45

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Organic matter
									K	T	
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm				Pct
AtB	0-8	8-20	1.30-1.50	2.0-6.0	0.11-0.16	5.1-6.5	0-2	Low	0.28	5	0-1
Attoyac	8-80	18-32	1.40-1.65	0.6-2.0	0.13-0.18	4.5-6.0	0-2	Low	0.32		
BeB	0-10	3-15	1.30-1.50	2.0-6.0	0.11-0.16	5.1-6.5	0-2	Low	0.28	5	0-2
Bernaldo	10-42	15-30	1.40-1.65	0.6-2.0	0.13-0.18	4.5-6.5	0-2	Moderate	0.32		
	42-80	10-30	1.45-1.65	0.6-2.0	0.13-0.18	4.5-6.5	0-2	Low	0.32		
BeD	0-10	3-15	1.30-1.50	2.0-6.0	0.11-0.16	5.1-6.5	0-2	Low	0.28	5	0-2
Bernaldo	10-34	15-30	1.40-1.65	0.6-2.0	0.13-0.18	4.5-6.5	0-2	Moderate	0.32		
	34-80	10-30	1.45-1.65	0.6-2.0	0.13-0.18	4.5-6.5	0-2	Low	0.32		
Bf	0-6	2-18	1.50-1.70	0.6-2.0	0.12-0.18	3.6-5.5	0-2	Low	0.20	5	1-3
Bibb	6-80	2-18	1.45-1.75	0.6-2.0	0.10-0.20	3.6-5.5	0-2	Low	0.37		
BoC	0-9	3-15	1.40-1.69	2.0-6.0	0.10-0.15	4.5-6.5	0-2	Low	0.32	5	.5-1
Bowie	9-64	18-35	1.60-1.69	0.6-2.0	0.10-0.16	4.5-5.5	0-2	Low	0.32		
	64-80	25-40	1.65-1.80	0.2-0.6	0.10-0.16	4.5-5.5	0-2	Moderate	0.32		
ByC	0-3	5-18	1.50-1.65	6.0-20	0.05-0.09	4.5-6.5	0-2	Low	0.20	5	.5-2
Briley	3-33	5-18	1.50-1.65	6.0-20	0.05-0.09	4.5-6.5	0-2	Low	0.20		
	33-80	15-35	1.55-1.69	0.6-2.0	0.10-0.16	4.5-6.0	0-2	Low	0.24		
CfE	0-7	2-15	1.20-1.40	2.0-6.0	0.09-0.12	4.5-6.5	0-2	Low	0.37	3	.5-2
Cuthbert	7-25	35-60	1.24-1.45	0.2-0.6	0.10-0.15	3.6-5.5	0-2	Moderate	0.32		
	25-31	20-50	1.35-1.60	0.2-0.6	0.08-0.14	3.6-5.5	0-2	Moderate	0.32		
	31-60	20-45	1.40-1.65	0.06-0.6	0.08-0.14	3.6-5.0	0-2	Moderate	0.32		
CgE	0-12	2-15	1.20-1.40	2.0-6.0	0.07-0.11	4.5-6.5	0-2	Low	0.20	3	.5-2
Cuthbert	12-20	35-60	1.24-1.45	0.2-0.6	0.10-0.15	3.6-5.5	0-2	Moderate	0.32		
	20-31	20-50	1.35-1.60	0.2-0.6	0.08-0.14	3.6-5.5	0-2	Moderate	0.32		
	31-60	20-45	1.40-1.65	0.06-0.6	0.08-0.14	3.6-5.0	0-2	Moderate	0.32		
DaC	0-3	2-10	1.35-1.55	6.0-20	0.05-0.08	4.5-6.5	0-2	Low	0.17	5	.5-1
Darco	3-56	3-15	1.60-1.85	6.0-20	0.05-0.10	4.5-6.5	0-2	Low	0.17		
	56-80	12-35	1.40-1.65	0.6-2.0	0.10-0.15	4.5-6.5	0-2	Low	0.24		
DaE	0-8	2-10	1.35-1.55	6.0-20	0.05-0.08	4.5-6.5	0-2	Low	0.17	5	.5-1
Darco	8-50	3-15	1.60-1.85	6.0-20	0.05-0.10	4.5-6.5	0-2	Low	0.17		
	50-80	12-35	1.40-1.65	0.6-2.0	0.10-0.15	4.5-6.5	0-2	Low	0.24		
DrA*:											
Derly	0-9	8-20	1.40-1.60	0.6-2.0	0.11-0.16	4.5-6.5	0-2	Low	0.37	5	.5-2
	9-21	27-40	1.35-1.55	0.06-0.2	0.13-0.18	4.5-6.0	0-2	Moderate	0.37		
	21-80	20-45	1.30-1.55	0.01-0.06	0.10-0.16	5.1-7.3	0-4	High	0.32		
Raino	0-10	5-18	1.30-1.40	0.6-2.0	0.11-0.20	4.5-6.5	0-2	Low	0.43	5	0-2
	10-25	5-18	1.35-1.55	0.6-2.0	0.11-0.20	4.5-6.5	0-2	Low	0.43		
	25-35	18-30	1.45-1.65	0.6-2.0	0.15-0.20	4.5-5.5	0-2	Moderate	0.43		
	35-80	40-60	1.45-1.65	<0.06	0.12-0.18	4.5-6.5	0-2	High	0.32		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Organic matter
									K	T	
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm				Pct
DuC----------	0-9	2-8	1.35-1.50	6.0-20	0.02-0.07	4.5-6.5	0-2	Low---------	0.15	5	0-1
Duffern	9-57	2-8	1.40-1.55	6.0-20	0.02-0.09	4.5-6.5	0-2	Low---------	0.15		
	57-80	5-10	1.45-1.60	6.0-20	0.05-0.09	4.5-6.5	0-2	Low---------	0.15		
ErC----------	0-6	2-15	1.25-1.40	2.0-6.0	0.11-0.15	5.1-7.3	0-2	Low---------	0.28	5	.5-2
Elrose	6-16	15-31	1.30-1.55	0.6-2.0	0.10-0.15	4.5-7.3	0-2	Low---------	0.32		
	16-80	27-55	1.35-1.65	0.6-2.0	0.11-0.16	4.5-6.5	0-2	Moderate----	0.32		
Es----------	0-4	40-59	1.40-1.55	<0.06	0.12-0.18	3.6-6.0	0-2	High--------	0.32	5	.5-5
Estes	4-53	35-50	1.45-1.65	<0.06	0.12-0.18	3.6-5.5	0-4	Moderate----	0.32		
	53-80	40-60	1.30-1.55	<0.06	0.12-0.18	3.6-5.5	0-4	High--------	0.32		
FrB----------	0-10	5-15	1.35-1.56	2.0-6.0	0.11-0.15	5.1-7.3	0-2	Low---------	0.32	5	.5-2
Freestone	10-27	20-35	1.35-1.55	0.2-0.6	0.12-0.17	4.5-6.5	0-2	Moderate----	0.32		
	27-80	30-50	1.29-1.60	0.06-0.2	0.12-0.18	4.5-6.5	0-2	High--------	0.32		
GaB----------	0-8	10-20	1.30-1.40	2.0-6.0	0.11-0.16	5.1-6.5	0-2	Low---------	0.32	5	.5-2
Gallime	8-34	10-20	1.35-1.50	2.0-6.0	0.11-0.16	5.1-6.5	0-2	Low---------	0.32		
	34-80	18-35	1.40-1.65	0.6-2.0	0.13-0.18	4.5-6.0	0-2	Moderate----	0.32		
Gw----------	0-8	50-75	1.20-1.40	0.06-0.2	0.15-0.20	5.6-7.3	0-2	Very high	0.32	5	1-3
Gladewater	8-73	60-75	1.20-1.40	<0.06	0.15-0.18	4.5-6.5	0-2	Very high	0.32		
	73-80	24-40	1.25-1.50	0.06-0.2	0.15-0.20	4.5-7.8	0-2	Moderate----	0.32		
HaA----------	0-11	3-8	1.50-1.70	6.0-20	0.05-0.10	4.5-6.5	0-2	Low---------	0.20	5	.5-2
Hainesville	11-80	2-10	1.50-1.70	6.0-20	0.04-0.10	4.5-6.5	0-2	Low---------	0.20		
Iu----------	0-7	6-15	1.20-1.40	0.6-2.0	0.11-0.18	4.5-6.0	0-2	Low---------	0.37	5	.5-2
Iulus	7-56	6-20	1.26-1.45	0.6-2.0	0.11-0.18	4.5-6.0	0-2	Low---------	0.32		
	56-80	10-28	1.30-1.50	0.6-2.0	0.11-0.18	4.5-6.0	0-2	Low---------	0.32		
KfC----------	0-11	2-15	1.20-1.40	2.0-6.0	0.09-0.12	5.1-7.3	0-2	Low---------	0.37	4	.5-2
Kirvin	11-43	35-60	1.24-1.45	0.2-0.6	0.11-0.15	3.6-5.5	0-2	Moderate----	0.32		
	43-50	25-50	1.35-1.60	0.2-0.6	0.11-0.15	3.6-5.0	0-2	Moderate----	0.32		
	50-70	20-45	1.40-1.65	0.2-0.6	0.08-0.14	3.6-5.0	0-2	Moderate----	0.32		
KgC----------	0-7	2-15	1.20-1.40	2.0-6.0	0.07-0.11	5.1-7.3	0-2	Low---------	0.20	4	.5-2
Kirvin	7-41	35-60	1.24-1.45	0.2-0.6	0.11-0.15	3.6-5.5	0-2	Moderate----	0.32		
	41-48	25-50	1.35-1.60	0.2-0.6	0.11-0.15	3.6-5.0	0-2	Moderate----	0.32		
	48-80	20-45	1.40-1.65	0.2-0.6	0.08-0.14	3.6-5.0	0-2	Moderate----	0.32		
KsC*----------	0-2	2-15	1.20-1.40	2.0-6.0	0.07-0.11	4.5-7.3	0-2	Low---------	0.20	4	.5-1
Kirvin	2-42	35-60	1.30-1.45	0.2-0.6	0.11-0.15	3.6-5.5	0-2	Moderate----	0.32		
	42-65	20-45	1.40-1.60	0.06-0.2	0.08-0.14	3.6-5.0	0-2	Moderate----	0.32		
KuB----------	0-13	10-18	1.30-1.60	0.6-2.0	0.13-0.20	5.1-6.5	0-2	Low---------	0.37	5	.5-1
Kullit	13-40	10-18	1.30-1.60	2.0-6.0	0.11-0.15	5.1-6.5	0-2	Low---------	0.37		
	40-80	18-35	1.35-1.60	0.6-2.0	0.11-0.15	4.5-5.5	0-2	Low---------	0.32		
	54-72	35-50	1.35-1.65	0.2-0.6	0.11-0.15	4.5-5.0	0-2	Moderate----	0.28		
LaA*:											
Latch----------	0-7	3-12	1.50-1.65	6.0-20	0.05-0.11	4.5-6.5	0-2	Low---------	0.17	5	1-2
	7-44	3-12	1.50-1.65	6.0-20	0.05-0.11	4.5-6.5	0-2	Low---------	0.17		
	44-65	18-35	1.55-1.70	0.6-2.0	0.12-0.17	4.5-6.0	0-2	Low---------	0.24		
	65-80	2-10	1.50-1.70	6.0-20	0.05-0.11	5.1-6.5	0-2	Low---------	0.17		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Organic matter
									K	T	
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm				Pct
Mollville	0-9	16-20	1.40-1.65	0.2-0.6	0.15-0.20	4.5-6.0	0-2	Low	0.37	5	.5-1
	9-43	20-35	1.50-1.69	0.06-0.2	0.12-0.17	4.5-6.0	0-4	Moderate	0.32		
	43-75	15-35	1.50-1.69	0.06-0.2	0.15-0.20	5.1-7.8	0-4	Moderate	0.32		
	75-80	3-12	1.50-1.65	2.0-6.0	0.07-0.11	5.1-7.8	0-4	Low	0.20		
LgB	0-8	2-12	1.20-1.50	6.0-20	0.07-0.11	4.5-6.0	0-2	Low	0.20	5	.5-2
Leagueville	8-27	2-10	1.20-1.50	6.0-20	0.07-0.11	4.5-6.5	0-2	Low	0.20		
	27-49	10-25	1.30-1.60	0.6-2.0	0.12-0.17	3.5-5.5	0-2	Low	0.32		
	49-80	5-25	1.30-1.60	2.0-6.0	0.07-0.15	3.5-5.5	0-2	Low	0.28		
LtC	0-9	3-15	1.50-1.60	6.0-20	0.05-0.10	4.5-6.0	0-2	Low	0.20	5	.5-2
Lilbert	9-32	3-15	1.50-1.65	6.0-20	0.05-0.10	4.5-6.0	0-2	Low	0.20		
	32-80	16-35	1.55-1.69	0.6-2.0	0.10-0.15	3.6-5.5	0-2	Low	0.24		
Ma	0-4	9-20	1.25-1.45	0.6-2.0	0.15-0.20	3.5-5.0	0-2	Low	0.37	5	1-4
Manco	4-80	18-30	1.25-1.45	0.6-2.0	0.11-0.24	3.5-5.0	0-2	Low	0.37		
MoA	0-11	6-20	1.40-1.65	0.2-0.6	0.15-0.20	4.5-6.0	0-2	Low	0.37	5	.5-1
Mollville	11-36	20-35	1.50-1.69	0.06-0.2	0.12-0.17	4.5-6.0	0-4	Moderate	0.32		
	36-80	15-35	1.50-1.69	0.06-0.2	0.15-0.20	5.1-7.8	0-4	Moderate	0.32		
OkB	0-19	5-15	1.30-1.50	2.0-6.0	0.10-0.15	5.6-7.3	0-2	Low	0.32	5	0-1
Oakwood	19-34	18-30	1.38-1.65	0.6-2.0	0.12-0.16	4.5-6.5	0-2	Low	0.32		
	34-80	18-30	1.38-1.70	0.2-0.6	0.12-0.16	3.5-6.5	0-2	Low	0.28		
Ow*	---	---	---	---	---	---	---		----	---	---
Oil-waste land											
PkC	0-6	4-12	1.30-1.60	6.0-20	0.07-0.11	5.6-7.3	0-2	Low	0.17	5	.5-2
Pickton	6-56	3-12	1.30-1.60	6.0-20	0.07-0.11	5.1-7.3	0-2	Low	0.17		
	56-80	18-30	1.30-1.65	0.6-2.0	0.12-0.17	4.5-6.5	0-2	Low	0.24		
PkE	0-12	4-12	1.30-1.60	6.0-20	0.07-0.11	5.6-7.3	0-2	Low	0.17	5	.5-2
Pickton	12-47	3-12	1.30-1.60	6.0-20	0.07-0.11	5.1-7.3	0-2	Low	0.17		
	47-80	18-30	1.30-1.65	0.6-2.0	0.12-0.17	4.5-6.5	0-2	Low	0.24		
RdC	0-7	2-15	1.35-1.55	0.6-2.0	0.07-0.11	5.6-7.3	0-2	Low	0.20	4	0-2
Redsprings	7-41	35-60	1.30-1.45	0.2-0.6	0.11-0.15	4.5-6.5	0-2	Moderate	0.32		
	41-60	20-55	1.40-1.60	0.06-0.2	0.08-0.14	4.5-6.0	0-2	Moderate	0.32		
RdE	0-7	2-15	1.35-1.55	0.6-2.0	0.07-0.11	5.6-7.3	0-2	Low	0.20	4	0-2
Redsprings	7-42	35-60	1.30-1.45	0.2-0.6	0.11-0.15	4.5-6.5	0-2	Moderate	0.32		
	42-65	20-55	1.40-1.60	0.06-0.2	0.08-0.14	4.5-6.0	0-2	Moderate	0.32		
RsD*	0-2	5-20	1.35-1.55	0.6-2.0	0.11-0.15	5.6-7.3	0-2	Low	0.24	4	.3-1
Redsprings	2-43	35-60	1.30-1.45	0.2-0.6	0.11-0.15	4.5-6.5	0-2	Moderate	0.32		
	43-62	20-55	1.40-1.60	0.06-0.2	0.08-0.14	4.5-6.0	0-2	Moderate	0.32		
SaB	0-9	10-25	1.30-1.50	0.6-2.0	0.13-0.17	4.5-6.0	0-2	Low	0.32	5	1-3
Sacul	9-41	35-60	1.25-1.40	0.06-0.2	0.15-0.18	3.6-5.5	0-2	High	0.32		
	41-80	15-40	1.30-1.45	0.2-0.6	0.14-0.18	3.6-5.5	0-2	Low	0.28		
TeE	0-3	3-15	1.50-1.65	6.0-20	0.05-0.10	4.5-6.0	0-2	Low	0.17	3	.5-1
Tenaha	3-32	3-15	1.50-1.65	6.0-20	0.05-0.10	4.5-6.0	0-2	Low	0.24		
	32-42	20-35	1.50-1.65	0.6-2.0	0.10-0.15	3.5-5.5	0-2	Low	0.32		
	42-60	20-40	1.60-1.75	0.2-0.6	0.08-0.14	3.5-5.5	0-2	Low	0.32		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm		K	T	Pct
WoC	0-4	3-12	1.30-1.60	6.0-20	0.06-0.09	4.5-6.5	0-2	Low	0.17	5	.5-2
Wolfpen	4-28	3-12	1.30-1.65	6.0-20	0.05-0.09	4.5-6.5	0-2	Low	0.17		
	28-43	18-30	1.30-1.65	0.6-2.0	0.10-0.16	4.5-6.5	0-2	Low	0.24		
	43-80	15-35	1.30-1.65	0.6-2.0	0.10-0.16	4.5-6.5	0-2	Low	0.24		
WoD	0-7	3-12	1.30-1.60	6.0-20	0.06-0.09	4.5-6.5	0-2	Low	0.17	5	.5-2
Wolfpen	7-29	3-12	1.30-1.65	6.0-20	0.05-0.09	4.5-6.5	0-2	Low	0.17		
	29-44	18-30	1.30-1.65	0.6-2.0	0.10-0.16	4.5-6.5	0-2	Low	0.24		
	44-80	15-35	1.30-1.65	0.6-2.0	0.10-0.16	4.5-6.5	0-2	Low	0.24		
WtC	0-5	5-20	1.30-1.55	0.6-2.0	0.11-0.15	4.5-6.5	0-2	Low	0.43	4	1-2
Woodtell	5-47	30-50	1.25-1.50	0.06-0.2	0.12-0.17	4.5-6.0	0-2	High	0.32		
	47-65	15-50	1.25-1.50	0.06-0.2	0.08-0.14	4.5-7.3	0-2	High	0.32		
WtD	0-7	5-20	1.30-1.55	0.6-2.0	0.11-0.15	4.5-6.5	0-2	Low	0.43	4	1-2
Woodtell	7-57	30-50	1.25-1.50	0.06-0.2	0.12-0.17	4.5-6.0	0-2	High	0.32		
	57-67	15-50	1.25-1.50	0.06-0.2	0.08-0.14	4.5-7.3	0-2	High	0.32		
WxB*:											
Woodtell	0-10	5-20	1.30-1.55	0.6-2.0	0.11-0.15	4.5-6.5	0-2	Low	0.43	4	1-2
	10-52	30-50	1.25-1.50	0.06-0.2	0.12-0.17	4.5-6.0	0-2	High	0.32		
	52-70	15-50	1.25-1.50	0.06-0.2	0.08-0.14	4.5-7.3	0-2	High	0.32		
Raino	0-6	5-18	1.30-1.40	0.6-2.0	0.11-0.20	4.5-6.5	0-2	Low	0.43	5	0-2
	6-16	5-18	1.35-1.55	0.6-2.0	0.11-0.20	4.5-6.5	0-2	Low	0.43		
	16-30	18-30	1.45-1.65	0.6-2.0	0.15-0.20	4.5-5.5	0-2	Moderate	0.43		
	30-80	40-60	1.45-1.65	<0.06	0.12-0.18	4.5-6.5	0-2	High	0.32		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
AtB---Attoyac	B	None	---	---	>6.0	---	---	Moderate	Moderate.
BeB, BeD---Bernaldo	B	None	---	---	4.0-6.0	Perched	Nov-May	Moderate	Moderate.
Bf---Bibb	D	Frequent	Brief to long.	Dec-May	0.5-1.0	Apparent	Dec-Apr	High	Moderate.
BoC---Bowie	B	None	---	---	3.5-5.0	Perched	Jan-Apr	Moderate	High.
ByC---Briley	B	None	---	---	>6.0	---	---	Moderate	High.
CfE, CgE---Cuthbert	C	None	---	---	>6.0	---	---	High	High.
DaC, DaE---Darco	A	None	---	---	>6.0	---	---	Low	Moderate.
DrA*:									
Derly	D	None	---	---	+.5-1.0	Perched	Nov-May	High	High.
Raino	D	None	---	---	2.0-3.5	Perched	Dec-May	High	Moderate.
DuC---Duffern	A	None	---	---	>6.0	---	---	Low	Moderate.
ErC---Elrose	B	None	---	---	>6.0	---	---	Moderate	Moderate.
Es---Estes	D	Frequent	Long	Nov-May	0-1.5	Perched	Nov-May	High	High.
FrB---Freestone	C	None	---	---	2.0-3.5	Perched	Dec-May	High	Moderate.
GaB---Gallime	B	None	---	---	4.0-6.0	Perched	Dec-Mar	Moderate	Moderate.
Gw---Gladewater	D	Frequent	Long to very long.	Nov-May	1.5-3.5	Perched	Nov-May	High	Moderate.
HaA---Hainesville	A	None	---	---	>6.0	---	---	Low	Moderate.
Iu---Iulus	B	Frequent	Very brief	Dec-Apr	1.5-4.0	Perched	Dec-Apr	Moderate	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
KfC, KgC---------- Kirvin	C	None---------	---	---	>6.0	---	---	High-----	High.
KsC*-------------- Kirvin	D	None---------	---	---	>6.0	---	---	High-----	High.
KuB--------------- Kullit	B	None---------	---	---	2.0-3.0	Apparent	Dec-May	High-----	High.
LaA*:									
Latch------------	A	None---------	---	---	2.5-4.0	Perched	Jan-Apr	Moderate	High.
Mollville---------	D	None---------	---	---	+.5-1.0	Perched	Nov-Jun	High-----	High.
LgB--------------- Leagueville	B/D	None---------	---	---	0.5-1.5	Apparent	Nov-May	High-----	High.
LtC--------------- Lilbert	B	None---------	---	---	>6.0	---	---	Moderate	High.
Ma---------------- Manco	C	Frequent-----	Long------	Nov-May	1.0-1.5	Apparent	Dec-May	High-----	High.
MoA--------------- Mollville	D	None---------	---	---	+.5-1.0	Perched	Nov-Jun	High-----	High.
OkB--------------- Oakwood	B	None---------	---	---	3.5-5.0	Perched	Jan-Apr	High-----	Moderate.
Ow*--------------- Oil-waste land	D	---	---	---	---	---	---	---	---
PkC, PkE---------- Pickton	A	None---------	---	---	4.0-6.0	Perched	Jan-Apr	Moderate	High.
RdC, RdE---------- Redsprings	B	None---------	---	---	>6.0	---	---	High-----	High.
RsD*-------------- Redsprings	D	None---------	---	---	>6.0	---	---	High-----	High.
SaB--------------- Sacul	C	None---------	---	---	2.0-4.0	Perched	Dec-Apr	High-----	High.
TeE--------------- Tenaha	B	None---------	---	---	>6.0	---	---	Moderate	Moderate.
WoC, WoD---------- Wolfpen	A	None---------	---	---	4.0-6.0	Perched	Dec-May	Moderate	High.
WtC, WtD---------- Woodtell	D	None---------	---	---	>6.0	---	---	High-----	High.
WxB*:									
Woodtell---------	D	None---------	---	---	>6.0	---	---	High-----	High.
Raino------------	D	None---------	---	---	2.0-3.5	Perched	Dec-May	High-----	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--PHYSICAL ANALYSES OF SELECTED SOILS

(Dash indicates the determination was not made.)

Soil Name and sample number	Depth	Horizon	Particle-size distribution: Sand: Very Coarse (2-1 mm)	Sand: Coarse (1-0.5 mm)	Sand: Medium (0.5-0.25 mm)	Sand: Fine (0.25-0.10 mm)	Sand: Very fine (0.1-0.05 mm)	Sand: Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Bulk density 1/3-bar	Water content 1/3-bar
	In		Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct	g/cc	Pct(wt)
Derly:[1,2]	0-6	Ap	0.2	0.2	0.6	15.2	15.8	32.0	47.3	20.7	1.43	28.1
(S89TX-499-002)	6-14	E	0.3	0.2	0.6	15.6	16.5	33.2	47.2	19.6	1.34	29.6
	14-27	Btg/E1	0.2	0.3	0.5	13.3	13.2	27.5	39.5	33.0	1.37	29.2
	27-41	Btg/E2	0.2	0.2	0.4	14.1	14.0	28.9	42.2	28.9	1.43	28.7
	41-56	Btg/E3	0.2	0.3	0.7	16.7	15.3	33.2	38.6	28.2	1.49	24.5
	56-73	Btg1	0.1	0.1	0.4	17.5	16.9	35.0	31.9	33.1	1.44	30.6
	73-80	Btg2	0.1	0.1	0.4	16.5	16.3	33.4	31.5	35.1	1.42	32.6
Duffern:[2,3]	0-9	A	0.1	20.5	48.2	15.6	4.3	88.7	7.8	3.5	---	---
(S89TX-499-001)	9-20	E1	0.1	25.1	51.3	14.5	2.8	93.8	3.2	3.0	---	---
	20-31	E2	0.2	23.5	52.4	14.2	3.4	93.7	3.6	2.7	---	---
	31-43	E3	0.1	20.7	53.7	15.7	3.5	93.7	3.6	2.7	---	---
	43-57	E4	0.1	21.5	53.4	15.6	3.6	94.2	3.0	2.8	---	---
	57-69	E&B1	0.2	22.6	55.1	13.9	2.5	94.3	3.5	2.2	---	---
	69-80	E&B2	0.2	22.5	51.6	15.1	2.8	92.2	4.6	3.2	---	---
Elrose:[4,5]	0-8	Ap	0.9	1.4	4.8	38.4	24.0	69.5	23.8	6.7	1.51	13.4
(S88TX-499-001)	8-14	Bt1	0.7	1.0	2.7	25.7	21.0	51.1	27.1	21.8	1.80	15.5
	14-21	Bt2	2.5	2.0	2.8	26.9	19.1	53.3	24.4	22.3	1.72	16.1
	21-26	Btc1	13.1	5.1	3.2	23.3	16.9	61.6	20.0	18.4	1.52	25.8
	26-39	Btc2	9.4	5.1	3.7	24.4	15.5	58.1	14.6	27.3	1.47	18.4
	39-50	B't1	1.7	1.5	3.2	26.4	18.7	51.5	15.5	33.0	1.43	18.8
	50-66	B't2	1.6	1.8	3.6	31.3	18.4	56.7	15.8	27.5	1.69	19.3
	66-84	B't3	1.8	1.1	3.1	32.6	18.7	57.3	14.8	27.9	1.66	20.0

See footnotes at end of table.

TABLE 17.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil Name and sample number	Depth	Horizon	Particle-size distribution								Bulk density 1/3-bar	Water content 1/3-bar
			Sand						Silt (0.05-0.002 mm)	Clay (<0.002 mm)		
			Very Coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.10 mm)	Very fine (0.1-0.05 mm)	Total (2-0.05 mm)				
	In		Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct	g/cc	Pct(wt)
Gladewater:[3,5]	0-8	A	0.1	0.6	0.9	2.8	3.6	8.0	18.0	74.0	1.12	38.2
(S91TX-499-001)	8-17	Bg	0.1	0.9	1.5	5.0	6.4	13.9	23.8	62.3	1.23	33.9
	17-37	Bgss1	0.1	0.7	1.1	4.6	6.0	12.5	20.0	67.5	1.24	32.8
	37-48	Bgss2	0.1	0.5	0.6	5.3	5.6	12.1	22.2	65.7	1.23	35.6
	48-60	Bgss3	TR	0.3	0.4	7.2	8.3	16.2	23.0	60.8	1.23	37.6
	60-73	Bgss4	TR	0.1	0.4	12.1	13.6	26.2	21.8	52.0	1.37	26.1
	73-83	BCg	---	0.1	0.4	26.7	22.1	49.3	19.9	30.8	1.54	24.3
Kirvin:[5,6]	0-4	A	6.1	2.8	1.5	39.5	27.9	77.8	17.0	5.2	1.54	9.5
(S88TX-499-002)	4-7	E	4.4	1.9	1.1	38.8	28.4	74.6	16.9	8.5	1.68	9.6
	7-17	Bt1	0.8	0.6	0.5	20.5	13.2	35.6	11.1	53.3	1.43	23.8
	17-30	Bt2	0.9	0.5	0.6	27.2	17.6	46.8	10.1	43.1	1.52	22.5
	30-41	Bt3	1.7	1.0	0.9	25.9	21.0	50.5	9.7	39.8	1.65	21.7
	41-48	BCt	0.2	0.2	0.2	45.2	20.3	66.1	6.9	27.0	1.60	15.3
	48-80	C	0.9	0.6	0.5	36.7	19.4	58.1	8.9	33.0	1.59	18.1
Manco:[2,7]	0-3	A	0.0	0.1	0.5	5.2	23.7	29.5	53.6	16.9	1.28	23.1
(S89TX-499-005)	3-11	Bw	0.1	0.1	0.5	9.0	39.1	48.8	41.8	9.4	1.34	20.6
	11-19	Bg1	0.3	0.1	0.2	8.2	36.3	45.1	45.2	9.7	1.20	26.0
	19-27	Bg2	0.1	0.1	0.2	4.9	17.4	22.7	57.9	19.4	1.25	21.6
	27-42	Bg3	0.1	0.1	0.2	4.8	11.3	16.5	49.5	34.0	1.23	24.5
	42-63	Bg4	0.1	0.1	0.4	8.0	18.0	26.6	45.5	27.9	1.23	24.2
	63-80	Bg5	0.1	0.2	0.4	4.6	16.2	21.5	43.2	35.3	1.29	23.6
Oakwood:[2,3]	0-6	Ap	0.2	0.2	1.0	21.7	36.7	59.8	36.4	3.8	1.31	25.4
(S89TX-499-004)	6-12	A	0.2	0.1	0.7	19.6	36.3	56.9	37.8	5.3	1.33	26.4
	12-19	E	0.1	0.1	0.8	19.5	36.0	56.5	36.1	7.4	1.30	18.1
	19-34	Bt	0.3	0.2	0.8	15.1	28.9	45.3	28.3	26.4	1.41	23.1
	34-48	Btv	0.1	0.1	0.5	13.5	32.0	46.2	27.5	26.3	1.38	19.6
	48-61	Btvx/E[8]	0.0	0.1	0.4	15.3	41.2	57.0	29.1	13.9	1.44	24.3
	48-61	Btvx/E[8]	0.0	0.1	0.4	14.9	38.3	53.7	27.2	19.1	---	---
	61-80	B’t1	0.1	0.1	0.4	13.5	35.6	49.7	24.3	26.0	1.48	20.4

See footnotes at end of table.

TABLE 17.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil Name and sample number	Depth	Horizon	Particle-size distribution: Sand: Very Coarse (2-1 mm)	Sand: Coarse (1-0.5 mm)	Sand: Medium (0.5-0.25 mm)	Sand: Fine (0.25-0.10 mm)	Sand: Very fine (0.1-0.05 mm)	Sand: Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Bulk density 1/3-bar	Water content 1/3-bar
	In		Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct	g/cc	Pct(wt)
Raino:[2,3]	0-10	Ap	0.5	0.6	0.8	21.3	34.3	47.5	43.5	9.0	1.29	36.3
(S89TX-499-003)	10-25	BE	0.3	0.2	0.7	19.6	23.9	44.7	42.7	12.6	1.41	26.2
	25-35	Bt/E	0.4	0.5	0.7	18.0	20.6	40.2	41.7	18.1	1.41	26.4
	35-45	Btssg1	0.2	0.2	0.4	11.4	11.8	24.0	26.6	49.4	1.33	34.9
	45-58	Btssg2	0.2	0.2	0.3	10.2	12.4	23.3	31.8	44.9	1.37	29.7
	58-72	Btg	0.1	0.0	0.3	11.7	12.6	24.7	32.5	42.8	1.43	24.7
	72-80	BCg	0.1	0.0	0.3	15.9	15.4	31.7	29.8	38.5	1.40	31.3

[1] Location of the sampled pedon of Derly soil: from the intersection of State Highway 182 and Farm Road 17 in Alba; 5.8 miles north on Farm Road 17, 200 feet west in pasture. This pedon is a taxadjunct to the Derly series because it is in a fine-loamy family.

[2] Analysis by the Soil Characterization Laboratory, Texas Agricultural Experiment Station, College Station, Texas.

[3] Location of the sampled pedon is the same as that of the typical pedon described in the section "Soil Series and Their Morphology".

[4] Location of the sampled pedon of Elrose soil: from the intersection of U.S. Highway 69 and U.S. Highway 80, 2.9 miles north on Farm Road 3056, 0.5 mile west on private road and 100 feet north in woodland. This pedon is outside the range in characteristics of the Elrose series because of excess gravel in parts of the B horizon.

[5] Analysis by the National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska.

[6] Location of the sampled pedon of Kirvin soil: from the intersection of U.S. Highway 69 and U.S. Highway 80 in Mineola, 9.3 miles east on U.S. Highway 80, 2.9 miles north on Farm Road 3056, and 0.5 miles west in woodland.

[7] Location of the sampled pedon of Manco soil: from the intersection of State Highway 37 and Farm Road 2088 in Quitman; 9.8 miles east on Farm Road 2088, 800 feet east in flood plain. This pedon is outside the range in characteristics of the Manco series because the reaction is slightly more acid.

[8] This horizon was divided for sampling purposes and the Bt and E materials were mixed.

TABLE 18.--CHEMICAL ANALYSES OF SELECTED SOILS

(Dash indicates the determination was not made. TR means trace.)

Soil Name and sample number	Depth	Horizon	Extractable bases: Ca	Mg	K	Na	CEC (Sum of cations): NaOAC	NH4OAC	Base saturation (sum)	Reaction 1:1 soil:water	Organic carbon	KCl Extractable aluminum	Exchangeable sodium
			Meq/100g						Pct	pH	Pct	Meq/100g	Pct
Derly: [1,2]	0-6	Ap	4.8	1.7	0.2	0.2	9.9	---	69	4.7	1.46	0.0	2
(S89TX-499-002)	6-14	E	3.6	1.9	0.1	0.3	7.8	---	77	4.7	0.42	1.2	4
	14-27	Btg/E1	6.2	3.7	0.3	0.7	15.1	---	72	4.5	0.33	2.5	5
	27-41	Btg/E2	7.2	4.1	0.3	1.1	13.6	---	94	4.7	0.30	1.2	8
	41-56	Btg/E3	7.8	3.9	0.2	1.6	14.1	---	96	5.8	0.26	0.0	11
	56-73	Btg1	9.9	6.2	0.3	2.5	17.2	---	100	5.4	0.19	0.0	11
	73-80	Btg2	10.9	6.4	0.4	2.6	19.1	---	100	5.5	0.16	0.0	10
Duffern: [2,3]	0-9	A	1.8	0.2	0.0	0.0	3.5	---	57	5.3	0.87	0.0	0
(S89TX-499-001)	9-20	E1	0.3	0.1	0.0	0.0	0.9	---	44	5.0	0.19	0.0	0
	20-31	E2	0.2	0.0	0.0	0.0	0.7	---	29	4.4	0.10	0.0	0
	31-43	E3	0.2	0.0	0.0	0.0	0.7	---	29	4.4	0.07	0.0	0
	43-57	E4	0.2	0.0	0.0	0.0	0.7	---	29	4.1	0.14	0.0	0
	57-69	E&B1	0.2	0.1	0.0	0.0	0.6	---	50	4.5	0.16	0.0	0
	69-80	E&B2	0.3	0.1	0.0	0.0	0.9	---	44	4.5	0.07	0.0	0
Elrose: [4,5]	0-8	Ap	2.6	0.5	0.2	TR	---	4.5	47	5.0	1.43	---	1
(S88TX-499-001)	8-14	Bt1	4.6	1.1	0.2	0.0	---	7.2	61	5.7	0.49	---	TR
	14-21	Bt2	3.9	1.2	0.2	TR	---	6.9	60	5.6	0.28	---	TR
	21-26	Btc1	3.5	1.3	0.2	TR	---	7.0	57	5.7	0.26	---	TR
	26-39	Btc2	4.4	1.9	0.3	TR	---	9.2	58	5.7	0.23	---	1
	39-50	B't1	5.5	2.2	0.4	TR	---	9.2	65	5.6	0.21	---	1
	50-66	B't2	4.1	1.7	0.4	TR	---	7.8	61	5.7	0.19	---	TR
	66-84	B't3	4.2	1.9	0.4	TR	---	7.9	61	5.9	0.21	---	TR

See footnotes at end of table.

TABLE 18.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil Name and sample number	Depth	Horizon	Extractable bases: Ca	Mg	K	Na	CEC (Sum of cations): NaOAC	NH4OAC	Base saturation (sum)	Reaction 1:1 soil:water	Organic carbon	KCl Extractable aluminum	Exchangeable sodium
			Meq/100g						Pct	pH	Pct	Meq/100g	Pct
Gladewater: [3,5]	0-8	A	44.1	8.7	0.6	0.6	---	56.7	75	6.7	1.44	---	---
(S91TX-499-001)	8-17	Bg	27.4	7.0	0.4	1.0	---	42.5	70	5.4	0.48	0.6	---
	17-37	Bgss1	29.1	8.3	0.4	2.1	---	44.6	72	4.7	0.34	1.8	---
	37-48	Bgss2	24.9	10.6	0.4	4.9	---	42.7	76	4.6	0.29	23.6	---
	48-60	Bgss3	24.8	11.7	0.4	6.0	---	41.1	77	4.5	0.27	0.8	---
	60-73	Bgss4	24.2	11.4	0.4	6.1	---	35.4	83	4.5	0.21	0.7	---
	73-83	BCg	35.0	6.3	0.3	2.6	---	21.2	89	4.6	0.10	0.4	---
Kirvin: [5,6]	0-4	A	0.9	0.4	0.1		---	4.6	19	5.1	1.06	0.7	TR
(S88TX-499-002)	4-7	E	0.8	0.6	0.1	TR	---	3.3	26	5.2	0.52	0.2	1
	7-17	Bt1	2.9	4.8	0.5	TR	---	14.9	37	5.0	0.73	2.9	TR
	17-30	Bt2	0.7	2.5	0.4	TR	---	13.9	19	4.8	0.42	7.1	TR
	30-41	Bt3	0.2	1.6	0.3	TR	---	13.7	11	4.8	0.26	8.7	TR
	41-48	BCt	0.1	0.7	0.2	TR	---	9.8	7	4.6	0.14	7.0	TR
	48-80	C	0.1	0.6	0.2	TR	---	13.5	5	4.5	0.12	11.2	TR
Manco: [2,7]	0-3	A	3.2	1.5	0.2	0.4	9.7	---	55	4.3	3.27	1.2	4
(S89TX-499-005)	3-11	Bw	1.7	0.7	0.1	0.2	4.4	---	61	4.4	0.73	1.2	5
	11-19	Bg1	2.4	0.8	0.0	0.2	5.2	---	65	4.7	0.87	0.0	4
	19-27	Bg2	2.4	1.1	0.1	0.3	8.0	---	49	4.5	0.89	2.4	4
	27-42	Bg3	4.2	1.3	0.2	0.3	11.9	---	50	4.2	0.75	4.7	3
	42-63	Bg4	1.6	0.9	0.2	0.3	9.7	---	31	3.9	0.52	4.7	3
	63-80	Bg5	1.9	1.1	0.2	0.3	13.9	---	26	3.8	0.57	6.0	2
Oakwood: [2,3]	0-6	Ap	1.9	0.4	0.3	0.1	4.2	---	64	5.3	1.29	0.0	2
(S89TX-499-004)	6-12	A	2.2	0.4	0.1	0.1	3.7	---	76	5.9	0.63	0.0	3
	12-19	E	2.2	0.2	0.0	0.0	3.5	---	69	6.0	0.31	0.0	0
	19-34	Bt	4.6	2.0	0.1	0.2	9.1	---	77	4.9	0.42	0.0	2
	34-48	Btv	1.2	1.3	0.1	0.1	7.2	---	38	4.3	0.23	2.5	1
	48-61	Btvx/E [8]	0.5	0.6	0.0	0.1	3.8	---	32	4.1	0.23	1.3	3
	48-61	Btvx/E [8]	0.7	0.6	0.1	0.2	5.2	---	31	4.5	0.14	2.5	4
	61-80	B't	1.5	1.5	0.1	0.3	7.8	---	44	4.2	0.16	3.6	4

See footnotes at end of table.

TABLE 18.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil Name and sample number	Depth	Horizon	Extractable bases: Ca	Mg	K	Na	CEC (Sum of cations): NaOAC	NH4OAC	Base saturation (sum)	Reaction 1:1 soil:water	Organic carbon	KCl Extractable aluminum	Exchangeable sodium
			Meq/100g						Pct	pH	Pct	Meq/100g	Pct
Raino: [2,3] (S89TX-499-003)	0-10	Ap	1.2	0.2	0.0	0.1	5.0	---	30	4.4	1.01	1.2	2
	10-25	BE	0.7	0.4	0.1	0.1	4.9	---	27	4.3	0.38	2.5	2
	25-35	Bt/E	0.6	1.1	0.1	0.3	7.6	---	28	4.5	0.24	3.8	4
	35-45	Btssg1	5.5	5.0	0.4	2.5	24.6	---	54	4.6	0.37	7.7	10
	45-58	Btssg2	4.7	5.4	0.4	2.2	20.9	---	60	4.6	0.47	5.1	10
	58-72	Btg	6.7	6.4	0.3	2.7	21.3	---	75	4.8	0.30	2.5	13
	72-80	BCg	7.1	6.2	0.4	2.8	19.3	---	85	5.0	0.26	1.3	14

[1] Location of the sampled pedon of Derly soil: from the intersection of State Highway 182 and Farm Road 17 in Alba; 5.8 miles north on Farm Road 17, 200 feet west in pasture. This pedon is a taxadjunct to the Derly series because it is in a fine-loamy family.

[2] Analysis by the Soil Characterization Laboratory, Texas Agricultural Experiment Station, College station, Texas.

[3] Location of the sampled pedon is the same as that of the typical pedon described in the section "Soil Series and Their Morphology."

[4] Location of the sampled pedon of Elrose soil: from the intersection of U.S. Highway 69 and U.S. Highway 80 in Mineola; 9.3 miles east on U.S. Highway 80, 2.9 miles north on Farm Road 3056, 0.5 mile west on private road and 100 feet north in woodland. This pedon is outside the range in characteristics of the Elrose series because of excess gravel in parts of the B horizon.

[5] Analysis by the National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska.

[6] Location of the sampled pedon of Kirvin soil: from the intersection of U.S. Highway 69 and U.S. Highway 80 in Mineola, 9.3 miles east on U.S. Highway 80, 2.9 miles north on Farm Road 3056, and 0.5 mile west in woodland.

[7] Location of the sampled pedon of Manco soil: from the intersection of State Highway 37 and Farm Road 2088 in Quitman; 9.8 miles east on Farm Road 2088, 800 feet east in floodplain. The pedon is outside the range in characteristics of the Manco series because the reaction is slightly more acid.

[8] This horizon was divided for sampling purposes and the Bt and E materials were mixed.

TABLE 19.--CLAY MINERALOGY OF SELECTED SOILS

(Low indicates that 0 to 10 percent of the mineral was detected; medium, 10 to 50 percent; and high, more than 50 percent. Dashes indicate that none of the mineral was detected)

Soil name and sample number	Depth	Horizon	Clay Minerals						
			Smectite	Vermiculite	Kaolinite	Goethite	Quartz	Mica	Hematite
	In								
Derly:[1,2]	14-27	Btg/E1	High	---	Medium	---	---	Low	---
(S89TX-499-002)	27-41	Btg/E2	High	---	Medium	---	---	Low	---
Elrose:[4,5]	0-8	Ap	---	---	Medium	Low	Low	Low	Low
(S88TX-499-001)	21-26	B’t2	---	---	Medium	---	---	Low	Low
	66-84	B't3	---	---	Medium	Low	---	Low	Low
Gladewater:[3,5]	0-8	A	Medium	---	Medium	---	Low	Low	---
(S91TX-499-001)	17-37	Bgss1	High	---	Medium	---	Low	Low	---
Kirvin:[5,6]	0-4	A	---	Low	Medium	Low	---	Low	Low
(S88TX-499-002)	7-17	Bt1	---	---	Low	Low	---	Low	Low
	48-80	C	Medium	---	Medium	Low	---	Low	Low
Raino:[2,3]	10-25	BE	Medium	---	Medium	---	Medium	Low	---
(S89TX-499-003)	35-45	Btssg1	Medium	---	Medium	---	Low	Low	---
	45-58	Btssg2	Medium	---	Medium	---	Low	Low	---

[1] Location of the sampled pedon of Derly soil: from the intersection of State Highway 182 and Farm Road 17 in Alba; 5.8 miles north on Farm Road 17, 200 feet west in pasture. This pedon is a taxadjunct to the Derly series because it is in a fine-loamy family.

[2] Analysis by the Soil Characterization Laboratory, Texas Agricultural Experiment Station, College Station, Texas.

[3] Location of the sampled pedon is the same as that of the typical pedon described in the section "Soil Series and Their Morphology".

[4] Location of the sampled pedon of Elrose soil: from the intersection of U.S. Highway 69 and U.S. Highway 80 in Mineola; 9.3 miles east on U.S. Highway 80, 2.9 miles north on Farm Road 3056, 0.5 miles west on private road and 100 feet north in woodland. This pedon is outside the range in characteristics of the Elrose series because of excess gravel in parts of the B horizon.

[5] Analysis by the National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska.

[6] Location of the sampled pedon of Kirvin soil: from the intersection of U.S. Highway 69 and U.S. Highway 80 in Mineola; 9.3 miles east on U.S. Highway 80, 2.9 miles north on Farm Road 3056, and 0.5 miles west in woodland.

TABLE 20.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Attoyac	Fine-loamy, siliceous, thermic Typic Paleudalfs
Bernaldo	Fine-loamy, siliceous, thermic Glossic Paleudalfs
Bibb	Coarse-loamy, siliceous, acid, thermic Typic Fluvaquents
Bowie	Fine-loamy, siliceous, thermic Plinthic Paleudults
Briley	Loamy, siliceous, thermic Arenic Paleudults
Cuthbert	Clayey, mixed, thermic Typic Hapludults
Darco	Loamy, siliceous, thermic Grossarenic Paleudults
Derly	Fine, montmorillonitic, thermic Typic Glossaqualfs
Duffern	Thermic, coated Argic Quartzipsamments
Elrose	Fine-loamy, siliceous, thermic Typic Paleudalfs
Estes	Fine, montmorillonitic, thermic Aeric Dystraquerts
Freestone	Fine-loamy, siliceous, thermic Glossaquic Paleudalfs
Gallime	Fine-loamy, siliceous, thermic Glossic Paleudalfs
Gladewater	Very-fine, montmorillonitic, thermic Chromic Endoaquerts
Hainesville	Thermic, coated Argic Quartzipsamments
Iulus	Coarse-loamy, siliceous, thermic Fluvaquentic Dystrochrepts
Kirvin	Clayey, mixed, thermic Typic Hapludults
Kullit	Fine-loamy, siliceous, thermic Aquic Paleudults
Latch	Loamy, siliceous, thermic Grossarenic Paleudalfs
Leagueville	Loamy, siliceous, thermic Arenic Paleaquults
Lilbert	Loamy, siliceous, thermic Arenic Plinthic Paleudults
Manco	Fine-silty, siliceous, acid, thermic Aeric Fluvaquents
Mollville	Fine-loamy, siliceous, thermic Typic Glossaqualfs
Oakwood	Fine-loamy, siliceous, thermic Fragic Glossudalfs
Pickton	Loamy, siliceous, thermic Grossarenic Paleudalfs
Raino	Fine-loamy over clayey, siliceous, thermic Aquic Glossudalfs
Redsprings	Fine, kaolinitic, thermic Ultic Hapludalfs
Sacul	Clayey, mixed, thermic Aquic Hapludults
Tenaha	Loamy, siliceous, thermic Arenic Hapludults
Wolfpen	Loamy, siliceous, thermic Arenic Paleudalfs
Woodtell	Fine, montmorillonitic, thermic Vertic Hapludalfs

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