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 Rusk County, Texas

How to Use This Soil Survey

General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, 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.

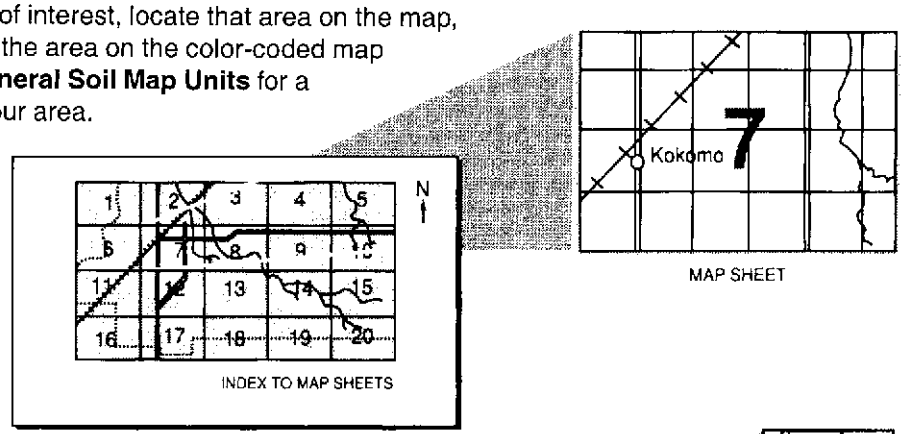
To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

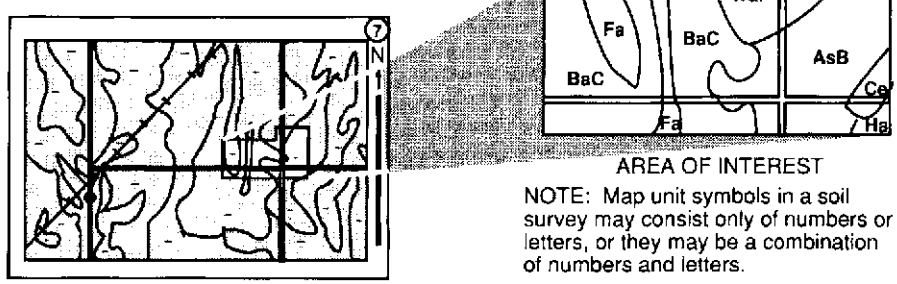
Detailed Soil Maps

The detailed soil maps follow the general soil map. These 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**, which precedes the soil maps. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map units 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.





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.

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.

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 1992. 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 Rusk 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: High-quality round bales of hay in an area of Betis loamy fine sand, 1 to 5 percent slopes. Over one-third of the acreage in Rusk County is used for pasture or hay.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

Issued 2000

Contents

Foreword

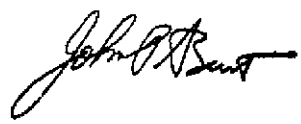
This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

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 shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

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



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Soil Survey of Rusk County, Texas

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Fieldwork by Kirby Griffith, Charles R. Fuchs, Joel Bolin, Raymond Dolezel, and Tom Holt, Natural Resources Conservation Service

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

Rusk County is in the northeastern part of Texas (fig. 1). It is approximately 45 miles long and 30 miles wide. It is bordered by Cherokee and Smith Counties on the west, Gregg and Harrison Counties on the north, Panola and Shelby Counties on the east, and Nacogdoches County on the south. It has 600,084 total acres, of which 590,178 acres is land and 9,906 acres is water. The elevation ranges from 250 feet to 703 feet above sea level.

Rusk County is in the Western Coastal Plain major land resource area (East Texas Timberland). The main soils formed under forest vegetation in a humid environment. Most soils are light colored and low in natural fertility. The land surface ranges from nearly level to very steep. Nearly level areas are often wet, and steep areas that are not protected by vegetation are easily eroded.

The entire county has a dendritic drainage system with many large streams.

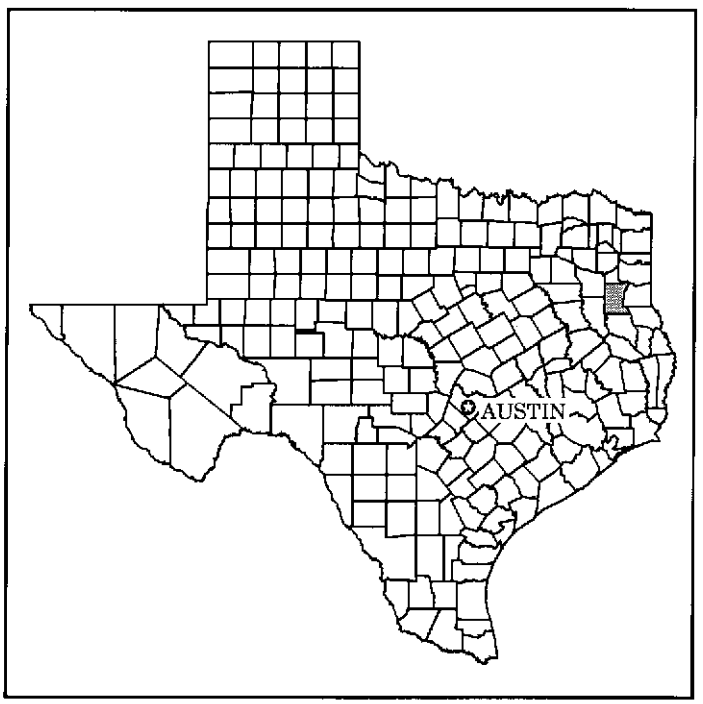

Figure 1.—Location of Rusk County in Texas.

General Nature of the County

This section briefly discusses settlement, agriculture, natural resources, and climate of the county.

Settlement

Rusk County was organized in 1843 from part of Nacogdoches County. It was named for Republic of Texas state leader Thomas Jefferson Rusk. Henderson, which is near the center of the county, was named the county seat.

By 1860, the population of Rusk County was the largest of any county in the state and was ranked sixth in wealth. Most of the original settlers were farmers. They cleared the trees from the land and planted cotton, corn, fruits, grains, and potatoes.

In the 1900's, the county's population slowly grew to 26,000. Agriculture was still the principal occupation, and

the leading commodities were cotton, dairies, beef cattle, poultry, swine, and timber. The most important event in 1930 was the discovery of oil.

Agriculture

Agriculture in the county has changed drastically over the years. The early settlers grew cotton, corn, fruits, grains, and potatoes. Farmers of the area tried to improve the agricultural picture by forming cooperatives, such as the Farmer's Alliance and the Farmer's Union.

Farming has declined over the years and many old fields and woodland areas have been cleared and planted to pasture.

Most livestock are raised in cow/calf operations and are mostly pasture fed with hay and feed supplements in the winter. Pastures are mainly in coastal bermudagrass, common bermudagrass, and bahiagrass, which also provide hay for beef production. Cool-season legumes are overseeded in many pastures to improve the soil and provide additional forage.

Beef cattle, swine, dairies, and timber are the main agricultural commodities.

Crop production is mainly non-irrigated truck crops of watermelons, corn, peas, potatoes, and other vegetables that are grown on some small farms.

Commercial timber production in the area is mostly on locally owned small tracts. Each year pine and hardwood timber is harvested for pulpwood, saw logs, crossties, posts, and poles.

Natural Resources

In 1930, oil was discovered on the Daisy Bradford farm west of Henderson. The entire western part of the county became a sea of derricks. More than half the wells completed in the United States in 1932 were found in this single field known as the Cherokee Strip. By 1948, Rusk County was the second highest oil-producing county in Texas.

The principal sources of income by the 1940's were oil, gas, and agriculture.

During the 1940's and 1950's, industries were attracted to the area. Two brick-making plants were built and in operation. Two large lakes were constructed, Lake Cherokee in the northeastern part of the county and Lake Striker in the western part of the county, for generating electricity and recreation.

In the early 1970's, Martin Lake was constructed to generate electricity and to serve as a cooling lake for the Texas Utilities Mining Company that mines lignite coal in the northeastern part of the county. Iron ore gravel, which is used for road construction, is also mined throughout the county.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Henderson 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 46 degrees F and the average daily minimum temperature is 35 degrees. The lowest temperature on record, which occurred on December 23, 1989, is -1 degree. In summer, the average temperature is 81 degrees and the average daily maximum temperature is 90 degrees. The highest recorded temperature, which occurred on August 6, 1964, is 108 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 inches, or 49 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 11.05 inches on March 29, 1989. Thunderstorms occur on about 56 days each year, and most occur in July.

The average seasonal snowfall is about 1.4 inches. The greatest snow depth at any one time during the period of record was 5 inches. The heaviest 1-day snowfall on record was 10 inches.

The average relative humidity in midafternoon is about 58 percent. Humidity is higher at night, and the average at dawn is about 87 percent. The sun shines 73 percent of the time possible in summer and 52 percent in winter. The prevailing wind is from the south-southeast. Average windspeed is highest, 10 miles per hour, in March.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from 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 in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

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

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, 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. 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 are generally 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 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 assure that a high water table will always be at a specific level in the soil on a specific date.

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

Map Unit Composition

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

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

so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

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

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, 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.

Soil Descriptions

Soils on Uplands

The map units in this group make up about 50 percent of Rusk County. The Bowie, Cuthbert, Kirvin, Maben, Pirkey, Redsprings, Ulto, and Woodtell soils are dominant in this group. These soils developed in loamy and clayey sediments. The landscape ranges from broad, nearly level and very gently sloping areas to steep side slopes.

1. Cuthbert-Kirvin-Bowie

Very gently sloping to steep, moderately deep to very deep, well drained, clayey and loamy soils (fig. 2)

Setting

Landform: Uplands
Landform position: Cuthbert—side slopes; Kirvin—ridges, knobs, and side slopes; Bowie—interstream divides
Distinctive landform features: Landscape is characterized by broad stream divides and side slopes
Slope range: 1 to 40 percent

Composition

Percent of the survey area: 31
Cuthbert soils—33 percent
Kirvin soils—25 percent
Bowie soils—11 percent
Minor soils—31 percent (includes Iulus, Laneville, Lilbert, Sacul, Sawlit, Sawtown, and Tenaha soils)

Typical Profile

Cuthbert

Surface layer: Brown fine sandy loam
Subsoil layer: Upper part—red clay; lower part—red sandy clay loam
Underlying layer: Stratified sandstone and shale in shades of red, yellow, and gray

Kirvin

Surface layer: Brown fine sandy loam
Subsoil layer: Upper part—red clay; lower part—red sandy clay loam
Underlying layer: Stratified sandstone and shale in shades of red, brown, yellow, and gray

Bowie

Surface layer: Brown very fine sandy loam
Subsoil layer: Upper part—brown sandy clay loam; lower part—variegated red and brown fine sandy loam with grayish streaks

Soil Properties and Qualities

Cuthbert

Depth class: Moderately deep
Drainage class: Well drained
Hazard of flooding: None
Reaction: Very strongly acid or strongly acid
Slope: Moderately sloping to steep

Kirvin

Depth class: Deep
Drainage class: Well drained
Hazard of flooding: None
Reaction: Very strongly acid or strongly acid
Slope: Very gently sloping to moderately steep

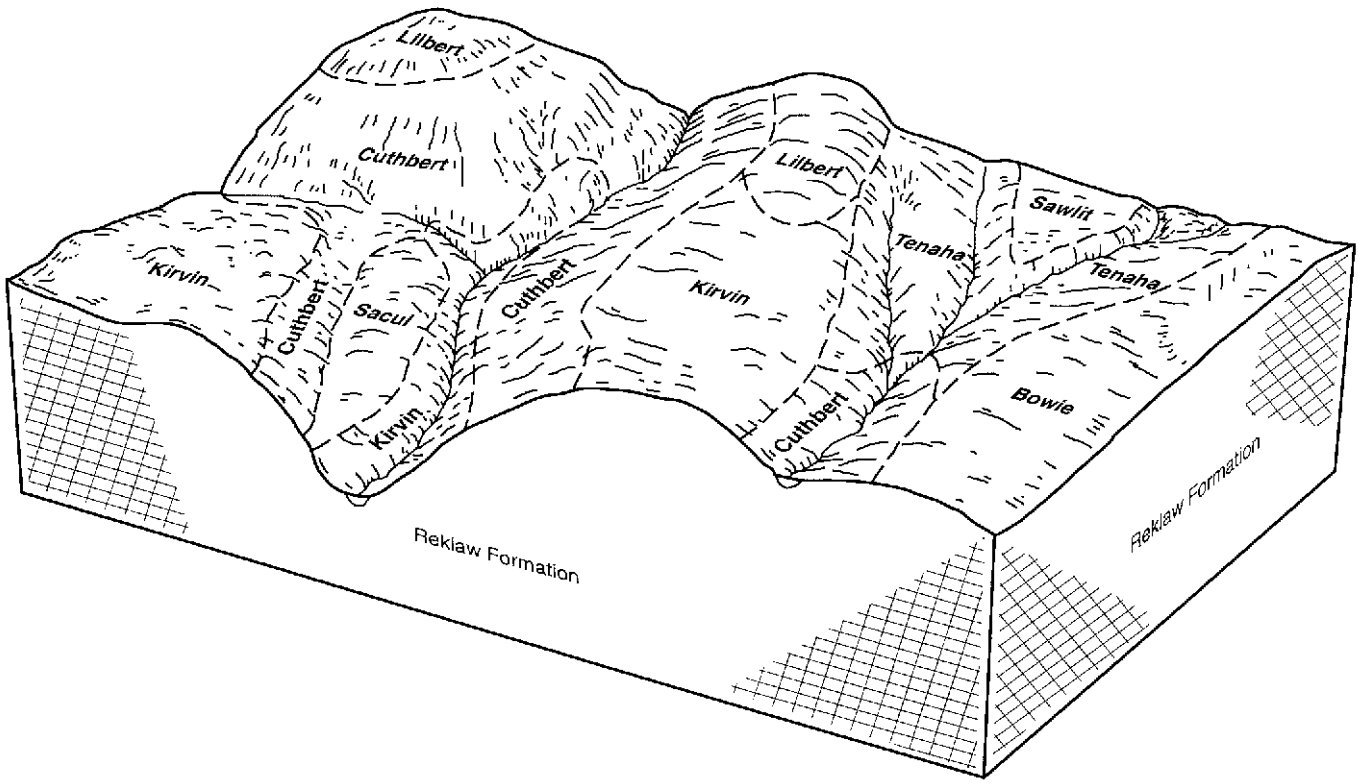

Figure 2.—Typical pattern of soils and parent material in the Cuthbert-Kirvin-Bowie general soil map unit.

Bowie

Depth class: Very deep
Drainage class: Well drained
Hazard of flooding: None
Reaction: Very strongly acid or strongly acid
Slope: Gently sloping

Minor soils

- Iulus and Laneville soils on flood plains of creeks
- Lilbert soils that have a thick, sandy surface and are on gently sloping stream divides
- Areas of clayey Sacul soils on gently sloping, slightly concave stream divides
- Areas of loamy Sawlit and Sawtown soils that occur as a mounded complex on stream terraces (Sawlit soils on lows or intermounds; Sawtown soils on mounds)
- Tenaha soils that have a thick, sandy surface and are on strongly sloping and moderately steep side slopes

Land Use

Dominant Uses: Woodland on the more sloping areas

Other Uses: Pasture on the smoother areas

Pasture and hayland

Adapted plants: Improved bermudagrass and bahiagrass
Limitations:
- Less sloping areas—seasonal droughtiness
- More sloping areas—erosion hazard

Management concerns:
- Care should be exercised not to overgraze the more sloping areas
- Legumes, such as crimson clover and vetch, can be overseeded to increase forage production
- Areas with slopes more than 15 percent are not suited for improved pasture

Woodland

Common trees: Loblolly pine, shortleaf pine, sweetgum, red oak, and white oak
Limitations:
- Less sloping areas—no significant limitations
- More sloping areas—erosion hazard, low soil strength, and equipment limitations

Management concerns:
- As slopes increase, potential for erosion and equipment use problems increases

2. Redsprings-Ulto

Very gently sloping to steep, deep, well drained, clayey and loamy soils (fig. 3)

Setting

Landform: Uplands
Landform position: Redsprings—ridges and side slopes; Ulto—saddles and toeslopes
Distinctive landform features: Landscape is characterized by broad ridges and slightly concave areas above side slopes
Slope range: 1 to 40 percent

Composition

Percent of the survey area: 11
Redsprings soils—68 percent
Ulto soils—14 percent
Minor soils—18 percent (includes Derly, Hannahatchee, Lilbert, and Tenaha soils)

Typical Profile

Redsprings

Surface layer: Reddish brown gravelly fine sandy loam
Subsoil layer: Upper part—reddish brown clay; lower part—dark red to red clay
Underlying layer: Reddish yellow glauconitic material and red clay

Ulto

Surface layer: Brown fine sandy loam
Subsoil layer: Upper part—yellowish red fine sandy loam over clay loam; middle part—strong brown clay loam; lower part—yellowish red sandy clay loam
Underlying layer: Red weakly consolidated sandstone and thin strata of shale with texture of sandy clay loam

Soil Properties and Qualities

Redsprings

Depth class: Deep
Drainage class: Well drained
Hazard of flooding: None

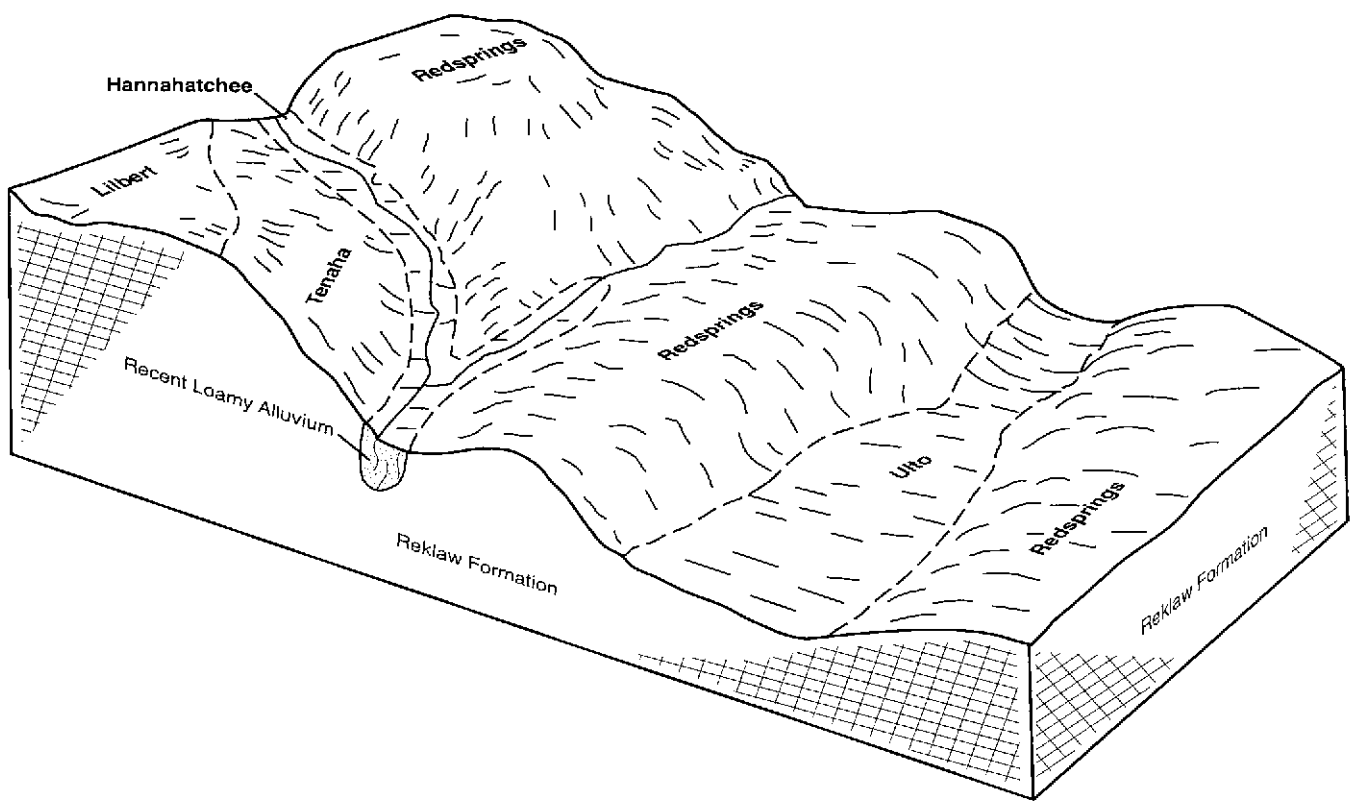

Figure 3.—Typical pattern of soils and parent material in the Redsprings-Ulto general soil map unit.

Reaction: Moderately acid to neutral
Slope: Very gently sloping to steep

Ulto

Depth class: Deep
Drainage class: Well drained
Hazard of flooding: None
Reaction: Very strongly acid to moderately acid
Slope: Very gently sloping

Minor soils

- Derly soils in poorly drained depressional areas
- Hannahatchee soils on flood plains of small creeks
- Lilbert and Tenaha soils that have a sandy surface layer 20 to 40 inches thick and are in positions similar to those of the Redsprings and Ulto soils

Land Use

Dominant Uses: Woodland

Other Uses: Pasture

Pasture and hayland

Adapted plants: Improved bermudagrass and bahiagrass
Limitations:
- Less sloping areas—seasonal droughtiness
- More sloping areas—erosion hazard

Management concerns:
- Production decreases as slopes exceed about 10 percent
- Legumes, such as crimson clover and vetch, can be overseeded to increase forage production
- Areas with slopes more than 15 percent are not suited for improved pasture

Woodland

Common trees: Loblolly pine, shortleaf pine, hickory, sweetgum, red oak, and white oak
Limitations:
- Less sloping areas—no significant limitations
- More sloping areas—erosion hazard, low soil strength, and equipment limitations

Management concerns:
- As slopes increase, potential for erosion and equipment use problems increases

3. Maben-Woodtell

Very gently sloping to moderately steep, moderately deep and deep, well drained, clayey soils

Setting

Landform: Uplands
Landform position: Maben—side slopes; Woodtell—interstream divides and side slopes
Distinctive landform features: Landscape is characterized by broad stream divides and side slopes
Slope range: 1 to 15 percent

Composition

Percent of the survey area: 8
Maben soils—30 percent
Woodtell soils—27 percent
Minor soils—43 percent (includes Attoyac, Betis, Laneville, Latex, Sawlit, and Tenaha soils)

Typical Profile

Maben

Surface layer: Brown fine sandy loam
Subsoil layer: Upper part—yellowish red and red clay; lower part—reddish yellow, grayish brown, and yellowish red clay loam
Underlying layer: Stratified light olive gray shale and siltstone

Woodtell

Surface layer: Dark yellowish brown loam
Subsoil layer: Upper part—red clay; lower part—light brownish gray clay
Underlying layer: Light brownish gray shale

Soil Properties and Qualities

Maben

Depth class: Moderately deep
Drainage class: Well drained
Hazard of flooding: None
Reaction: Very strongly acid to moderately acid
Slope: Moderately sloping to moderately steep

Woodtell

Depth class: Deep
Drainage class: Well drained
Hazard of flooding: None
Reaction: Very strongly acid to moderately acid
Slope: Very gently sloping to moderately steep

Minor soils

- Areas of loamy Attoyac and Sawlit soils on stream terraces
- Areas of sandy Betis soils on ridgetops
- Laneville soils on flood plains
- Areas of loamy Latex soils on higher terraces than the Maben and Woodtell soils
- Tenaha soils that have a sandy surface layer 20 to 40 inches thick and are on side slopes

Land Use

Dominant Uses: Woodland on the more sloping areas

Other Uses: Pasture or hayland on the smoother areas

Pasture and hayland

Adapted plants: Improved bermudagrass and bahiagrass
Limitations:
- Less sloping areas—seasonal wetness and clayey subsoils
- More sloping areas—droughtiness and erosion hazard

Management concerns:
- Erosion hazard increases on the more sloping areas, and care should be exercised not to overgraze
- The period of grazing may be limited by wetness on the less sloping areas
- Legumes, such as vetch, crimson clover, or arrowleaf clover, overseeded into the base grass lengthens the grazing season and improves the soil
- Pastures require liming, fertilization, and rotational grazing to maintain forage vigor

Woodland

Common trees: Loblolly pine, shortleaf pine, sweetgum, red oak, and white oak
Limitations:
- Less sloping areas—low soil strength
- More sloping areas—erosion hazard and equipment limitations

Management concerns:
- On smoother areas, restriction of equipment use due to low soil strength may be expected during the winter months
- As slopes increase, potential for erosion and equipment use problems increases
- On all slopes, care to ensure proper tree planting is needed due to the presence of a clayey subsoil that is often close to the surface

4. Pirkey

Very gently sloping to strongly sloping, very deep, well drained, loamy soils

Setting

Landform: Uplands
Landform position: Broad interstream divides and side slopes
Distinctive landform features: Landscape is man-made consisting of reclaimed soil material resulting from lignite mining on interstream divides and side slopes
Slope range: 1 to 12 percent

Composition

Percent of the survey area: <1
Pirkey soils—79 percent
Minor soils—21 percent (includes Laneville soils)

Typical Profile

Surface layer: Yellowish brown very fine sandy loam
Subsoil layer: Red sandy clay loam
Underlying layer: Olive gray very fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Hazard of flooding: None
Reaction: Extremely acid to strongly acid
Slope: Very gently sloping to strongly sloping

Minor soils

- Laneville soils on flood plains of small creeks

Land Use

Dominant Uses: Woodland

Other Uses: Hayland

Pasture and hayland

Adapted plants: Improved bermudagrass and bahiagrass
Limitations:
- Less sloping areas—seasonal droughtiness
- More sloping areas—erosion hazard

Management concerns:
- Erosion hazard increases on the more sloping areas, and care should be exercised not to overgraze
- Legumes, such as vetch or crimson clover, overseeded into the base grass lengthens the grazing season and improves the soil
- The clayey subsoil may limit water intake and forage production
- Pastures require liming, fertilization, and rotational grazing to maintain forage vigor

Woodland

Common trees: Loblolly pine, persimmon, American sycamore, and southern red oak
Limitations:
- Less sloping areas—no significant limitations
- More sloping areas—moderate erosion hazard

Management concerns:
- As slopes increase, potential for erosion becomes greater
- Currently, long term productivity data is not available for this soil

5. Tenaha-Lilbert-Darco

Very gently sloping to moderately steep, deep and very deep, well drained and somewhat excessively drained, loamy soils (fig. 4)

Setting

Landform: Uplands
Landform position: Tenaha—side slopes; Lilbert—interstream divides; Darco—broad interstream divides and side slopes
Distinctive landform features: Landscape is characterized by broad stream divides and side slopes
Slope range: 1 to 15 percent

Composition

Percent of the survey area: 26
Tenaha soils—24 percent
Lilbert soils—22 percent
Darco soils—14 percent
Minor soils—40 percent (includes Bowie, Cuthbert, Iulus, Kirvin, Laneville, Naconiche, and Rentzel soils)

Typical Profile

Tenaha

Surface and subsurface layer: Brown loamy fine sand
Subsoil layer: Yellowish brown sandy clay loam
Underlying layer: Pale brown loamy fine sand with a few yellowish brown bands and spots

Lilbert

Surface and subsurface layer: Brown loamy fine sand
Subsoil layer: Upper part—yellowish brown sandy clay loam with reddish iron accumulations; lower part—brownish yellow sandy clay loam with reddish and brownish iron accumulations

Darco

Surface and subsurface layer: Brown loamy fine sand
Subsoil layer: Upper part—strong brown fine sandy loam with reddish lithochromic mottles; lower part—strong brown sandy clay loam with brownish, reddish, and yellowish lithochromic mottles

Soil Properties and Qualities

Tenaha

Depth class: Deep

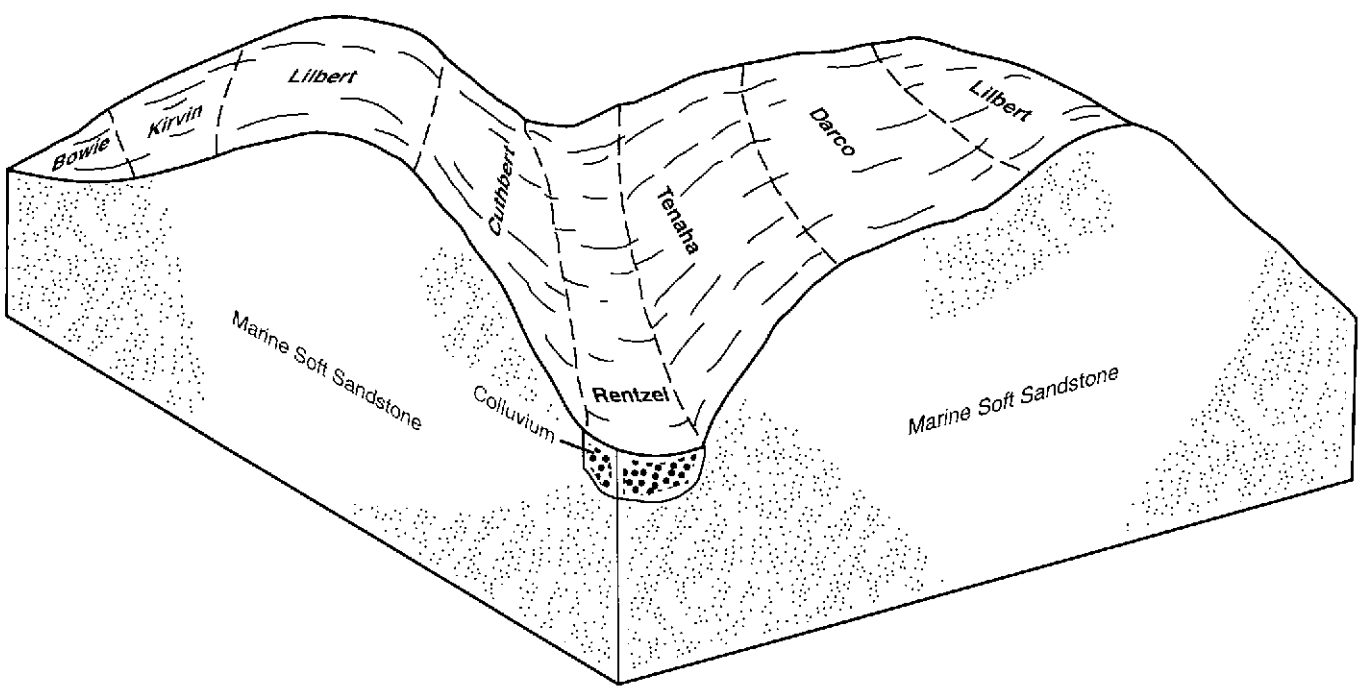

Figure 4.—Typical pattern of soils and parent material in the Tenaha-Lilbert-Darco general soil map unit.

Drainage class: Well drained
Hazard of flooding: None
Reaction: Very strongly acid to moderately acid
Slope: Moderately sloping to moderately steep

Lilbert

Depth class: Very deep
Drainage class: Well drained
Hazard of flooding: None
Reaction: Strongly acid to slightly acid
Slope: Gently sloping

Darco

Depth class: Very deep
Drainage class: Somewhat excessively drained
Hazard of flooding: None
Reaction: Very strongly acid or strongly acid
Slope: Very gently sloping to moderately steep

Minor soils

- Areas of loamy Bowie soils that are in landscape positions similar to those of the Lilbert and Darco soils
- Cuthbert and Kirvin soils that have clayey subsoils and are on stream divides and side slopes
- Iulus and Laneville soils on flood plains of streams
- The very poorly drained Naconiche soils along poorly defined drainageways
- Rentzel soils that have a seasonal water table and are on toeslopes

Land Use

Dominant Uses: Woodland

Other Uses: Pasture

Pasture and hayland

Adapted plants: Weeping lovegrass and improved bermudagrass
Limitations:
- Droughtiness
- Low soil fertility

Management concerns:
- Legumes, such as vetch, overseeded into the base grass lengthens the grazing season and improves the soil
- Equipment use is limited on slopes above about 10 percent

Woodland

Common trees: Loblolly pine, shortleaf pine, post oak, southern red oak, sweetgum, and hickory
Limitations:
- Droughtiness
- Loose, sandy surface layer
- More sloping areas—erosion hazard

Management concerns:
- Equipment use and seedling mortality are problems due to droughtiness and poor trafficability when the soil is dry
- As slopes increase, potential for erosion and equipment use problems increases

6. Tonkawa

Nearly level to steep, very deep, somewhat excessively drained, sandy soils

Setting

Landform: Uplands
Landform position: Broad interstream divides and side slopes
Distinctive landform features: Landscape is characterized by broad stream divides and side slopes
Slope range: 0 to 35 percent

Composition

Percent of the survey area: 1
Tonkawa soils—70 percent
Minor soils—30 percent (includes Cuthbert, Lilbert, Naconiche, and Tenaha soils)

Typical Profile

Surface layer: Dark grayish brown fine sand
Subsoil layer: Upper part—brown and red fine sand; lower part—very pale brown and yellow fine sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Hazard of flooding: None
Reaction: Very strongly acid or strongly acid
Slope: Nearly level to steep

Minor soils

- Areas of clayey Cuthbert soils on side slopes
- Lilbert and Tenaha soils that have a subsoil within 40 inches of the surface
- The very poorly drained Naconiche soils on narrow flood plains

Land Use

Dominant Uses: Woodland

Other Uses: Pasture on some of the smoother areas

Pasture and hayland

Adapted plants: Weeping lovegrass and improved bermudagrass

Limitations:
- Less sloping areas—droughtiness and low soil fertility
- More sloping areas—slope and erosion hazard

Management concerns:
- Legumes, such as vetch, overseeded into the base grass lengthens the grazing season and improves the soil
- Equipment use is limited on slopes above about 10 percent; areas with slopes above 15 percent are not suited for improved pasture

Woodland

Common trees: Loblolly pine, shortleaf pine, post oak, and hickory

Limitations:
- Droughtiness
- Loose, sandy surface layer
- More sloping areas—erosion hazard

Management concerns:
- Equipment use and seedling mortality are problems due to droughtiness and poor trafficability when the soil is dry
- As slopes increase, potential for erosion and equipment use problems increases

Soils on Terraces

The map units in this group make up about 1 percent of Rusk County. The major soils in this group are Sawlit, Sawtown, Latex, Attoyac, Bernaldo, and Bienville. These soils developed in loamy and sandy fluvial sediments. The landform is nearly level to very gently sloping stream terraces with moderately steep side slopes above the flood plains.

7. Sawlit-Sawtown-Latex

Nearly level to very gently sloping, very deep, moderately well drained to well drained, loamy soils (fig. 5)

Setting

Landform: Terraces and uplands

Landform position: Sawlit—slightly concave areas and intermounds; Sawtown—convex mounds; Latex—broad interstream divides

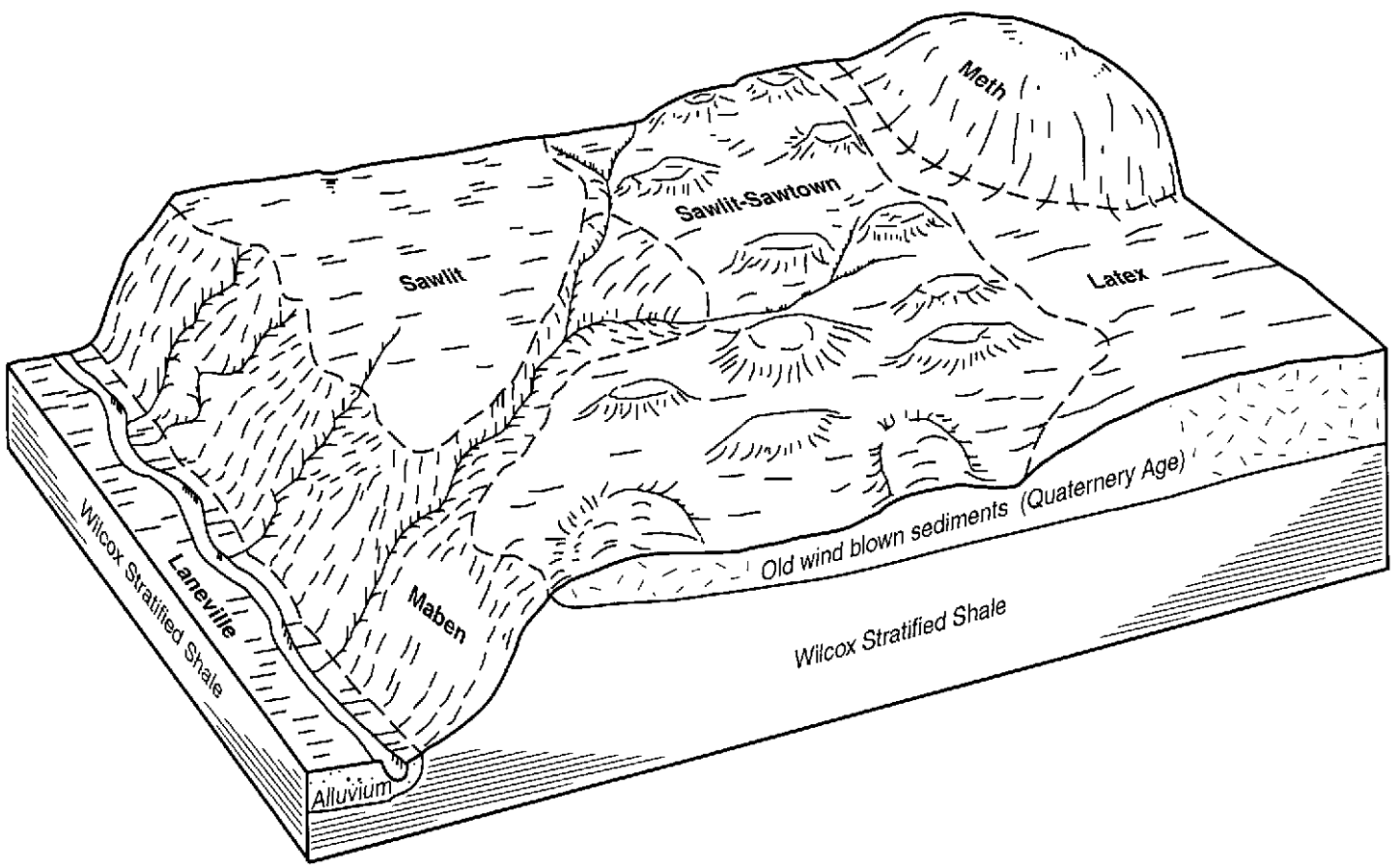

Figure 5.—Typical pattern of soils and parent material in the Sawlit-Sawtown-Latex general soil map unit.

Distinctive landform features: Landscape is characterized by mounded terraces and broad interstream divides
Slope range: 0 to 3 percent

Composition

Percent of the survey area: 12
Sawlit soils—32 percent
Sawtown soils—13 percent
Latex soils—11 percent
Minor soils—44 percent (includes Laneville, Maben, Meth, and Sacul soils)

Typical Profile

Sawlit

Surface and subsurface layer: Brown loam
Subsoil layer: Upper part—yellowish brown loam and clay loam; lower part—yellowish brown clay

Sawtown

Surface and subsurface layer: Brown very fine sandy loam
Subsoil layer: Upper part—brown loam and clay loam; lower part—light brownish gray clay

Latex

Surface and subsurface layer: Brown very fine sandy loam
Subsoil layer: Upper part—yellowish brown clay loam; lower part—light brownish gray clay

Soil Properties and Qualities

Sawlit

Depth class: Very deep
Drainage class: Moderately well drained
Hazard of flooding: None
Reaction: Very strongly acid
Slope: Nearly level to very gently sloping

Sawtown

Depth class: Very deep
Drainage class: Well drained
Hazard of flooding: None
Reaction: Very strongly acid
Slope: Nearly level to very gently sloping

Latex

Depth class: Very deep
Drainage class: Moderately well drained
Hazard of flooding: None
Reaction: Very strongly acid to moderately acid
Slope: Very gently sloping

Minor soils

- Laneville soils on flood plains
- Areas of clayey Maben soils on steep side slopes
- Areas of clayey Meth soils on ridgetops
- Areas of clayey Sacul soils on concave stream divides

Land Use

Dominant Uses: Pasture and hayland

Other Uses: Woodland

Pasture and hayland

Adapted plants: Improved bermudagrass and bahiagrass
Limitations:
- No significant limitations

Management concerns:
- Legumes, such as white clover, arrowleaf clover, and vetch, overseeded into the base grass lengthens the grazing season and improves the soil

Woodland

Common trees: Loblolly pine, shortleaf pine, southern red oak, white oak, and water oak
Limitations:
- No significant limitations

Management concerns:
- On some low areas, restriction of equipment use due to wetness may be expected during the winter months

8. Bernaldo-Attoyac

Very gently sloping to moderately steep, very deep, well drained, loamy soils

Setting

Landform: Terraces
Landform position: Convex interstream divides and side slopes
Distinctive landform features: Landscape is characterized by convex interstream divides and side slopes
Slope range: 1 to 15 percent

Composition

Percent of the survey area: <1
Bernaldo soils—35 percent
Attoyac soils—23 percent
Minor soils—42 percent (includes Betis, Cuthbert, Derly, Keechi, and Laneville soils)

Typical Profile

Bernaldo

Surface layer: Brown very fine sandy loam
Subsoil layer: Brown sandy clay loam

Attoyac

Surface layer: Brown fine sandy loam
Subsoil layer: Red sandy clay loam

Soil Properties and Qualities

Bernaldo

Depth class: Very deep
Drainage class: Well drained
Hazard of flooding: None
Reaction: Slightly acid to moderately acid
Slope: Very gently sloping to moderately sloping

Attoyac

Depth class: Very deep
Drainage class: Well drained
Hazard of flooding: None
Reaction: Slightly acid to moderately acid
Slope: Very gently sloping to moderately steep

Minor soils

- Areas of sandy Betis soils in higher landscape positions than the Bernaldo and Attoyac soils
- Areas of sandy Cuthbert soils on side slopes
- The poorly drained Derly soils in depressional areas
- Keechi and Laneville soils on flood plains

Land Use

Dominant Uses: Pasture and hayland

Other Uses: Woodland

Pasture and hayland

Adapted plants: Improved bermudagrass and bahiagrass
Limitations:
- Less sloping areas—no significant limitations
- More sloping areas—moderate erosion hazard

Management concerns:
- Legumes, such as white clover, arrowleaf clover, and vetch, overseeded into the base grass lengthens the grazing season and improves the soil

Woodland

Common trees: Loblolly pine, shortleaf pine, southern red oak, white oak, and water oak
Limitations:
- Less sloping areas—no significant limitations
- More sloping areas—moderate erosion hazard

Management concerns:
- As slopes increase, potential for erosion problems increases

9. Bienville

Nearly level to very gently sloping, very deep, somewhat excessively drained, sandy soils

Setting

Landform: Terraces
Landform position: Broad flats
Distinctive landform features: None
Slope range: 0 to 2 percent

Composition

Percent of the survey area: 1
Bienville soils—69 percent
Minor soils—31 percent (includes Alazan, Cuthbert, Derly, and Gallime)

Typical Profile

Surface and subsurface layer: Brown loamy fine sand
Subsoil layer: Strong brown and yellowish brown loamy fine sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Hazard of flooding: None
Reaction: Strongly acid to moderately acid
Slope: Nearly level to very gently sloping

Minor soils

- Areas of loamy Alazan and Gallime soils that occur as a mounded complex (Alazan on lows or intermounds; Gallime on mounds)
- Areas of clayey Cuthbert soils on side slopes
- The poorly drained Derly soils in depressional areas

Land Use

Dominant Uses: Pasture and hayland

Other Uses: Woodland

Pasture and hayland

Adapted plants: Improved bermudagrass with a few areas of weeping lovegrass
Limitations:
- Droughtiness
- Medium fertility

Management concerns:
- Legumes, such as vetch, overseeded into the base grass lengthens the grazing season and improves the soil
- Pastures require light applications of fertilizer and lime at frequent intervals and rotational grazing to maintain forage vigor

Woodland

Common trees: Loblolly pine, shortleaf pine, and southern red oak
Limitations:
- Droughtiness
- Loose, sandy surface layer

Management concerns:
- Equipment use and seedling mortality are problems due to droughtiness and poor trafficability when the soil is dry

Soils on Flood Plains

The map units in this group make up about 10 percent of Rusk County. The major soils are Dreka, Estes, Keechi, Laneville, and Mattex. These soils developed in loamy and clayey sediments of Recent age. The landscape is nearly level flood plains along rivers and streams. The soils in this group are subject to flooding and most are wet for extended periods.

10. Laneville-Mattex

Nearly level, very deep, well drained and somewhat poorly drained, loamy soils that are occasionally flooded to frequently flooded

Setting

Landform: Flood plains of major streams
Landform position: Alluvial flats
Distinctive landform features: None
Slope range: 0 to 1 percent

Composition

Percent of the survey area: 8
Laneville soils—55 percent
Mattex soils—16 percent
Minor soils—29 percent (includes Bienville, Cuthbert, Sawlit, and Tenaha soils)

Typical Profile

Laneville

Surface layer: Upper part—brown loam; lower part—yellowish brown silt loam
Subsoil layer: Upper part—brown clay loam; lower part—gray clay loam

Mattex

Surface layer: Upper part—brown clay loam; lower part—gray loam
Subsoil layer: Upper part—gray sandy clay loam over very fine sandy loam; lower part—gray clay loam

Soil Properties and Qualities

Laneville

Depth class: Very deep
Drainage class: Well drained
Hazard of flooding: Occasionally flooded to frequently flooded
Reaction: Extremely acid to strongly acid
Slope: Nearly level

Mattex

Depth class: Very deep
Drainage class: Somewhat poorly drained
Hazard of flooding: Frequently flooded
Reaction: Very strongly acid or strongly acid
Slope: Nearly level

Minor soils

- Areas of sandy Bienville soils on stream terraces
- Areas of clayey Cuthbert soils on side slopes above the flood plain
- Areas of loamy Sawlit soils on stream terraces
- Tenaha soils that have a sandy surface layer 20 to 40 inches thick and are on side slopes

Land Use

Dominant Uses: Woodland

Other Uses: Pasture

Pasture and hayland

Adapted plants: Improved bermudagrass, bahiagrass, and fescue
Limitations:
- Lower areas—wetness and flooding
- Higher areas—flooding

Management concerns:
- Equipment use and the period of grazing may be limited on the higher areas during some years due to flooding and on the lower areas in most years due to wetness and flooding
- Legumes, such as crimson clover, white clover, and vetch, overseeded into the base grass lengthens the grazing season and improves the soil

Woodland

Common trees: Laneville—loblolly pine, water oak, cherrybark oak, white ash, and sweetgum; Mattex—willow oak, cherrybark oak, green ash, American elm, and sweetgum
Limitations:
- Lower areas—wetness and flooding
- Higher areas—flooding

Management concerns:
- Equipment use, plant competition, and seedling mortality problems can be expected due to wetness and flooding
- Areas of Mattex soils generally are not suited for pine production

11. Dreka

Nearly level, very deep, somewhat poorly drained, loamy soils that are frequently flooded

Setting

Landform: Flood plains of major streams in the eastern part of the survey area
Landform position: Alluvial flats
Distinctive landform features: None
Slope range: 0 to 1 percent

Composition

Percent of the survey area: 1
Dreka soils—75 percent
Minor soils—25 percent (includes Cuthbert, Sawlit, and Sawtown soils)

Typical Profile

Surface layer: Brown loam with grayish iron depletions
Subsoil layer: Upper part—gray loam with brownish and yellowish iron accumulations; lower part—gray silty clay with brownish and yellowish iron accumulations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Hazard of flooding: Frequently flooded
Reaction: Slightly acid to slightly alkaline
Slope: Nearly level

Minor soils

- Areas of clayey Cuthbert soils on side slopes above the flood plain
- Areas of loamy Sawlit and Sawtown soils that occur as a mounded complex on stream terraces (Sawlit soils on lows or intermounds; Sawtown soils on mounds)

Land Use

Dominant Uses: Woodland

Other Uses: Pasture

Pasture and hayland

Adapted plants: Bahiagrass and fescue
Limitations:
- Wetness
- Flooding

Management concerns:
- Equipment use and the period of grazing are limited due to wetness and flooding
- Legumes, such as white clover and vetch, can be overseeded to increase forage production

Woodland

Common trees: Willow oak, cherrybark oak, green ash, American elm, and sweetgum
Limitations:
- Flooding
- Wetness

Management concerns:
- Equipment use, plant competition, and seedling mortality problems can be expected due to wetness and flooding
- Areas of Dreka soils generally are not suited for pine production

12. Keechi

Nearly level, very deep, very poorly drained, loamy soils that are frequently flooded

Setting

Landform: Flood plains of Bowles and Johnson Creeks in the western part of the survey area
Landform position: Alluvial flats
Distinctive landform features: None
Slope range: 0 to 1 percent

Composition

Percent of the survey area: <1
Keechi soils—72 percent
Minor soils—28 percent (includes Bienville, Cuthbert, Laneville, and Tenaha soils)

Typical Profile

Surface layer: Very dark grayish brown fine sandy loam
Subsurface layer: Gray fine sandy loam
Subsoil layer: Upper part—gray fine sandy loam with brownish and yellowish iron accumulations; lower part—gray clay loam with brownish iron accumulations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Very poorly drained
Hazard of flooding: Frequently flooded
Reaction: Slightly acid to slightly alkaline
Slope: Nearly level

Minor soils

- Areas of sandy Bienville soils on stream terraces

• Areas of clayey Cuthbert soils on side slopes above the drains
• The better drained Laneville soils in slightly higher areas than the Keechi soils
• Tenaha soils that have a sandy surface layer 20 to 40 inches thick and are on side slopes

Land Use

Dominant Uses: Wildlife habitat

Other Uses: None

Pasture and hayland

Adapted plants: None
Limitations:
• Wetness
• Ponding
• Flooding
Management concerns:
• Areas of Keechi soils generally are not suited for improved pasture

Woodland

Common trees: No commercial species
Limitations:
• Flooding
• Ponding
• Wetness
Management concerns:
• Areas of Keechi soils generally are not suited for pine production

13. Estes

Nearly level, very deep, somewhat poorly drained, clayey soils that are frequently flooded

Setting

Landform: Flood plains of the Sabine River
Landform position: Alluvial flats
Distinctive landform features: None
Slope range: 0 to 1 percent

Composition

Percent of the survey area: <1
Estes soils—97 percent
Minor soils—3 percent (includes Woodtell soils)

Typical Profile

Surface layer: Brown clay
Subsoil layer: Upper part—gray clay; lower part—gray sandy clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Hazard of flooding: Frequently flooded
Reaction: Very strongly acid
Slope: Nearly level

Minor soils

• Areas of clayey Woodtell soils on side slopes above the flood plain

Land Use

Dominant Uses: Woodland

Other Uses: Pasture

Pasture and hayland

Adapted plants: Bahiagrass and fescue
Limitations:
• Wetness
• Flooding
Management concerns:
• Equipment use and the period of grazing are limited due to wetness and flooding
• Legumes, such as white clover and vetch, can be overseeded to increase forage production

Woodland

Common trees: Willow oak, cherrybark oak, green ash, American elm, and sweetgum
Limitations:
• Flooding
• Wetness
Management concerns:
• Equipment use, plant competition, and seedling mortality problems can be expected due to wetness and flooding
• Areas of Estes soils generally are not suited for pine production

Detailed Soil Map Units

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

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

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

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Cuthbert fine sandy loam, 5 to 15 percent slopes, is a phase of the Cuthbert series.

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

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Sawlit-Sawtown complex, 0 to 2 percent slopes, is an example.

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

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

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

Soil Descriptions

AyB—Attoyac fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Terraces
Landform position: Convex interstream divides
Distinctive landform features: None
Slope: Very gently sloping
Shape of areas: Oval to elongated
Size of areas: 15 to 50 acres
Native vegetation: Pine/hardwood

Composition

Attoyac and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Typical Profile

Surface layer:
0 to 14 inches—brown fine sandy loam

Subsoil layer:
14 to 31 inches—yellowish red sandy clay loam
31 to 52 inches—red sandy clay loam with strong brown and dark red lithochromic mottles
52 to 80 inches—yellowish red sandy clay loam with strong brown and red lithochromic mottles

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Very low
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Low
Permeability: Moderate
Available water capacity: High

Contrasting Inclusions

- Sacul and Woodtell soils that are developed from 40 to 60 inches deep, have a clayey subsoil, and are on side slopes and heads of drains

Land Use

Dominant Uses: Pasture
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
- No significant limitations

Management concerns:
- None

Woodland

Limitations:
- No significant limitations

Management concerns:
- None

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Moderate
Limitations:
- Percs slowly

Management measures:
- An oversize drain field design helps to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Slight
Limitations:
- No significant limitations

Management measures:
- Standard construction and landscaping techniques generally are adequate

Local Roads and Streets

Limitation rating: Moderate
Limitations:
- Low strength

Management measures:
- Special road base design and construction techniques may be needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: IIe
Pasture management group: 1
Woodland management group: 4

AyE—Attoyac fine sandy loam, 8 to 15 percent slopes

Setting

Landform: Terraces
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Strongly sloping to moderately steep
Shape of areas: Elongated
Size of areas: 15 to 50 acres
Native vegetation: Pine

Composition

Attoyac and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Typical Profile

Surface layer:
0 to 8 inches—brown fine sandy loam

Subsurface layer:
8 to 14 inches—yellowish red fine sandy loam

Subsoil layer:
14 to 36 inches—red sandy clay loam
36 to 44 inches—red sandy clay loam with yellowish brown lithochromic mottles
44 to 80 inches—red sandy clay loam with yellowish brown lithochromic mottles and streaks of clean sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Moderate
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Moderate
Shrink-swell potential: Low

Contrasting Inclusions

• Cuthbert, Kirvin, Maben, and Woodtell soils that are developed from 40 to 60 inches deep, have a clayey subsoil, and are in landscape positions similar to those of the Attoyac soil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
• Moderate erosion hazard
Management concerns:
• Areas should be protected from erosion during establishment or renovation of pastures
• Care should be taken not to overgraze

Woodland

Limitations:
• Medium rate of runoff
Management concerns:
• Moderate erosion hazard

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Moderate
Limitations:
• Percs slowly
• Slope
Management measures:
• An oversize drain field design on the contour helps to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Moderate
Limitations:
• Slope
Management measures:
• Constructing buildings on less sloping areas, preserving plant cover during construction, and proper landscaping can help to reduce soil erosion and runoff problems

Local Roads and Streets

Limitation rating: Moderate
Limitations:
• Low strength
• Slope
Management measures:
• Special road base design and construction techniques may be needed to compensate for low strength in the subsoil
• Some cutting and filling may be needed to compensate for slope

Interpretive Groups

Land capability classification: IVe
Pasture management group: 3
Woodland management group: 4

BeB—Bernaldo very fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Terraces
Landform position: Convex interstream divides
Distinctive landform features: None
Slope: Very gently sloping
Shape of areas: Irregular to oblong
Size of areas: 20 to 150 acres
Native vegetation: Pine/hardwood

Composition

Bernaldo and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Typical Profile

Surface layer:
0 to 4 inches—dark brown very fine sandy loam

Subsurface layer:
4 to 17 inches—yellowish brown very fine sandy loam

Subsoil layer:
17 to 25 inches—strong brown sandy clay loam
25 to 49 inches—strong brown sandy clay loam with red and brown iron accumulations
49 to 80 inches—brownish yellow sandy clay loam with red and brown iron accumulations and pale brown streaks

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Water table: Perched at 4 to 6 feet during November through May
Hazard of flooding: None
Runoff: Very low
Permeability: Moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Moderate

Contrasting Inclusions

- The moderately well drained Alazan soils on toeslopes
- Sawlit soils that are more clayey than the Bernaldo soil and are on heads of drains

Land Use

Dominant Uses: Pasture (fig. 6)
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
- No significant limitations

Management concerns:
- None

Woodland

Limitations:
- No significant limitations

Management concerns:
- None

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Moderate
Limitations:
- Wetness
- Percs slowly

Management measures:
- An oversize drain field design helps to prevent the septic system from malfunctioning during rainy periods

Figure 6.—This area of Bernaldo very fine sandy loam, 1 to 3 percent slopes, is well suited to the production of coastal bermudagrass and timber.

Dwellings without Basements

Limitation rating: Moderate
Limitations:
• Shrink-swell
Management measures:
• Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell

Local Roads and Streets

Limitation rating: Severe
Limitations:
• Low strength
Management measures:
• Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: IIe
Pasture management group: 1
Woodland management group: 4

BeD—Bernaldo very fine sandy loam, 5 to 8 percent slopes

Setting

Landform: Terraces
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Moderately sloping
Shape of areas: Elongated
Size of areas: 15 to 75 acres
Native vegetation: Pine/hardwood

Composition

Bernaldo and similar soils: 80 to 99 percent
Contrasting inclusions: 1 to 20 percent

Typical Profile

Surface layer:
0 to 3 inches—dark yellowish brown very fine sandy loam

Subsurface layer:
3 to 14 inches—light brown very fine sandy loam

Subsoil layer:
14 to 30 inches—strong brown sandy clay loam with yellowish red iron accumulations
30 to 45 inches—strong brown and yellowish brown sandy clay loam with red and yellowish red iron accumulations
45 to 62 inches—light yellowish brown and brownish yellow sandy clay loam with red, strong brown, and pale brown iron accumulations
62 to 80 inches—brownish yellow and strong brown fine sandy loam with red iron accumulations and light gray iron depletions

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Water table: Perched at 4 to 6 feet during November through May
Hazard of flooding: None
Runoff: Medium
Permeability: Moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Moderate
Shrink-swell potential: Moderate

Contrasting Inclusions

• Cuthbert and Kirvin soils that have a clayey subsoil and are in landscape positions similar to those of the Bernaldo soil

Land Use

Dominant Uses: Pasture
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
• Moderate erosion hazard
Management concerns:
• Areas should be protected from erosion during establishment or renovation of pastures
• Care should be taken not to overgraze

Woodland

Limitations:
• No significant limitations
Management concerns:
• None

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Moderate
Limitations:
• Wetness
• Percs slowly
Management measures:
• An oversize drain field design helps to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Moderate
Limitations:
• Shrink-swell
Management measures:
• Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell

Local Roads and Streets

Limitation rating: Severe
Limitations:
• Low strength
Management measures:
• Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: IVe
Pasture management group: 3
Woodland management group: 4

BtB—Betis loamy fine sand, 1 to 5 percent slopes

Setting

Landform: Uplands
Landform position: Convex interstream divides
Distinctive landform features: None
Slope: Gently sloping
Shape of areas: Oval and elongated
Size of areas: 20 to 200 acres
Native vegetation: Pine

Composition

Betis and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Typical Profile

Surface layer:
0 to 9 inches—brown loamy fine sand

Subsurface layer:
9 to 23 inches—light yellowish brown loamy fine sand
23 to 49 inches—pale brown loamy fine sand

Subsoil layer:
49 to 80 inches—light yellowish brown loamy fine sand with thin layers of strong brown fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Negligible to very low
Permeability: Rapid
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Low
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

• Kawah and Rentzel soils that have a water table near the surface during most of the year and are on toeslopes
• Tenaha soils that have a finer textured subsoil than the Betis soil between 20 and 40 inches deep and are on side slopes

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
• Low soil fertility
• Droughtiness
Management concerns:
• Production may be limited during dry years due to low available water capacity in the sandy surface layer
• Care should be taken not to overgraze

Woodland

Limitations:
• Loose, sandy surface layer
• Low available water capacity
Management concerns:
• Severe equipment limitations
• Moderate seedling mortality
• Plant competition

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
• Poor filter
Management measures:
• An oversize drain field design can help to prevent groundwater pollution from seepage

Dwellings without Basements

Limitation rating: Slight
Limitations:
• No significant limitations

Management measures:
• Standard construction and landscaping techniques generally are adequate

Local Roads and Streets

Limitation rating: Slight
Limitations:
• No significant limitations
Management measures:
• Standard road building techniques generally are adequate

Interpretive Groups

Land capability classification: IIIs
Pasture management group: 6
Woodland management group: 14

BvB—Bienville loamy fine sand, 0 to 2 percent slopes

Setting

Landform: Terraces
Landform position: Convex interstream divides
Distinctive landform features: None
Slope: Nearly level to very gently sloping
Shape of areas: Oblong
Size of areas: 20 to 150 acres
Native vegetation: Pine

Composition

Bienville and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Typical Profile

Surface layer:
0 to 12 inches—dark brown loamy fine sand

Subsurface layer:
12 to 26 inches—yellowish brown loamy fine sand

Subsoil layer:
26 to 40 inches—yellowish brown loamy fine sand with strong brown spots
40 to 80 inches—strong brown and yellowish brown loamy fine sand with spots of clean sand grains

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Water table: Apparent at 4 to 6 feet during December through April
Hazard of flooding: None
Runoff: Negligible
Permeability: Moderately rapid
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

• Wet soils in depressional areas

Land Use

Dominant Uses: Pasture
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
• Medium soil fertility
• Droughtiness
Management concerns:
• Production may be limited during dry years due to low available water capacity in the sandy surface layer
• Care should be taken not to overgraze

Woodland

Limitations:
• Loose, sandy surface layer
• Low available water capacity
Management concerns:
• Severe equipment limitations
• Moderate seedling mortality

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Moderate
Limitations:
• Wetness
Management measures:
• An oversize drain field design is needed to overcome occasional wetness in the lower parts of the soil

Dwellings without Basements

Limitation rating: Slight
Limitations:
• No significant limitations
Management measures:
• Standard construction and landscaping techniques generally are adequate

Local Roads and Streets

Limitation rating: Slight
Limitations:
• No significant limitations
Management measures:
• Standard road building techniques generally are adequate

Interpretive Groups

Land capability classification: IIs
Pasture management group: 5
Woodland management group: 5

BwB—Bowie very fine sandy loam, 1 to 4 percent slopes

Setting

Landform: Uplands
Landform position: Convex interstream divides
Distinctive landform features: None
Slope: Gently sloping
Shape of areas: Irregular
Size of areas: 10 to 150 acres
Native vegetation: Pine

Composition

Bowie and similar soils: 80 to 100 percent
Contrasting inclusions: 0 to 20 percent

Typical Profile

Surface layer:
0 to 7 inches—brown very fine sandy loam

Subsurface layer:
7 to 10 inches—pale brown very fine sandy loam

Subsoil layer:
10 to 20 inches—strong brown sandy clay loam
20 to 49 inches—strong brown sandy clay loam with yellowish red iron accumulations
49 to 63 inches—yellowish brown fine sandy loam with red iron accumulations and light brownish gray streaks
63 to 80 inches—variegated red and yellowish brown fine sandy loam with light brownish gray streaks

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Water table: Perched at 3.5 to 5 feet during January through April
Hazard of flooding: None
Runoff: Low to medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

- Kirvin soils that have a red, clayey subsoil and are on knobs and ridges
- Lilbert soils that have a sandy surface layer 20 to 40 inches thick and are in landscape positions similar to those of the Bowie soil
- Sacul soils that have gray iron depletions due to wetness and are on heads of drains

Land Use

Dominant Uses: Pasture
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
- Seasonal droughtiness

Management concerns:
- Moderate available water capacity may limit production somewhat

Woodland

Limitations:
- No significant limitations

Management concerns:
- None

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Wetness
- Percs slowly

Management measures:
- An onsite sewage treatment plant generally is needed to dispose of wastewater properly

Dwellings without Basements

Limitation rating: Slight
Limitations:
- No significant limitations

Management measures:
- Standard construction and landscaping techniques generally are adequate

Local Roads and Streets

Limitation rating: Moderate
Limitations:
- Low strength

Management measures:
- Special road base design and construction techniques may be needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: IIe
Pasture management group: 4
Woodland management group: 8

CbE—Cuthbert fine sandy loam, 5 to 15 percent slopes

Setting

Landform: Uplands
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Moderately sloping to moderately steep
Shape of areas: Elongated
Size of areas: 25 to 150 acres
Native vegetation: Pine

Composition

Cuthbert and similar soils: 85 to 100 percent
Contrasting inclusions: 0 to 15 percent

Typical Profile

Surface layer:
0 to 6 inches—dark brown fine sandy loam

Subsurface layer:
6 to 8 inches—yellowish brown fine sandy loam

Subsoil layer:
8 to 14 inches—yellowish red clay with strong brown lithochromic mottles
14 to 19 inches—yellowish red clay with red and strong brown lithochromic mottles
19 to 32 inches—yellowish red sandy clay loam with red and strong brown lithochromic mottles
32 to 36 inches—reddish yellow sandy clay loam with yellowish red and reddish yellow lithochromic mottles

Underlying layer:
36 to 60 inches—red, strong brown, light yellowish brown, and light brownish gray stratified sandstone and shale with a sandy clay loam texture

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Moderately deep
Natural soil fertility: Medium
Water erosion hazard: Severe
Shrink-swell potential: Moderate

Contrasting Inclusions

- Iulus soils that are loamy throughout the profile and are on narrow flood plains of small streams
- Kirvin soils that are developed deeper than 40 inches and are on knobs and ridges
- Tenaha soils that have a thick, sandy surface and subsurface layer and are in landscape positions similar to those of the Cuthbert soil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
- Droughtiness
- Medium rate of runoff
- Severe erosion hazard

Management concerns:
- Production may be limited during dry years due to moderate available water capacity
- Areas should be protected from erosion during establishment or renovation of pastures
- Care should be taken not to overgraze

Woodland

Limitations:
- Low soil strength
- Slope
- Medium rate of runoff

Management concerns:
- Moderate erosion hazard
- Equipment limitations

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly

Management measures:
- An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Shrink-swell
- Slope

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell
- Constructing buildings on less sloping areas, preserving plant cover during construction, and proper landscaping can help to reduce soil erosion and runoff problems

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low strength

Management measures:
- Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: VIe
Pasture management group: 9
Woodland management group: 15

CbG—Cuthbert fine sandy loam, 15 to 35 percent slopes

Setting

Landform: Uplands
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Moderately steep to steep
Shape of areas: Elongated
Size of areas: 50 to 100 acres
Native vegetation: Pine

Composition

Cuthbert and similar soils: 80 to 100 percent
Contrasting inclusions: 0 to 20 percent

Typical Profile

Surface layer:
0 to 2 inches—dark brown fine sandy loam

Subsurface layer:
2 to 4 inches—yellowish brown fine sandy loam

Subsoil layer:
4 to 15 inches—yellowish red clay
15 to 20 inches—yellowish red clay with dark reddish brown lithochromic mottles
20 to 24 inches—light yellowish brown clay loam with yellowish red lithochromic mottles

Underlying layer:
24 to 36 inches—light brownish gray, brownish yellow, and strong brown stratified loamy soil materials

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Medium to high
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Moderately deep
Natural soil fertility: Medium
Water erosion hazard: Severe
Shrink-swell potential: Moderate

Contrasting Inclusions

- Darco and Tenaha soils that have a thick, sandy surface and subsurface layer and are in landscape positions similar to those of the Cuthbert soil
- Iulus soils that are loamy throughout the profile and are on narrow flood plains of small streams

Land Use

Dominant Uses: Woodland
Other Uses: None

Pasture and hayland

Limitations:
- Medium to high rate of runoff
- Severe erosion hazard

Management concerns:
- Areas generally are not suited for improved pasture

Woodland

Limitations:
- Slope
- Medium to high rate of runoff

Management concerns:
- Severe erosion hazard
- Equipment limitations

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly
- Slope

Management measures:
- An oversize drain field design on the contour or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Slope

Management measures:
- Preserving the existing plant cover during construction and proper landscaping can help to reduce soil erosion and runoff problems
- Cutting and filling generally are needed to create a level building site

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low strength
- Slope

Management measures:
- Backfilling with suitable soil materials and special road base design generally are needed to prevent damage to roads and streets due to low strength in the subsoil
- Cutting and filling generally are needed to compensate for slope

Interpretive Groups

Land capability classification: VIIe
Pasture management group: Not assigned
Woodland management group: 17

CsG—Cuthbert fine sandy loam, 15 to 40 percent slopes, stony

Setting

Landform: Uplands
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Moderately steep to steep
Shape of areas: Elongated
Size of areas: 10 to 35 acres
Native vegetation: Pine

Composition

Cuthbert and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Typical Profile

Surface layer:
0 to 4 inches—dark brown fine sandy loam with stones

Subsurface layer:
4 to 8 inches—brown fine sandy loam with stones

Subsoil layer:
8 to 12 inches—yellowish red sandy clay loam
12 to 33 inches—red clay with brownish yellow lithochromic mottles and light gray shale bits

Underlying layer:
33 to 60 inches—weakly consolidated red, gray, and brown sandstone with a fine sandy loam texture

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Medium to high
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Moderately deep
Natural soil fertility: Medium
Water erosion hazard: Severe
Shrink-swell potential: Moderate

Contrasting Inclusions

- Iulus soils that are loamy throughout the profile and are on narrow flood plains of small streams
- Tenaha soils that have a sandy surface and subsurface layer 20 to 40 inches thick and are in landscape positions similar to those of the Cuthbert soil

Land Use

Dominant Uses: Woodland
Other Uses: None

Pasture and hayland

Limitations:
- Medium to high rate of runoff
- Severe erosion hazard

Management concerns:
- Areas generally are not suited for improved pasture

Woodland

Limitations:
- Slope
- Medium to high rate of runoff

Management concerns:
- Severe erosion hazard
- Equipment limitations

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly
- Slope

Management measures:
- An oversize drain field design on the contour or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Slope

Management measures:
- Preserving the existing plant cover during construction and proper landscaping can help to reduce soil erosion and runoff problems
- Cutting and filling generally are needed to create a level building site

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low strength
- Slope

Management measures:
- Backfilling with suitable soil materials and special road base design generally are needed to prevent damage to roads and streets due to low strength in the subsoil
- Cutting and filling generally are needed to compensate for slope

Interpretive Groups

Land capability classification: VIIs
Pasture management group: Not assigned
Woodland management group: 19

CtE—Cuthbert gravelly fine sandy loam, 5 to 15 percent slopes

Setting

Landform: Uplands
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Moderately sloping to moderately steep
Shape of areas: Elongated
Size of areas: 10 to 75 acres
Native vegetation: Pine

Composition

Cuthbert and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Typical Profile

Surface layer:
0 to 4 inches—dark brown gravelly fine sandy loam

Subsurface layer:
4 to 13 inches—brown gravelly fine sandy loam

Subsoil layer:
13 to 18 inches—red clay with strong brown lithochromic mottles
18 to 25 inches—red clay with strong brown lithochromic mottles and light brownish gray shale spots
25 to 37 inches—red clay loam with yellowish red and strong brown lithochromic mottles and light brownish gray shale strata

Underlying layer:
37 to 50 inches—variegated red and light brownish gray weakly consolidated shale and strong brown weathered glauconitic material with a clay loam texture
50 to 60 inches—light brownish gray weakly consolidated shale with a clay loam texture

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Moderately deep
Natural soil fertility: Medium
Water erosion hazard: Severe
Shrink-swell potential: Moderate

Contrasting Inclusions

- Iulus soils that are loamy throughout the profile and are on narrow flood plains of small streams
- Tenaha soils that have a thick, sandy surface and subsurface layer and are in landscape positions similar to those of the Cuthbert soil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
- Droughtiness
- Medium rate of runoff
- Severe erosion hazard

Management concerns:
- Production may be limited during dry years due to moderate available water capacity
- Areas should be protected from erosion during establishment or renovation of pastures
- Care should be taken not to overgraze

Woodland

Limitations:
- Low soil strength
- Slope
- Medium rate of runoff

Management concerns:
- Moderate erosion hazard
- Equipment limitations

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly

Management measures:
- An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Shrink-swell
- Slope

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell
- Constructing buildings on less sloping areas, preserving plant cover during construction, and proper landscaping can help to reduce soil erosion and runoff problems

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low strength

Management measures:
- Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: VIe
Pasture management group: 9
Woodland management group: 16

DaC—Darco loamy fine sand, 1 to 8 percent slopes

Setting

Landform: Uplands
Landform position: Convex interstream divides
Distinctive landform features: None
Slope: Very gently sloping to moderately sloping
Shape of areas: Elongated
Size of areas: 10 to 100 acres
Native vegetation: Pine

Composition

Darco and similar soils: 85 to 100 percent
Contrasting inclusions: 0 to 15 percent

Typical Profile

Surface layer:
0 to 10 inches—dark brown loamy fine sand

Subsurface layer:
10 to 54 inches—brown loamy fine sand in the upper part and pale brown loamy fine sand in the lower part

Subsoil layer:
54 to 64 inches—strong brown fine sandy loam with yellowish red lithochromic mottles
64 to 80 inches—strong brown sandy clay loam with grayish brown, red, and brownish yellow lithochromic mottles

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Negligible to low
Permeability: Moderate
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Low
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

- Bowie soils that are brownish yellow, have a loamy surface layer, and are in landscape positions similar to those of the Darco soil
- Kirvin soils that have a red, clayey subsoil and are on knobs and ridges

Land Use

Dominant Uses: Pasture (fig. 7)
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
- Low soil fertility
- Droughtiness

Management concerns:
- Production may be limited during dry years due to low available water capacity in the sandy surface layer
- Care should be taken not to overgraze

Woodland

Limitations:
- Loose, sandy surface layer
- Low available water capacity

Figure 7.—Although the dominant land use is pasture, truck crops, such as these watermelons, are occasionally grown in areas of Darco loamy fine sand, 1 to 8 percent slopes.

Management concerns:
- Severe equipment limitations
- Moderate seedling mortality
- Plant competition

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Poor filter

Management measures:
- An oversize drain field design can help to prevent groundwater pollution from seepage

Dwellings without Basements

Limitation rating: Slight
Limitations:
- No significant limitations

Management measures:
- Standard construction and landscaping techniques generally are adequate

Local Roads and Streets

Limitation rating: Slight
Limitations:
- No significant limitations

Management measures:
- Standard road building techniques generally are adequate

Interpretive Groups

Land capability classification: IIIs
Pasture management group: 6
Woodland management group: 14

DaE—Darco loamy fine sand, 8 to 15 percent slopes

Setting

Landform: Uplands
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Strongly sloping to moderately steep
Shape of areas: Elongated

Size of areas: 10 to 150 acres
Native vegetation: Pine

Composition

Darco and similar soils: 85 to 100 percent
Contrasting inclusions: 0 to 15 percent

Typical Profile

Surface layer:
0 to 4 inches—brown loamy fine sand

Subsurface layer:
4 to 55 inches—yellowish brown over light yellowish brown loamy fine sand with very pale brown spots

Subsoil layer:
55 to 80 inches—yellowish red sandy clay loam with red lithochromic mottles

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Moderate
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Low
Water erosion hazard: Moderate
Shrink-swell potential: Low

Contrasting Inclusions

- Cuthbert and Kirvin soils that have a loamy surface layer, a clayey subsoil, and are in landscape positions similar to those of the Darco soil
- Iulus and Naconiche soils on narrow flood plains of small streams

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
- Low soil fertility
- Droughtiness
- Slope

Management concerns:
- Production may be limited during dry years due to low available water capacity in the sandy surface layer
- Care should be taken not to overgraze
- Equipment use is limited on slopes above 10 percent due to the loose, sandy surface layer

Woodland

Limitations:
- Loose, sandy surface layer
- Low available water capacity

Management concerns:
- Severe equipment limitations
- Moderate seedling mortality
- Plant competition

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Poor filter

Management measures:
- An oversize drain field design can help to prevent groundwater pollution from seepage

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Slope

Management measures:
- Constructing buildings on less sloping areas, preserving plant cover during construction, and proper landscaping can help to reduce soil erosion and runoff problems

Local Roads and Streets

Limitation rating: Moderate
Limitations:
- Slope

Management measures:
- Cutting and filling may be needed to compensate for slope

Interpretive Groups

Land capability classification: VIe
Pasture management group: 8
Woodland management group: 14

DeA—Derly silt loam, 0 to 1 percent slopes

Setting

Landform: Uplands
Landform position: Concave depressions
Distinctive landform features: None
Slope: Nearly level
Shape of areas: Irregular
Size of areas: 5 to 25 acres
Native vegetation: Hardwood

Composition

Derly and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Typical Profile

Surface layer:
0 to 4 inches—brown silt loam with gray and grayish brown iron depletions

Subsurface layer:
4 to 7 inches—light brownish gray silt loam with yellowish brown iron accumulations

Subsoil layer:
7 to 11 inches—grayish brown clay loam with yellowish brown iron accumulations
11 to 29 inches—grayish brown clay with light yellowish brown iron accumulations
29 to 42 inches—dark grayish brown clay
42 to 57 inches—dark grayish brown clay with brownish yellow iron accumulations
57 to 80 inches—variegated light brownish gray and yellowish brown clay with dark grayish brown iron accumulations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Poorly drained
Water table: Perched at -0.5 to 1 foot during October through May
Hazard of flooding: None
Runoff: Negligible
Permeability: Very slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: High

Contrasting Inclusions

- The better drained Bernaldo, Sawlit, Sawtown, Ulto, and Woden soils in higher landscape positions than the Derly soil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture

Pasture and hayland

Limitations:
- Wetness
- Ponding

Management concerns:
- Establishment and maintenance of grasses are impractical during the wet season
- Equipment use and period of grazing are limited

Woodland

Limitations:
- Wetness
- Flooding

Management concerns:
- Moderate seedling mortality
- Severe equipment limitations
- Plant competition

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Ponding
- Percs slowly

Management measures:
- None feasible; drainage and the addition of large amounts of fill material would be required

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Ponding
- Shrink-swell

Management measures:
- None feasible; drainage and the addition of large amounts of fill material would be required

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Shrink-swell
- Low strength
- Ponding

Management measures:
- Backfilling with suitable soil materials and special road base design generally are needed to prevent damage to roads and streets due to low strength and shrink-swell in the subsoil
- Filling with suitable soil materials to build an elevated road base above the level of ponding and installing culverts of adequate size and spacing are needed to keep roads from being inundated and damaged during high water episodes

Interpretive Groups

Land capability classification: IIIw
Pasture management group: 11
Woodland management group: 18

Dr—Dreka loam, frequently flooded

Setting

Landform: Flood plains
Landform position: Alluvial flats
Distinctive landform features: None
Slope: Nearly level
Shape of areas: Long and broad
Size of areas: 50 to 250 acres
Native vegetation: Hardwood

Composition

Dreka and similar soils: 80 to 100 percent
Contrasting inclusions: 0 to 20 percent

Typical Profile

Surface layer:
0 to 10 inches—brown loam with dark gray iron depletions and brown iron accumulations

Subsoil layer:
10 to 16 inches—grayish brown loam with yellowish red, brown, and strong brown iron accumulations
16 to 23 inches—light brownish gray loam with strong brown iron accumulations
23 to 49 inches—gray loam with dark yellowish brown and brownish yellow iron accumulations
49 to 63 inches—gray silty clay with yellowish brown and dark yellowish brown iron accumulations
63 to 80 inches—dark gray silty clay with olive yellow and light yellowish brown iron accumulations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Water table: Perched at 1 foot to 4 feet during November through May
Hazard of flooding: Frequently flooded; brief duration
Runoff: Negligible
Permeability: Moderately slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Moderate

Contrasting Inclusions

- Iulus and Owentown soils that are loamy throughout the profile and are on natural levees
- Wet, mucky soils in remnant drains and sloughs

Land Use

Dominant Uses: Pasture
Other Uses: Woodland

Pasture and hayland

Limitations:
- Frequent flooding (fig. 8)
- Wetness

Management concerns:
- Establishment and maintenance of grasses are impractical during the wet season or when the soil has been flooded
- Equipment use and period of grazing are limited

Woodland

Limitations:
- Wetness
- Flooding

Management concerns:
- Moderate equipment limitations
- Seedling mortality
- Plant competition
- Areas generally are not suited for pine production

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Flooding
- Wetness
- Percs slowly

Management measures:
- None feasible; drainage, protection from flooding, and an onsite sewage treatment plant would be required

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Flooding
- Wetness

Management measures:
- Flood-control structures are needed; otherwise, buildings should be constructed on elevated pilings or mounds to elevate the foundation above the level of flooding

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low strength
- Flooding

Figure 8.—Water standing on the surface of an area of Dreka loam, frequently flooded, after a heavy rainfall.

Management measures:

- Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil
- Filling with suitable soil materials to build an elevated road base above the level of flooding and installing culverts of adequate size and spacing are needed to keep roads from being inundated and damaged during flood episodes

Interpretive Groups

Land capability classification: Vw
Pasture management group: 12
Woodland management group: 7

Es—Estes clay, frequently flooded

Setting

Landform: Flood plains
Landform position: Alluvial flats
Distinctive landform features: None
Slope: Nearly level

Shape of areas: Long and broad
Size of areas: One area of about 1,500 acres
Native vegetation: Hardwood

Composition

Estes and similar soils: 85 to 95 percent
Contrasting inclusions: 5 to 15 percent

Typical Profile

Surface layer:
0 to 4 inches—dark grayish brown clay

Subsoil layer:
4 to 9 inches—variegated grayish brown and strong brown clay
9 to 60 inches—gray clay with strong brown iron accumulations
60 to 80 inches—light brownish gray sandy clay loam with red and strong brown iron accumulations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Water table: Perched at 0 to 1.5 feet during November through May
Hazard of flooding: Frequently flooded; long duration
Runoff: Low
Permeability: Very slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: High

Contrasting Inclusions

- Iulus soils that are loamy throughout the profile and are on natural levees
- Laneville soils that are loamy in the upper part of the profile and are in landscape positions similar to those of the Estes soil
- Wet, mucky soils in remnant drains and sloughs

Land Use

Dominant Uses: Woodland
Other Uses: Pasture

Pasture and hayland

Limitations:
- Frequent flooding
- Wetness

Management concerns:
- Establishment and maintenance of grasses are impractical during the wet season or when the soil has been flooded
- Equipment use and period of grazing are limited

Woodland

Limitations:
- Wetness
- Flooding

Management concerns:
- Severe equipment limitations
- Moderate seedling mortality
- Plant competition
- Areas generally are not suited for pine production

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Flooding
- Wetness
- Percs slowly

Management measures:
- None feasible; drainage, protection from flooding, and an onsite sewage treatment plant would be required

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Flooding
- Wetness

Management measures:
- Flood-control structures are needed; otherwise, buildings should be constructed on elevated pilings or mounds to elevate the foundation above the level of flooding

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low soil strength
- Wetness
- Flooding

Management measures:
- Filling with suitable soil materials to build an elevated road base above the level of flooding and installing culverts of adequate size and spacing are needed to keep roads from being inundated and damaged during flood episodes

Interpretive Groups

Land capability classification: Vw
Pasture management group: 12
Woodland management group: 7

GaA—Gallime-Alazan complex, 0 to 2 percent slopes

Setting

Landform: Terraces
Landform position: Gallime—convex mounds; Alazan—concave intermounds
Distinctive landform features: Landscape is mounded
Slope: Gallime—very gently sloping; Alazan—nearly level to very gently sloping
Shape of areas: Irregular
Size of areas: 20 to 50 acres
Native vegetation: Pine/hardwood

Composition

Gallime and similar soils: 52 to 68 percent
Alazan and similar soils: 27 to 43 percent
(Individual areas of the two soils are so small or narrow that mapping them separately is not practical at the scale used)
Contrasting inclusions: 0 to 10 percent

Typical Profile

Gallime

Surface layer:
0 to 8 inches—dark brown very fine sandy loam

Subsurface layer:
8 to 24 inches—yellowish brown very fine sandy loam

Subsoil layer:
24 to 29 inches—yellowish brown loam
29 to 52 inches—brownish yellow sandy clay loam with yellowish red iron accumulations
52 to 80 inches—brownish yellow sandy clay loam with yellowish red and strong brown iron accumulations and pale brown streaks

Alazan

Surface layer:
0 to 5 inches—dark brown loam

Subsurface layer:
5 to 10 inches—pale brown loam with yellowish red and brownish yellow iron accumulations

Subsoil layer:
10 to 30 inches—strong brown sandy clay loam with yellowish red iron accumulations and grayish brown iron depletions with light brownish gray streaks
30 to 80 inches—reddish yellow sandy clay loam with yellowish red iron accumulations and light brownish gray streaks

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Gallime—well drained; Alazan—moderately well drained
Water table: Gallime—apparent at 4 to 6 feet during December through March; Alazan—apparent at 1.5 to 2.5 feet during January through April
Hazard of flooding: None
Runoff: Gallime—negligible; Alazan—very low
Permeability: Moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Gallime—moderate; Alazan—low

Contrasting Inclusions

- The poorly drained Derly and Mollville soils in depressional areas

Land Use

Dominant Uses: Pasture
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
- No significant limitations

Management concerns:
- None

Woodland

Limitations:
- Gallime—no significant limitations
- Alazan—seasonal wetness

Management concerns:
- Alazan—moderate equipment limitations and plant competition

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Gallime—moderate; Alazan—severe
Limitations:
- Gallime—wetness and percs slowly
- Alazan—wetness

Management measures:
- An oversize drain field design helps to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Gallime—slight; Alazan—moderate
Limitations:
- Gallime—no significant limitations
- Alazan—wetness

Management measures:
- Standard construction and landscaping techniques generally are adequate

Local Roads and Streets

Limitation rating: Gallime—slight; Alazan—moderate
Limitations:
- Gallime—no significant limitations
- Alazan—low soil strength and wetness

Management measures:
- Standard road building techniques generally are adequate

Interpretive Groups

Land capability classification: Gallime—I; Alazan—IIw
Pasture management group: Gallime and Alazan—1
Woodland management group: Gallime—8; Alazan—6

Ha—Hannahatchee fine sandy loam, occasionally flooded

Setting

Landform: Flood plains
Landform position: Alluvial flats
Distinctive landform features: None
Slope: Nearly level
Shape of areas: Elongated
Size of areas: 15 to 150 acres
Native vegetation: Pine/hardwood

Composition

Hannahatchee and similar soils: 80 to 100 percent
Contrasting inclusions: 0 to 20 percent

Typical Profile

Surface layer:
0 to 6 inches—reddish brown fine sandy loam

Subsoil layer:
6 to 21 inches—dark reddish brown loam
21 to 56 inches—yellowish red loam
56 to 80 inches—yellowish red sandy clay loam with red and reddish yellow lithochromic mottles

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Water table: Perched at 4 to 6 feet during March through May
Hazard of flooding: Occasionally flooded; brief duration
Runoff: Negligible
Permeability: Moderate
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

- Iulus and Laneville soils in lower and wetter positions than the Hannahatchee soil
- Gray, wet soils in depressional areas

Land Use

Dominant Uses: Pasture
Other Uses: Woodland

Pasture and hayland

Limitations:
- Occasional flooding

Management concerns:
- Establishment and maintenance of grasses are impractical during periods when the soil has been flooded
- Equipment use and period of grazing are limited

Woodland

Limitations:
- No significant limitations

Management concerns:
- None

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Flooding

Management measures:
- None feasible; protection from flooding would be required

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Flooding

Management measures:
- Flood-control structures are needed; otherwise, buildings should be constructed on elevated pilings or mounds to elevate the foundation above the level of flooding

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Flooding

Management measures:
- Filling with suitable soil materials to build an elevated road base above the level of flooding and installing culverts of adequate size and spacing are needed to keep roads from being inundated and damaged during flood episodes

Interpretive Groups

Land capability classification: IIw
Pasture management group: 2
Woodland management group: 1

Iu—Iulus fine sandy loam, occasionally flooded

Setting

Landform: Flood plains
Landform position: Alluvial flats
Distinctive landform features: None
Slope: Nearly level
Shape of areas: Elongated
Size of areas: 15 to 75 acres
Native vegetation: Pine/hardwood

Composition

Iulus and similar soils: 75 to 100 percent
Contrasting inclusions: 0 to 25 percent

Typical Profile

Surface layer:
0 to 4 inches—brown fine sandy loam

Subsurface layer:
4 to 17 inches—yellowish brown fine sandy loam

Subsoil layer:
17 to 24 inches—dark yellowish brown fine sandy loam with brownish yellow iron accumulations and light brownish gray iron depletions
24 to 35 inches—dark yellowish brown fine sandy loam with grayish brown iron accumulations
35 to 48 inches—variegated light brownish gray, yellowish red, and strong brown fine sandy loam
48 to 80 inches—light brownish gray fine sandy loam with strong brown iron accumulations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Water table: Perched at 1.5 to 4 feet during December through April
Hazard of flooding: Occasionally flooded; very brief duration
Runoff: Low
Permeability: Moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

- Laneville and Mattex soils that have a finer textured subsoil than the Iulus soil and are in lower and wetter positions than the Iulus soil

Land Use

Dominant Uses: Pasture
Other Uses: Woodland

Pasture and hayland

Limitations:
- Occasional flooding
- Wetness

Management concerns:
- Establishment and maintenance of grasses are impractical during the wet season in some years or when the soil has been flooded
- Equipment use and period of grazing are limited

Woodland

Limitations:
- Occasional flooding
- Seasonal wetness

Management concerns:
- Moderate equipment limitations

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Flooding
- Wetness

Management measures:
- None feasible; drainage, protection from flooding, and an onsite sewage treatment plant would be required

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Flooding

Management measures:
- Flood-control structures are needed; otherwise, buildings should be constructed on elevated pilings or mounds to elevate the foundation above the level of flooding

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Flooding

Management measures:
• Filling with suitable soil materials to build an elevated road base above the level of flooding and installing culverts of adequate size and spacing are needed to keep roads from being inundated and damaged during flood episodes

Interpretive Groups

Land capability classification: IIw
Pasture management group: 2
Woodland management group: 2

KaA—Kawah fine sand, 0 to 2 percent slopes

Setting

Landform: Uplands
Landform position: Concave depressions
Distinctive landform features: None
Slope: Nearly level to very gently sloping
Shape of areas: Oval
Size of areas: 10 to 35 acres
Native vegetation: Pine

Composition

Kawah and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Typical Profile

Surface layer:
0 to 6 inches—dark gray fine sand

Subsurface layer:
6 to 15 inches—grayish brown fine sand

Subsoil layer:
15 to 30 inches—pale brown fine sand with strong brown iron accumulations
30 to 80 inches—light gray fine sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Water table: Apparent at 1.5 to 3 feet during January through December
Hazard of flooding: None
Runoff: Negligible
Permeability: Rapid
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Low
Water erosion hazard: None
Shrink-swell potential: Low

Contrasting Inclusions

• Naconiche soils on narrow flood plains of small streams

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
• Seasonal wetness
Management concerns:
• Establishment and maintenance of grasses are impractical during the wet season in some years
• Equipment use and period of grazing are limited

Woodland

Limitations:
• Seasonal wetness
Management concerns:
• Severe equipment limitations
• Plant competition
• Moderate seedling mortality

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
• Wetness
• Poor filter
Management measures:
• An onsite sewage treatment plant generally is needed to treat wastewater properly

Dwellings without Basements

Limitation rating: Moderate
Limitations:
• Wetness
Management measures:
• Drainage may be needed around the foundations of buildings

Local Roads and Streets

Limitation rating: Moderate
Limitations:
• Wetness
Management measures:
• Roadside ditches generally are needed to remove excess water more quickly

Interpretive Groups

Land capability classification: IIIw
Pasture management group: 5
Woodland management group: 10

Kc—Keechi fine sandy loam, frequently flooded

Setting

Landform: Flood plains
Landform position: Alluvial flats
Distinctive landform features: None
Slope: Nearly level
Shape of areas: Long and broad
Size of areas: 15 to 50 acres
Native vegetation: Marsh

Composition

Keechi and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Typical Profile

Surface layer:
0 to 3 inches—very dark grayish brown fine sandy loam

Subsurface layer:
3 to 7 inches—gray fine sandy loam

Subsoil layer:
7 to 11 inches—gray fine sandy loam with light olive brown and strong brown iron accumulations
11 to 22 inches—light brownish gray fine sandy loam with brownish yellow iron accumulations
22 to 52 inches—gray fine sandy loam with brownish yellow iron accumulations
52 to 64 inches—gray fine sandy loam with light olive brown iron accumulations
64 to 80 inches—gray clay loam with yellowish brown and dark yellowish brown iron accumulations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Very poorly drained
Water table: Perched at -1 to 1.5 feet during January through December
Hazard of flooding: Frequently flooded; long duration
Runoff: Low
Permeability: Slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Low
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

- Dreka, Laneville, and Mattex soils that have a finer textured subsoil and are slightly drier than the Keechi soil and are in landscape positions similar to those of the Keechi soil
- Iulus soils that are drier and not as gray as the Keechi soil and are on natural levees

Land Use

Dominant Uses: Wildlife
Other Uses: None

Pasture and hayland

Limitations:
- Frequent flooding
- Wetness
- Ponding

Management concerns:
- Areas are not suited for improved pasture

Woodland

Limitations:
- Frequent flooding
- Wetness
- Ponding

Management concerns:
- Severe equipment limitations
- Seedling mortality
- Areas are not suited for pine production

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Flooding
- Ponding
- Percs slowly

Management measures:
- None feasible; flood-control structures, drainage, and the addition of large amounts of fill material would be required

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Flooding
- Ponding

Management measures:
- None feasible; flood-control and drainage structures and the addition of large amounts of fill material would be required

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Ponding
- Flooding

Management measures:
• Filling with suitable soil materials to build an elevated road base above the level of ponding and flooding and installing culverts of adequate size and spacing are needed to keep roads from being inundated and damaged during flood or high water episodes

Interpretive Groups

Land capability classification: VIIw
Pasture management group: Not assigned
Woodland management group: Not assigned

KfC—Kirvin fine sandy loam, 2 to 5 percent slopes

Setting

Landform: Uplands
Landform position: Convex knobs and ridges
Distinctive landform features: None
Slope: Gently sloping
Shape of areas: Irregular
Size of areas: 10 to 100 acres
Native vegetation: Pine

Composition

Kirvin and similar soils: 85 to 100 percent
Contrasting inclusions: 0 to 15 percent

Typical Profile

Surface layer:
0 to 5 inches—brown fine sandy loam

Subsoil layer:
5 to 18 inches—red clay with strong brown lithochromic mottles
18 to 31 inches—red clay with yellowish red lithochromic mottles
31 to 36 inches—red clay with strong brown lithochromic mottles and light brownish gray shale pieces
36 to 48 inches—red sandy clay loam with red and strong brown lithochromic mottles, light brownish gray shale pieces, and weathered glauconitic fragments

Underlying layer:
48 to 57 inches—light brownish gray stratified shale and reddish yellow sandstone with a sandy clay loam texture
57 to 65 inches—yellowish red and yellowish brown stratified weakly consolidated sandstone and light brownish gray shale with a sandy clay loam texture

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Very low to low
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Low to medium
Water erosion hazard: Slight to moderate
Shrink-swell potential: Moderate

Contrasting Inclusions

• Areas of loamy Bowie soils that have a seasonal high water table and are in lower landscape positions than the Kirvin soil
• Lilbert soils that have a thick, sandy surface layer and are in landscape positions similar to those of the Kirvin soil
• Tenaha soils that have a thick, sandy surface and subsurface layer and are on side slopes

Land Use

Dominant Uses: Pasture
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
• Seasonal droughtiness
Management concerns:
• Moderate available water capacity may limit production somewhat

Woodland

Limitations:
• No significant limitations
Management concerns:
• None

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
• Percs slowly
Management measures:
• An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Moderate
Limitations:
• Shrink-swell
Management measures:
• Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell

Local Roads and Streets

Limitation rating: Severe
Limitations:
• Low strength
Management measures:
• Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: IIIe
Pasture management group: 7
Woodland management group: 11

KfE—Kirvin fine sandy loam, 5 to 15 percent slopes

Setting

Landform: Uplands
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Moderately sloping to moderately steep
Shape of areas: Elongated
Size of areas: 25 to 100 acres
Native vegetation: Pine

Composition

Kirvin and similar soils: 80 to 100 percent
Contrasting inclusions: 0 to 20 percent

Typical Profile

Surface layer:
0 to 6 inches—dark yellowish brown fine sandy loam

Subsoil layer:
6 to 15 inches—dark red clay
15 to 23 inches—red clay with light brownish gray shale bits
23 to 30 inches—variegated red and light brownish gray clay with pale brown shale spots
30 to 38 inches—variegated red, light brownish gray, dark red, and reddish yellow clay with small shale pieces
38 to 51 inches—variegated yellowish brown and red clay with reddish brown shale pieces

Underlying layer:
51 to 80 inches—reddish brown and yellowish brown shale with a clay loam texture

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Low to medium
Water erosion hazard: Severe
Shrink-swell potential: Moderate

Contrasting Inclusions

• Bowie soils that have a loamy subsoil and are on ridges
• Iulus soils that are loamy throughout the profile and are on narrow flood plains of small creeks
• Tenaha soils that have a thick, sandy surface and subsurface layer and are in landscape positions similar to those of the Kirvin soil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
• Seasonal droughtiness
• Medium rate of runoff
• Severe erosion hazard
Management concerns:
• Production may be limited somewhat due to moderate available water capacity
• Areas should be protected from erosion during establishment or renovation of pastures
• Care should be taken not to overgraze

Woodland

Limitations:
• Slope
• Low soil strength
• Medium rate of runoff
Management concerns:
• Moderate erosion hazard
• Equipment limitations

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
• Percs slowly
Management measures:
• An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Moderate

Limitations:
- Shrink-swell
- Slope

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell
- Constructing buildings on less sloping areas, preserving plant cover during construction, and proper landscaping can help to reduce soil erosion and runoff problems

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low strength

Management measures:
- Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: VIe
Pasture management group: 9
Woodland management group: 12

KgC—Kirvin gravelly fine sandy loam, 2 to 5 percent slopes

Setting

Landform: Uplands
Landform position: Convex knobs and ridges
Distinctive landform features: None
Slope: Gently sloping
Shape of areas: Round to linear
Size of areas: 20 to 150 acres
Native vegetation: Pine

Composition

Kirvin and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Typical Profile

Surface layer:
0 to 3 inches—brown gravelly fine sandy loam

Subsurface layer:
3 to 12 inches—dark brown gravelly fine sandy loam
12 to 16 inches—yellowish red gravelly fine sandy loam

Subsoil layer:
16 to 24 inches—red clay
24 to 31 inches—red clay with dark red and brownish yellow lithochromic mottles
31 to 44 inches—variegated dark red and yellowish brown clay with light brownish gray shale strata

Underlying layer:
44 to 62 inches—variegated gray, brown, red, and yellow stratified shale and sandstone with a sandy clay loam texture

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Very low to low
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Low to medium
Water erosion hazard: Moderate
Shrink-swell potential: Moderate

Contrasting Inclusions

- Lilbert soils that have a thick, sandy surface layer and are in landscape positions similar to those of the Kirvin soil
- Tenaha soils that have a thick, sandy surface and subsurface layer and are on side slopes
- Areas of loamy Bowie soils that have a seasonal high water table and are in lower landscape positions than the Kirvin soil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban (fig. 9)

Pasture and hayland

Limitations:
- Seasonal droughtiness

Management concerns:
- Moderate available water capacity may limit production somewhat

Woodland

Limitations:
- No significant limitations

Management concerns:
- None

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly

Figure 9.—Well managed bahiagrass in an area of Kirvin gravelly fine sandy loam, 2 to 5 percent slopes.

Management measures:
- An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Shrink-swell

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low strength

Management measures:
- Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: IVe
Pasture management group: 7
Woodland management group: 16

KsC—Kirvin soils graded, 2 to 8 percent slopes

Setting

Landform: Uplands
Landform position: Convex knobs and ridges

Distinctive landform features: Gravel pits
Slope: Very gently sloping to moderately sloping
Shape of areas: Irregular
Size of areas: 10 to 30 acres
Native vegetation: Pine

Composition

Kirvin and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Typical Profile

Subsoil layer:
0 to 4 inches—red clay loam with brownish yellow lithochromic mottles
4 to 21 inches—red clay with yellowish brown lithochromic mottles
21 to 41 inches—variegated red and yellowish brown clay

Underlying layer:
41 to 52 inches—variegated red, gray, and yellow stratified shale and sandstone with a clay loam texture
52 to 80 inches—weathered shale, sandstone, and weathered glauconitic material with a sandy clay loam texture

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Very low to medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Low to medium
Water erosion hazard: Moderate to severe
Shrink-swell potential: Moderate

Contrasting Inclusions

- Kirvin and Cuthbert soils that have not been desurfaced and are in landscape positions similar to those of the Kirvin soil
- Areas of sandy Lilbert and Tenaha soils in landscape positions similar to those of the Kirvin soil

Land Use

Dominant Uses: Gravel pits
Other Uses: Woodland, pasture, and urban

Pasture and hayland

Limitations:
- Low soil fertility
- Lack of topsoil
- Seasonal droughtiness

Management concerns:
- Grasses are difficult to establish and maintain without addition of significant amounts of soil amendments and mulch

Woodland

Limitations:
- Slope
- Low soil strength
- Moderate available water capacity

Management concerns:
- Moderate erosion hazard
- Equipment limitations
- Seedling mortality

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly

Management measures:
- An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Shrink-swell

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low strength

Management measures:
- Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: VIe
Pasture management group: 13
Woodland management group: 20

La—Laneville loam, occasionally flooded

Setting

Landform: Flood plains
Landform position: Alluvial flats
Distinctive landform features: None
Slope: Nearly level
Shape of areas: Long and narrow to broad
Size of areas: 50 to 250 acres
Native vegetation: Hardwood/pine

Composition

Laneville and similar soils: 65 to 100 percent
Contrasting inclusions: 0 to 35 percent

Typical Profile

Surface layer:
0 to 4 inches—brown loam with strong brown iron accumulations

Subsoil layer:
4 to 16 inches—dark yellowish brown loam with strong brown and pale brown iron accumulations and light brownish gray iron depletions
16 to 48 inches—yellowish brown clay loam with strong brown iron accumulations and light brownish gray iron depletions
48 to 80 inches—grayish brown clay loam with dark yellowish brown, dark brown, and strong brown iron accumulations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Water table: Perched at 1.5 to 3 feet during November through May
Hazard of flooding: Occasionally flooded; brief or very brief duration
Runoff: Very low
Permeability: Slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Moderate

Contrasting Inclusions

- Iulus and Owentown soils that have a coarser subsoil than the Laneville soil and are in landscape positions similar to those of the Laneville soil
- Mattex soils that are grayer, wetter, and in lower areas than the Laneville soil

Land Use

Dominant Uses: Pasture
Other Uses: Woodland

Pasture and hayland

Limitations:
- Occasional flooding

Management concerns:
- Establishment and maintenance of grasses are impractical during periods when the soil has been flooded
- Equipment use and period of grazing are limited

Woodland

Limitations:
- Occasional flooding
- Seasonal wetness

Management concerns:
- Moderate equipment limitations
- Plant competition

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Flooding
- Wetness
- Percs slowly

Management measures:
- None feasible; drainage, protection from flooding, and an onsite sewage treatment plant would be required

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Flooding

Management measures:
- Flood-control structures are needed; otherwise, buildings should be constructed on elevated pilings or mounds to elevate the foundation above the level of flooding

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low strength
- Flooding

Management measures:
- Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil
- Filling with suitable soil materials to build an elevated road base above the level of flooding and installing culverts of adequate size and spacing are needed to keep roads from being inundated and damaged during flood episodes

Interpretive Groups

Land capability classification: IIw
Pasture management group: 2
Woodland management group: 2

Lf—Laneville loam, frequently flooded

Setting

Landform: Flood plains
Landform position: Alluvial flats
Distinctive landform features: None
Slope: Nearly level
Shape of areas: Elongated
Size of areas: 50 to 300 acres
Native vegetation: Hardwood/pine

Composition

Laneville and similar soils: 65 to 100 percent
Contrasting inclusions: 0 to 35 percent

Typical Profile

Surface layer:
0 to 4 inches—brown loam

Subsurface layer:
4 to 15 inches—yellowish brown silt loam with brown iron accumulations

Subsoil layer:
15 to 22 inches—variegated dark yellowish brown, yellowish brown, and grayish brown clay loam
22 to 36 inches—variegated yellowish brown, grayish brown, and strong brown clay loam
36 to 50 inches—gray clay loam with strong brown and red iron accumulations
50 to 80 inches—gray clay loam with red and light olive brown iron accumulations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Water table: Perched at 1.5 to 3 feet during November through May
Hazard of flooding: Frequently flooded; brief or very brief duration
Runoff: Very low
Permeability: Slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Moderate

Contrasting Inclusions

- Hannahatchee soils that have a red subsoil and are in landscape positions similar to those of the Laneville soil
- Iulus and Owentown soils that have a coarser subsoil than the Laneville soil and are on natural levees
- Mattex soils that are wetter, grayer, and in lower areas than the Laneville soil

Land Use

Dominant Uses: Pasture
Other Uses: Woodland

Pasture and hayland

Limitations:
- Frequent flooding

Management concerns:
- Establishment and maintenance of grasses are impractical during periods when the soil has been flooded
- Equipment use and period of grazing are limited

Woodland

Limitations:
- Frequent flooding
- Seasonal wetness

Management concerns:
- Moderate equipment limitations
- Plant competition

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Flooding
- Wetness
- Percs slowly

Management measures:
- None feasible; drainage, protection from flooding, and an onsite sewage treatment plant would be required

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Flooding

Management measures:
- Flood-control structures are needed; otherwise, buildings should be constructed on elevated pilings or mounds to elevate the foundation above the level of flooding

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low strength
- Flooding

Management measures:
- Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil
- Filling with suitable soil materials to build an elevated road base above the level of flooding and installing culverts of adequate size and spacing are needed to keep roads from being inundated and damaged during flood episodes

Interpretive Groups

Land capability classification: Vw
Pasture management group: 2
Woodland management group: 2

LtB—Latex very fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Landform position: Convex interstream divides
Distinctive landform features: None
Slope: Very gently sloping
Shape of areas: Oblong
Size of areas: 20 to 100 acres
Native vegetation: Pine

Composition

Latex and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Typical Profile

Surface layer:
0 to 3 inches—yellowish brown very fine sandy loam

Subsurface layer:
3 to 9 inches—light yellowish brown very fine sandy loam

Subsoil layer:
9 to 15 inches—yellowish brown clay loam
15 to 23 inches—yellowish brown clay loam with yellowish red iron accumulations
23 to 46 inches—yellowish brown clay loam with red iron accumulations
46 to 80 inches—light brownish gray clay with red and brownish yellow iron accumulations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Water table: Perched at 3 to 4.5 feet during December through April
Hazard of flooding: None
Runoff: Low
Permeability: Slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: High

Contrasting Inclusions

- Meth soils that are developed from 40 to 60 inches deep and are on knobs and ridges
- Woodtell soils that have a clayey subsoil and are in landscape positions similar to those of the Latex soil

Land Use

Dominant Uses: Pine
Other Uses: Woodland and urban

Pasture and hayland (fig. 10)

Limitations:
- No significant limitations

Management concerns:
- None

Woodland

Limitations:
- No significant limitations

Management concerns:
- None

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Wetness
- Percs slowly

Management measures:
- An onsite sewage treatment plant generally is needed to dispose of wastewater properly

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Shrink-swell

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell

Local Roads and Streets

Limitation rating: Moderate
Limitations:
- Shrink-swell
- Low strength

Figure 10.—An area of Latex very fine sandy loam, 1 to 3 percent slopes, used as winter pasture of small grains for livestock grazing.

Management measures:
- Backfilling with suitable soil materials helps to minimize the hazard of damage to roads and streets due to shrink-swell and low strength in the subsoil

Interpretive Groups

Land capability classification: IIe
Pasture management group: 1
Woodland management group: 8

LyC—Lilbert loamy fine sand, 2 to 5 percent slopes

Setting

Landform: Uplands
Landform position: Broad convex ridges
Distinctive landform features: None
Slope: Gently sloping
Shape of areas: Irregular
Size of areas: 15 to 100 acres
Native vegetation: Pine

Composition

Lilbert and similar soils: 85 to 100 percent
Contrasting inclusions: 0 to 15 percent

Typical Profile

Surface layer:
0 to 10 inches—brown loamy fine sand

Subsurface layer:
10 to 29 inches—light yellowish brown loamy fine sand

Subsoil layer:
29 to 38 inches—yellowish brown sandy clay loam with yellowish red iron accumulations
38 to 49 inches—yellowish brown sandy clay loam with yellowish red and red iron accumulations
49 to 80 inches—brownish yellow sandy clay loam with red, yellowish red, and dark reddish brown iron accumulations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Moderately slow
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

- Betis soils that have a loamy fine sand texture throughout and are in slightly higher landscape positions than the Lilbert soil
- Bowie and Kirvin soils that do not have a thick, sandy surface layer and are in landscape positions similar to those of the Lilbert soil
- Cuthbert soils that have a clayey subsoil and are on side slopes

Land Use

Dominant Uses: Pasture
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
- Medium soil fertility
- Roughness

Management concerns:
- Production may be limited during dry years due to low available water capacity in the sandy surface layer
- Care should be taken not to overgraze

Woodland

Limitations:
- Loose, sandy surface layer
- Low available water capacity

Management concerns:
- Moderate equipment limitations
- Seedling mortality

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly

Management measures:
- An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Slight
Limitations:
- No significant limitations

Management measures:
- Standard construction and landscaping techniques generally are adequate

Local Roads and Streets

Limitation rating: Slight
Limitations:
- No significant limitations

Management measures:
- Standard road building techniques generally are adequate

Interpretive Groups

Land capability classification: IIIe
Pasture management group: 6
Woodland management group: 9

MaE—Maben fine sandy loam, 5 to 15 percent slopes

Setting

Landform: Uplands
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Moderately sloping to moderately steep
Shape of areas: Elongated
Size of areas: 15 to 150 acres
Native vegetation: Pine

Composition

Maben and similar soils: 85 to 100 percent
Contrasting inclusions: 0 to 15 percent

Typical Profile

Surface layer:
0 to 4 inches—brown fine sandy loam

Subsoil layer:
4 to 15 inches—yellowish red clay with red and strong brown lithochromic mottles
15 to 27 inches—red clay with strong brown, yellowish brown, and light yellowish brown lithochromic mottles
27 to 34 inches—yellowish red clay with strong brown lithochromic mottles
34 to 38 inches—variegated reddish yellow, grayish brown, and yellowish red clay loam

Underlying layer:
38 to 60 inches—interlayered light olive gray and yellowish brown shale and siltstone with a silty clay loam texture

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Moderately deep
Natural soil fertility: Medium
Water erosion hazard: Severe
Shrink-swell potential: High

Contrasting Inclusions

- Bernaldo soils that are less clayey than the Maben soil and are in landscape positions similar to those of the Maben soil
- Iulus soils that are loamy throughout the profile and are on narrow flood plains of small streams
- Meth soils that are developed deeper than 40 inches and are on knobs and ridges
- Tenaha soils that have a thick, sandy surface and subsurface layer and are in landscape positions similar to those of the Maben soil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
- Droughtiness
- Medium rate of runoff
- Severe erosion hazard

Management concerns:
- Production may be limited during dry years due to moderate available water capacity
- Areas should be protected from erosion during establishment or renovation of pastures
- Care should be taken not to overgraze

Woodland

Limitations:
- Low soil strength
- Slope
- Medium rate of runoff

Management concerns:
- Moderate erosion hazard
- Equipment limitations

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly

Management measures:
- An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Shrink-swell
- Slope

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell
- Constructing buildings on less sloping areas, preserving plant cover during construction, and proper landscaping can help to reduce soil erosion and runoff problems

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low strength

Management measures:
- Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: IVe
Pasture management group: 9
Woodland management group: 12

Me—Mattex clay loam, frequently flooded

Setting

Landform: Flood plains
Landform position: Alluvial flats
Distinctive landform features: None
Slope: Nearly level
Shape of areas: Long and broad
Size of areas: 20 to 50 acres
Native vegetation: Hardwood

Composition

Mattex and similar soils: 70 to 100 percent
Contrasting inclusions: 0 to 30 percent

Typical Profile

Surface layer:
0 to 8 inches—dark brown clay loam with dark grayish brown iron depletions

Subsurface layer:
8 to 13 inches—dark gray loam with yellowish brown iron accumulations

Subsoil layer:
13 to 26 inches—grayish brown sandy clay loam with yellowish brown iron accumulations
26 to 34 inches—gray sandy clay loam with yellowish brown iron accumulations
34 to 44 inches—variegated light brownish gray and gray very fine sandy loam with yellowish brown iron accumulations
44 to 80 inches—dark gray clay loam with red and dark yellowish brown iron accumulations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
Water table: Perched at 1 foot to 2.5 feet during December through March
Hazard of flooding: Frequently flooded; long duration (fig. 11)
Runoff: Low
Permeability: Slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

- The moderately well drained Iulus and Laneville soils that have a browner subsoil than the Mattex soil and are on natural levees and in higher landscape positions than the Mattex soil
- Naconiche soils that have a mucky texture and are in lower and wetter areas and sloughs

Land Use

Dominant Uses: Woodland
Other Uses: Pasture

Pasture and hayland

Limitations:
- Frequent flooding
- Wetness

Management concerns:
- Establishment and maintenance of grasses are impractical during the wet season or when the soil has been flooded
- Equipment use and period of grazing are limited

Woodland

Limitations:
- Frequent flooding
- Wetness

Management concerns:
- Severe equipment limitations
- Windthrow hazard
- Moderate seedling mortality
- Plant competition
- Areas generally are not suited for pine production

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Flooding
- Wetness
- Percs slowly

Management measures:
- None feasible; drainage, protection from flooding, and an onsite sewage treatment plant would be required

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Flooding
- Wetness

Management measures:
- Flood-control structures are needed; otherwise, buildings should be constructed on elevated pilings or mounds to elevate the foundation above the level of flooding

Figure 11.—An area of Mattex clay loam, frequently flooded, is inundated for several days to several weeks after a heavy rainfall, which severely limits its use for pasture, woodland, or urban development.

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Flooding

Management measures:
- Filling with suitable soil materials to build an elevated road base above the level of flooding and installing culverts of adequate size and spacing are needed to keep roads from being inundated and damaged during flood episodes

Interpretive Groups

Land capability classification: Vw
Pasture management group: 12
Woodland management group: 7

Mo—Mattex-Owentown complex, flooded

Setting

Landform: Flood plains
Landform position: Mattex—mounds;
Owentown—intermounds
Distinctive landform features: Landscape is mounded
Slope: Nearly level
Shape of areas: Elongated
Size of areas: 50 to 200 acres
Native vegetation: Hardwood/pine

Composition

Mattex and similar soils: 37 to 53 percent

Owentown and similar soils: 32 to 48 percent
(Individual areas of the two soils are so small or narrow that mapping them separately is not practical at the scale used)
Contrasting inclusions: 10 to 20 percent

Typical Profile

Mattex

Surface layer:
0 to 5 inches—brown loam

Subsoil layer:
5 to 17 inches—grayish brown loam with brown and yellowish brown iron accumulations and light brownish gray iron depletions
17 to 30 inches—grayish brown clay loam with strong brown iron accumulations
30 to 80 inches—grayish brown clay loam with yellowish brown iron accumulations

Owentown

Surface layer:
0 to 6 inches—dark yellowish brown loam

Subsoil layer:
6 to 14 inches—dark yellowish brown loam with reddish yellow iron accumulations
14 to 29 inches—strong brown fine sandy loam
29 to 80 inches—yellowish brown fine sandy loam with light brownish gray iron depletions and yellowish brown iron accumulations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Mattex—somewhat poorly drained; Owentown—moderately well drained
Water table: Mattex—perched at 1 foot to 2.5 feet during December through March; Owentown—apparent at 2.5 to 4 feet during October through June
Hazard of flooding: Mattex—frequently flooded, long duration; Owentown—occasionally flooded, brief duration
Runoff: Mattex—very low; Owentown—low
Permeability: Mattex—slow; Owentown—moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

- Wet, mucky soils on sloughs and intermittent drains

Land Use

Dominant Uses: Pasture
Other Uses: Woodland

Pasture and hayland

Limitations:
- Flooding
- Wetness

Management concerns:
- Establishment and maintenance of grasses are impractical during the wet season or when the soil has been flooded
- Equipment use and period of grazing are limited

Woodland

Limitations:
- Flooding
- Wetness

Management concerns:
- Mattex—severe equipment limitations, windthrow hazard, moderate seedling mortality, plant competition; areas generally are not suited for pine production
- Owentown—none

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Mattex—flooding, wetness, and percs slowly
- Owentown—flooding and wetness

Management measures:
- None feasible; drainage, protection from flooding, and an onsite sewage treatment plant would be required

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Mattex—flooding and wetness
- Owentown—flooding

Management measures:
- Flood-control structures are needed; otherwise, buildings should be constructed on elevated pilings or mounds to elevate the foundation above the level of flooding

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Flooding

Management measures:
- Filling with suitable soil materials to build an elevated road base above the level of flooding and installing culverts of adequate size and spacing are needed to keep roads from being inundated and damaged during flood episodes

Interpretive Groups

Land capability classification: Mattex—Vw; Owentown—IIw
Pasture management group: Mattex—12; Owentown—2
Woodland management group: Mattex—7; Owentown—1

MtC—Meth fine sandy loam, 2 to 5 percent slopes

Setting

Landform: Uplands
Landform position: Convex knobs and ridges
Distinctive landform features: None
Slope: Gently sloping
Shape of areas: Irregular
Size of areas: 20 to 100 acres
Native vegetation: Pine

Composition

Meth and similar soils: 80 to 100 percent
Contrasting inclusions: 0 to 20 percent

Typical Profile

Surface layer:
0 to 12 inches—dark yellowish brown fine sandy loam

Subsoil layer:
12 to 51 inches—red clay with yellowish brown lithochromic mottles
51 to 80 inches—red sandy clay loam with yellowish brown lithochromic mottles and pockets of light brownish gray shale

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Moderately slow
Available water capacity: High
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Moderate
Shrink-swell potential: Moderate

Contrasting Inclusions

- Maben soils that are developed from 20 to 40 inches deep and are on side slopes
- Sawlit and Latex soils that have a loamy subsoil and are in lower landscape positions than the Meth soil

Land Use

Dominant Uses: Pasture
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
- Seasonal droughtiness

Management concerns:
- Moderate available water capacity may limit production somewhat

Woodland

Limitations:
- No significant limitations

Management concerns:
- None

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly

Management measures:
- An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Shrink-swell

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low strength

Management measures:
- Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: IIIe
Pasture management group: 7
Woodland management group: 11

MvA—Mollville-Besner complex, 0 to 1 percent slopes

Setting

Landform: Terraces
Landform position: Mollville—concave intermounds; Besner—convex mounds
Distinctive landform features: Landscape is mounded
Slope: Nearly level
Shape of areas: Irregular
Size of areas: 10 to 75 acres
Native vegetation: Hardwood/pine

Composition

Mollville and similar soils: 42 to 58 percent
Besner and similar soils: 22 to 38 percent
(Individual areas of the two soils are so small or narrow that mapping them separately is not practical at the scale used)
Contrasting inclusions: 15 to 25 percent

Typical Profile

Mollville

Surface layer:
0 to 4 inches—dark grayish brown loam

Subsurface layer:
4 to 8 inches—grayish brown loam
8 to 13 inches—light brownish gray loam

Subsoil layer:
13 to 21 inches—grayish brown loam with yellowish brown iron accumulations and light brownish gray streaks
21 to 55 inches—grayish brown clay loam with strong brown iron accumulations and light brownish gray streaks
55 to 80 inches—grayish brown sandy clay loam with yellowish brown iron accumulations

Besner

Surface layer:
0 to 4 inches—dark grayish brown fine sandy loam

Subsurface layer:
4 to 21 inches—yellowish brown fine sandy loam
21 to 32 inches—light yellowish brown fine sandy loam

Subsoil layer:
32 to 60 inches—light yellowish brown loam with strong brown iron accumulations and light brownish gray streaks
60 to 80 inches—yellowish brown sandy clay loam with light brownish gray streaks

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Mollville—poorly drained; Besner—well drained
Water table: Mollville—perched at -0.5 to 1 foot during November through June; Besner—apparent at 3.5 to 5 feet during January through February
Hazard of flooding: None
Runoff: Negligible
Permeability: Mollville—slow; Besner—moderate
Available water capacity: Mollville—high; Besner—moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Mollville—moderate; Besner—low

Contrasting Inclusions

- Alazan soils that have a browner subsoil and are better drained than the Mollville soil and are in landscape positions similar to those of the Besner and Mollville soils
- Bernaldo soils that are not as gray as the Mollville soil, have a finer textured subsoil than the Besner soil, and are in landscape positions similar to those of the Besner and Mollville soils
- Bienville soils that have a loamy fine sand or fine sand subsoil and are in landscape positions similar to those of the Besner and Mollville soils
- Wet, mucky soils in some lower areas

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
- Wetness
- Ponding

Management concerns:
- Establishment and maintenance of grasses are impractical during the wet season
- Equipment use and period of grazing are limited

Woodland

Limitations:
- Mollville—wetness and ponding
- Besner—no significant limitations

Management concerns:
- Mollville—severe equipment limitations, plant competition, and moderate seedling mortality

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Mollville—severe; Besner—moderate
Limitations:
- Mollville—ponding and percs slowly
- Besner—wetness and percs slowly

Management measures:
- None feasible; drainage and the addition of large amounts of fill material would be required

Dwellings without Basements

Limitation rating: Mollville—severe; Besner—slight
Limitations:
- Mollville—ponding
- Besner—no significant limitations

Management measures:
- None feasible; drainage and the addition of large amounts of fill material would be required

Local Roads and Streets

Limitation rating: Mollville—severe; Besner—slight
Limitations:
- Mollville—ponding
- Besner—no significant limitations

Management measures:
- Mollville—filling with suitable soil materials to build an elevated road base above the level of ponding and installing culverts of adequate size and spacing are needed to keep roads from being inundated and damaged during high water episodes

Interpretive Groups

Land capability classification: Mollville—IVw; Besner—IIe
Pasture management group: Mollville—11; Besner—1
Woodland management group: Mollville—18; Besner—8

Na—Naconiche mucky sandy loam, frequently flooded

Setting

Landform: Flood plains
Landform position: Alluvial flats
Distinctive landform features: None
Slope: Nearly level to very gently sloping
Shape of areas: Elongated
Size of areas: 15 to 75 acres
Native vegetation: Hardwood

Composition

Naconiche and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Typical Profile

Surface layer:
0 to 12 inches—very dark gray mucky sandy loam with white spots
12 to 19 inches—black mucky fine sandy loam

Subsoil layer:
19 to 29 inches—very dark gray sand
29 to 32 inches—dark gray sand with white spots
32 to 36 inches—black loamy sand with white spots
36 to 40 inches—light gray sand
40 to 45 inches—black sand
45 to 52 inches—very dark grayish brown mucky fine sandy loam with dark brown and black strata
52 to 57 inches—light gray sand
57 to 67 inches—black, very dark gray, and white loamy fine sand
67 to 73 inches—white fine sand
73 to 80 inches—dark grayish brown fine sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Very poorly drained
Water table: Apparent at 0 to 1 foot during January through December
Hazard of flooding: Frequently flooded; long to very long duration
Runoff: Negligible
Permeability: Moderately rapid
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

- Iulus soils that have a loamy subsoil and are on natural levees
- Kawah soils that have a fine sand texture throughout and are on toeslopes

Land Use

Dominant Uses: Woodland
Other Uses: Pasture

Pasture and hayland

Limitations:
- Frequent flooding
- Wetness

Management concerns:
- Areas generally are not suited for improved pasture

Woodland

Limitations:
- Frequent flooding
- Wetness

Management concerns:
- Severe equipment limitations
- Windthrow hazard
- Seedling mortality
- Plant competition

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Flooding
- Wetness

Management measures:
- None feasible; drainage, protection from flooding, and an onsite sewage treatment plant would be required

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Flooding
- Wetness

Management measures:
- Flood-control structures are needed; otherwise, buildings should be constructed on elevated pilings or mounds to elevate the foundation above the level of flooding

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Wetness
- Flooding

Management measures:
- Filling with suitable soil materials to build an elevated road base above the level of flooding and installing culverts of adequate size and spacing are needed to keep roads from being inundated and damaged during flood or high water episodes

Interpretive Groups

Land capability classification: VIIw
Pasture management group: Not assigned
Woodland management group: 3

Ow—Owentown fine sandy loam, occasionally flooded

Setting

Landform: Flood plains
Landform position: Alluvial flats
Distinctive landform features: None
Slope: Nearly level
Shape of areas: Elongated
Size of areas: 20 to 50 acres
Native vegetation: Pine/hardwood

Composition

Owentown and similar soils: 80 to 100 percent
Contrasting inclusions: 0 to 20 percent

Typical Profile

Surface layer:
0 to 16 inches—dark yellowish brown fine sandy loam

Subsoil layer:
16 to 40 inches—yellowish brown loam
40 to 53 inches—brownish yellow loam with light yellowish brown spots
53 to 80 inches—brownish yellow loam with very pale brown spots and light yellowish brown iron accumulations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Water table: Apparent at 2.5 to 4 feet during October through June
Hazard of flooding: Occasionally flooded; brief duration
Runoff: Very low
Permeability: Moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

- Dreka, Laneville, and Mattex soils that are grayer than the Owentown soil due to wetness and are in lower landscape positions than the Owentown soil

Land Use

Dominant Uses: Pasture
Other Uses: Woodland

Pasture and hayland

Limitations:
- Occasional flooding

Management concerns:
- Establishment and maintenance of grasses are impractical during periods when the soil has been flooded
- Equipment use and period of grazing are limited

Woodland

Limitations:
- No significant limitations

Management concerns:
- None

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Flooding
- Wetness

Management measures:
- None feasible; drainage, protection from flooding, and an onsite sewage treatment plant would be required

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Flooding

Management measures:
- Flood-control structures are needed; otherwise, buildings should be constructed on elevated pilings or mounds to elevate the foundation above the level of flooding

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Flooding

Management measures:
- Filling with suitable soil materials to build an elevated road base above the level of flooding and installing culverts of adequate size and spacing are needed to keep roads from being inundated and damaged during flood episodes

Interpretive Groups

Land capability classification: IIw
Pasture management group: 2
Woodland management group: 1

PrC—Pirkey very fine sandy loam, 1 to 5 percent slopes

Setting

Landform: Uplands
Landform position: Convex interstream divides
Distinctive landform features: Reclaimed mine areas
Slope: Gently sloping
Shape of areas: Broad to oval
Size of areas: 10 to 250 acres
Native vegetation: None

Composition

Pirkey and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Typical Profile

Surface layer:
0 to 7 inches—yellowish brown very fine sandy loam

Subsurface layer:
7 to 15 inches—yellowish brown and yellowish red very fine sandy loam

Subsoil layer:
15 to 22 inches—red sandy clay loam with strong brown and light brownish gray spots
22 to 35 inches—red sandy clay loam with strong brown spots and dark red clay balls
35 to 55 inches—red sandy clay loam with strong brown and light gray spots

Underlying layer:
55 to 80 inches—olive gray silty clay loam with dark gray, light gray, and red spots

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Low
Water erosion hazard: Moderate
Shrink-swell potential: Moderate

Contrasting Inclusions

- Soils with a mixture of oxidized and unoxidized material in the upper 48 inches

Land Use

Dominant Uses: Pasture
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
- Seasonal droughtiness

Management concerns:
- Moderate available water capacity may limit production somewhat

Woodland

Limitations:
- No significant limitations

Management concerns:
- None

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly

Management measures:
- An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Unstable fill

Management measures:
- None feasible; grading, filling, drainage, and compaction of fill materials generally would be needed to create a suitable building site

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low soil strength
- Unstable fill

Management measures:
- Backfilling with suitable soil materials, compaction, and special road base design generally are needed to prevent damage to roads and streets due to low soil strength and uncertain stability

Interpretive Groups

Land capability classification: IVe
Pasture management group: 7
Woodland management group: Not assigned

PrD—Pirkey very fine sandy loam, 5 to 12 percent slopes

Setting

Landform: Uplands
Landform position: Convex side slopes
Distinctive landform features: Reclaimed mine areas
Slope: Strongly sloping
Shape of areas: Irregular
Size of areas: 10 to 20 acres
Native vegetation: None

Composition

Pirkey and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Typical Profile

Surface layer:
0 to 10 inches—brown very fine sandy loam

Subsoil layer:
10 to 24 inches—strong brown sandy clay loam
24 to 50 inches—yellowish brown sandy clay loam with yellowish red and red spots

Underlying layer:
50 to 70 inches—very dark gray silty clay with dark red and strong brown spots
70 to 80 inches—dark gray silty clay with yellowish red, red, and gray spots

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: High
Permeability: Slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Low
Water erosion hazard: Moderate
Shrink-swell potential: Moderate

Contrasting Inclusions

- Soils with a mixture of oxidized and unoxidized material in the upper 48 inches

Land Use

Dominant Uses: Hayland
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
- Droughtiness
- High rate of runoff
- Moderate erosion hazard

Management concerns:
- Production may be limited during dry years due to moderate available water capacity
- Areas should be protected from erosion during establishment or renovation of pastures
- Care should be taken not to overgraze

Woodland

Limitations:
- High rate of runoff

Management concerns:
- Moderate erosion hazard

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly

Management measures:
- An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Unstable fill

Management measures:
- None feasible; grading, filling, drainage, and compaction of fill materials generally would be needed to create a suitable building site

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low soil strength
- Unstable fill

Management measures:
- Backfilling with suitable soil materials, compaction, and special road base design generally are needed to prevent damage to roads and streets due to low soil strength and uncertain stability

Interpretive Groups

Land capability classification: VIe
Pasture management group: 9
Woodland management group: Not assigned

Pt—Pits

Setting

Landform: Uplands
Landform position: Variable
Distinctive landform features: Open excavations from which soil and geologic materials have been removed, and spoil piles
Shape of areas: Angular or irregular
Size of areas: 3 to 25 acres
Slope: Very gently sloping to moderately steep
Native vegetation: None

Composition

Pits and similar soils: 91 to 99 percent
Contrasting inclusions: 1 to 9 percent

Soil Properties and Qualities

Depth class: Variable
Drainage class: Variable
Water table: Variable
Hazard of flooding: None
Runoff: Variable
Permeability: Variable
Available water capacity: Variable
Root zone: Variable
Natural soil fertility: Very low
Water erosion hazard: Variable
Shrink-swell potential: Variable

Contrasting Inclusions

- Betis, Kirvin, and Redsprings soils that have undisturbed profiles and are in areas adjacent to the pits

Land Use

Dominant Uses: Mining operations (fig. 12)
Other Uses: Wildlife or recreational uses

Pasture and hayland

Limitations:
- Infertile soil material
- Slope
- Uneven terrain
- Ponding

Management concerns:
- Areas are not suited for improved pasture

Woodland

Limitations:
- Infertile soil material
- Slope
- Uneven terrain
- Ponding

Figure 12.—An area of Pits that contains ponding water, irregular slopes, and infertile soil material. Extraction of soil material for use in brick manufacturing and road construction caused these pits.

Management concerns:
- Severe seedling mortality
- Equipment limitations
- Areas generally are not suited for pine production

Urban Use

Septic Tank Absorption Fields

Limitation rating: Variable
Limitations:
- Variable

Management measures:
- None feasible

Dwellings without Basements

Limitation rating: Variable
Limitations:
- Variable

Management measures:
- None feasible

Local Roads and Streets

Limitation rating: Variable
Limitations:
- Variable

Management measures:
- None feasible

Interpretive Groups

Land capability classification: Not classified
Pasture management group: Not assigned
Woodland management group: Not assigned

ReC—Redsprings gravelly fine sandy loam, 2 to 5 percent slopes

Setting

Landform: Uplands
Landform position: Broad convex ridges
Distinctive landform features: None
Slope: Gently sloping
Shape of areas: Irregular
Size of areas: 25 to 150 acres
Native vegetation: Pine

Composition

Redsprings and similar soils: 80 to 100 percent
Contrasting inclusions: 0 to 20 percent

Typical Profile

Surface layer:
0 to 6 inches—dark reddish brown gravelly fine sandy loam

Subsoil layer:
6 to 14 inches—dark reddish brown clay loam
14 to 35 inches—dark red clay loam
35 to 44 inches—red clay

Underlying layer:
44 to 80 inches—reddish yellow weathered glauconitic material and red clay

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Low to medium
Water erosion hazard: Moderate
Shrink-swell potential: Moderate

Contrasting Inclusions

- The moderately deep Cuthbert and Maben soils on side slopes
- Lilbert soils that have a thick, sandy surface layer and are in landscape positions similar to those of the Redsprings soil
- Ulto soils that are brown, have a less clayey subsoil than the Redsprings soil, and are on saddles

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
- Seasonal droughtiness

Management concerns:
- Moderate available water capacity may limit production somewhat

Woodland

Limitations:
- Low soil strength

Management concerns:
- Moderate equipment limitations

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly

Management measures:
- An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Shrink-swell

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell

Local Roads and Streets

Limitation rating: Moderate
Limitations:
- Shrink-swell
- Low strength

Management measures:
- Backfilling with suitable soil materials helps to minimize the hazard of damage to roads and streets due to shrink-swell and low strength in the subsoil

Interpretive Groups

Land capability classification: IIIe
Pasture management group: 7
Woodland management group: 16

ReE—Redsprings gravelly fine sandy loam, 5 to 15 percent slopes

Setting

Landform: Uplands
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Moderately sloping to moderately steep
Shape of areas: Long and narrow
Size of areas: 20 to 100 acres
Native vegetation: Pine

Composition

Redsprings and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Typical Profile

Surface layer:
0 to 6 inches—reddish brown gravelly fine sandy loam
6 to 10 inches—dark red gravelly fine sandy loam

Subsoil layer:
10 to 23 inches—red clay with brownish yellow weathered glauconite spots
23 to 34 inches—red clay loam with brownish yellow and strong brown weathered glauconite spots
34 to 45 inches—red sandy clay loam with strong brown weathered glauconite

Underlying layer:
45 to 60 inches—red, yellow, and brown weathered glauconitic material with grayish sandy strata

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Low to medium
Water erosion hazard: Severe
Shrink-swell potential: Moderate

Contrasting Inclusions

- Hannahatchee soils that are loamy throughout the profile and are on flood plains of small creeks
- Tenaha soils that have a thick, sandy surface and subsurface layer and are in landscape positions similar to those of the Redsprings soil
- Ulto soils that have a brown subsoil and are on saddles

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
- Droughtiness
- Medium rate of runoff
- Severe erosion hazard

Management concerns:
- Production may be limited during dry years due to moderate available water capacity
- Areas should be protected from erosion during establishment or renovation of pastures
- Care should be taken not to overgraze

Woodland

Limitations:
- Low soil strength
- Slope
- Medium rate of runoff

Management concerns:
- Moderate erosion hazard
- Equipment limitations
- Seedling mortality

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly

Management measures:
- An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Shrink-swell
- Slope

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell
- Constructing buildings on less sloping areas, preserving plant cover during construction, and proper landscaping can help to reduce soil erosion and runoff problems

Local Roads and Streets

Limitation rating: Moderate
Limitations:
- Shrink-swell
- Low strength

Management measures:
- Backfilling with suitable soil materials helps to minimize the hazard of damage to roads and streets due to shrink-swell and low strength in the subsoil

Interpretive Groups

Land capability classification: VIe
Pasture management group: 9
Woodland management group: 16

ReG—Redsprings gravelly fine sandy loam, 15 to 40 percent slopes

Setting

Landform: Uplands
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Moderately steep to steep
Shape of areas: Long and narrow
Size of areas: 20 to 75 acres
Native vegetation: Pine

Composition

Redsprings and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Typical Profile

Surface layer:
0 to 5 inches—dark reddish brown gravelly fine sandy loam

Subsoil layer:
5 to 36 inches—dark red clay
36 to 48 inches—red clay with yellow weathered glauconite bits
48 to 56 inches—red clay with grayish shale strata and yellow weathered glauconite bits

Underlying layer:
56 to 65 inches—red, light gray, and strong brown shale with stratified weathered glauconitic material

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Medium to high
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Low to medium
Water erosion hazard: Severe
Shrink-swell potential: Moderate

Contrasting Inclusions

- Hannahatchee soils that are loamy throughout the profile and are on flood plains of small creeks
- Tenaha soils that have a thick, sandy surface and subsurface layer and are in landscape positions similar to those of the Redsprings soil

Land Use

Dominant Uses: Woodland
Other Uses: None

Pasture and hayland

Limitations:
- Medium to high rate of runoff
- Severe erosion hazard

Management concerns:
- Areas generally are not suited for improved pasture

Woodland

Limitations:
- Low soil strength
- Slope
- Medium to high rate of runoff

Management concerns:
- Severe erosion hazard
- Moderate equipment limitations
- Seedling mortality

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly
- Slope

Management measures:
- An oversize drain field design on the contour or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Slope

Management measures:
- Constructing buildings on less sloping areas, preserving plant cover during construction, and proper landscaping can help to reduce soil erosion and runoff problems

Local Roads and Streets

Limitation rating: Severe
Limitations:
• Slope
Management measures:
• Cutting and filling generally are needed to compensate for slope

Interpretive Groups

Land capability classification: VIIe
Pasture management group: Not assigned
Woodland management group: 17

RgC—Redsprings soils, graded, 2 to 5 percent slopes

Setting

Landform: Uplands
Landform position: Convex knobs and ridges
Distinctive landform features: Gravel pits
Slope: Gently sloping
Shape of areas: Irregular
Size of areas: 10 to 20 acres
Native vegetation: None

Composition

Redsprings and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Typical Profile

Subsoil layer:
0 to 2 inches—red clay loam
2 to 15 inches—red clay
15 to 29 inches—dark red clay loam
29 to 40 inches—red gravelly clay loam with weathered glauconitic material

Underlying layer:
40 to 48 inches—strong brown weathered glauconitic material

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Low to medium
Water erosion hazard: Severe
Shrink-swell potential: Moderate

Contrasting Inclusions

• Areas of sandy Lilbert soils in landscape positions similar to those of the Redsprings soil
• Redsprings soils that have not been desurfaced
• Areas of sandy Tenaha soils on side slopes

Land Use

Dominant Uses: Gravel pits (fig. 13)
Other Uses: Woodland, pasture, and urban

Pasture and hayland

Limitations:
• Low soil fertility
• Lack of topsoil
• Seasonal droughtiness
Management concerns:
• Grasses are difficult to establish and maintain without addition of significant amounts of soil amendments and mulch

Woodland

Limitations:
• Low soil fertility
• Lack of surface layer
• Low soil strength
• Medium rate of runoff
Management concerns:
• Moderate erosion hazard
• Equipment limitations
• Severe seedling mortality

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
• Percs slowly
Management measures:
• An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Moderate
Limitations:
• Shrink-swell
Management measures:
• Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell

Local Roads and Streets

Limitation rating: Moderate

Figure 13.—An area of Redsprings soils, graded, 2 to 5 percent slopes. Ironstone gravel is mined for use in road construction.

Limitations:
- Shrink-swell
- Low strength

Management measures:
- Backfilling with suitable soil materials helps to minimize the hazard of damage to roads and streets due to shrink-swell and low strength in the subsoil

Interpretive Groups

Land capability classification: VIe
Pasture management group: 13
Woodland management group: 20

RzB—Rentzel loamy fine sand, 0 to 4 percent slopes

Setting

Landform: Uplands
Landform position: Toeslopes
Distinctive landform features: None
Slope: Nearly level to gently sloping
Shape of areas: Oval
Size of areas: 15 to 80 acres
Native vegetation: Pine/hardwood

Composition

Rentzel and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Typical Profile

Surface layer:
0 to 9 inches—brown loamy fine sand

Subsurface layer:
9 to 22 inches—light yellowish brown loamy fine sand

Subsoil layer:
22 to 26 inches—yellowish brown sandy clay loam with red iron accumulations
26 to 80 inches—variegated yellowish brown, light brownish gray, and red sandy clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Water table: Perched at 1.5 to 3 feet during January through March
Hazard of flooding: None
Runoff: Very low to medium
Permeability: Moderately slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Low
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

- Iulus soils that are loamy throughout the profile and are on narrow flood plains of small creeks
- Naconiche soils that have a mucky texture and are on flood plains of small streams

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
- Seasonal wetness

Management concerns:
- Establishment and maintenance of grasses are impractical during the wet season in some years
- Equipment use and period of grazing are limited

Woodland

Limitations:
- Seasonal wetness

Management concerns:
- Moderate equipment limitations
- Seedling mortality
- Plant competition

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Wetness
- Percs slowly
- Poor filter

Management measures:
- An onsite sewage treatment plant generally is needed to dispose of wastewater properly

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Wetness

Management measures:
- Drainage may be needed around the foundations of buildings

Local Roads and Streets

Limitation rating: Moderate
Limitations:
- Wetness

Management measures:
- Roadside ditches generally are needed to remove excess water more quickly

Interpretive Groups

Land capability classification: IIIw
Pasture management group: 5
Woodland management group: 10

SaB—Sacul fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Landform position: Convex ridgetops
Distinctive landform features: None
Slope: Very gently sloping
Shape of areas: Irregular
Size of areas: 20 to 150 acres
Native vegetation: Pine

Composition

Sacul and similar soils: 85 to 100 percent
Contrasting inclusions: 0 to 15 percent

Typical Profile

Surface layer:
0 to 3 inches—dark brown fine sandy loam

Subsurface layer:
3 to 8 inches—yellowish brown fine sandy loam

Subsoil layer:
8 to 24 inches—red clay with light yellowish brown iron depletions
24 to 31 inches—red clay with light brownish gray, pale brown, and yellowish brown iron depletions
31 to 37 inches—variegated red, light brownish gray, and yellowish brown clay
37 to 53 inches—light brownish gray clay loam with red and yellowish brown iron accumulations

Underlying layer:
53 to 80 inches—grayish brown and brown shale with a clay loam texture

Soil Properties and Qualities

Depth class: Deep to very deep
Drainage class: Moderately well drained
Water table: Perched at 2 to 4 feet during December through April
Hazard of flooding: None
Runoff: Medium
Permeability: Slow
Available water capacity: High
Root zone: Deep to very deep
Natural soil fertility: Medium
Water erosion hazard: Moderate
Shrink-swell potential: High

Contrasting Inclusions

- Bowie soils that have a brown, loamy subsoil and are in landscape positions similar to those of the Sacul soil
- Lilbert soils that have a thick, sandy surface layer and are in landscape positions similar to those of the Sacul soil

Land Use

Dominant Uses: Pasture
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
- Seasonal droughtiness

Management concerns:
- Moderate available water capacity may limit production somewhat

Woodland

Limitations:
- Seasonal wetness
- Low soil strength

Management concerns:
- Moderate equipment limitations
- Windthrow hazard

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Wetness
- Percs slowly

Management measures:
- An onsite sewage treatment plant generally is needed to dispose of wastewater properly

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Shrink-swell

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Shrink-swell
- Low strength

Management measures:
- Backfilling with suitable soil materials and special road base design generally are needed to prevent damage to roads and streets due to low strength and shrink-swell in the subsoil

Interpretive Groups

Land capability classification: IIIe
Pasture management group: 7
Woodland management group: 12

StB—Sawlit loam, 0 to 2 percent slopes

Setting

Landform: Uplands
Landform position: Heads of drains
Distinctive landform features: None
Slope: Nearly level to very gently sloping

Shape of areas: Oblong
Size of areas: 20 to 80 acres
Native vegetation: Pine/hardwood

Composition

Sawlit and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Typical Profile

Surface layer:
0 to 2 inches—brown loam

Subsurface layer:
2 to 7 inches—yellowish brown fine sandy loam

Subsoil layer:
7 to 13 inches—yellowish brown clay loam with reddish yellow iron accumulations and grayish brown iron depletions
13 to 19 inches—brownish yellow clay loam with yellowish red and red iron accumulations and grayish brown iron depletions
19 to 30 inches—yellowish brown clay loam with red iron accumulations and grayish brown iron depletions
30 to 36 inches—brownish yellow clay loam with red iron accumulations and light brownish gray iron depletions
36 to 63 inches—variegated light gray, red, and brownish yellow clay
63 to 80 inches—variegated brownish yellow and light gray clay

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
Water table: Perched at 1.5 to 3 feet during January through May
Hazard of flooding: None
Runoff: Very low
Permeability: Very slow
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: High

Contrasting Inclusions

- Gallime and Sawtown soils that have a thick, loamy surface layer and are on mounds
- Woodtell soils that have a more clayey subsoil than the Sawlit soil and are in landscape positions similar to those of the Sawlit soil

Land Use

Dominant Uses: Pasture
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
- No significant limitations

Management concerns:
- None

Woodland

Limitations:
- Seasonal wetness

Management concerns:
- Moderate equipment limitations

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Wetness
- Percs slowly

Management measures:
- An onsite sewage treatment plant generally is needed to dispose of wastewater properly

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Wetness
- Shrink-swell

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell
- Drainage may be needed around the foundations of buildings

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low strength

Management measures:
- Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: IIw
Pasture management group: 1
Woodland management group: 10

SwA—Sawlit-Sawtown complex, 0 to 2 percent slopes

Setting

Landform: Terraces
Landform position: Sawlit—concave intermounds; Sawtown—convex mounds
Distinctive landform features: Landscape is mounded
Slope: Nearly level to very gently sloping
Shape of areas: Irregular
Size of areas: 50 to 200 acres
Native vegetation: Pine/hardwood

Composition

Sawlit and similar soils: 47 to 63 percent
Sawtown and similar soils: 32 to 48 percent
(Individual areas of the two soils are so small or narrow that mapping them separately is not practical at the scale used)
Contrasting inclusions: 0 to 10 percent

Typical Profile

Sawlit

Surface layer:
0 to 4 inches—dark brown loam

Subsurface layer:
4 to 9 inches—dark brown loam

Subsoil layer:
9 to 15 inches—yellowish brown loam
15 to 21 inches—yellowish brown loam with strong brown iron accumulations and light brownish gray iron depletions
21 to 29 inches—yellowish brown clay loam with yellowish red and red iron accumulations and light brownish gray iron depletions
29 to 36 inches—yellowish brown clay loam with red iron accumulations and grayish brown iron depletions
36 to 80 inches—yellowish brown clay with red iron accumulations and grayish brown iron depletions

Sawtown

Surface layer:
0 to 9 inches—dark brown very fine sandy loam

Subsurface layer:
9 to 23 inches—yellowish brown very fine sandy loam

Subsoil layer:
23 to 31 inches—strong brown loam with yellowish red iron accumulations
31 to 49 inches—brownish yellow clay loam with yellowish red iron accumulations
49 to 80 inches—variegated light brownish gray, dark red, and yellowish brown clay with light gray streaks

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Sawlit—moderately well drained; Sawtown—well drained
Water table: Sawlit—perched at 1.5 to 3 feet during January through May; Sawtown—perched at 3.5 to 5 feet during January through May
Hazard of flooding: None
Runoff: Sawlit—negligible; Sawtown—very low
Permeability: Sawlit—very slow; Sawtown—moderate
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: High

Contrasting Inclusions

- The poorly drained Derly soils in depressional areas
- Woodtell soils that are more clayey than the Sawlit and Sawtown soils and are on side slopes

Land Use

Dominant Uses: Pasture
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
- No significant limitations

Management concerns:
- None

Woodland

Limitations:
- Sawlit—seasonal wetness
- Sawtown—no significant limitations

Management concerns:
- Sawlit—moderate equipment limitations

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Wetness
- Percs slowly

Management measures:
- An onsite sewage treatment plant generally is needed to dispose of wastewater properly

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Sawlit—wetness and shrink-swell
- Sawtown—shrink-swell

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell
- Drainage may be needed around the foundations of buildings

Local Roads and Streets

Limitation rating: Sawlit—severe; Sawtown—moderate
Limitations:
- Sawlit—low strength
- Sawtown—shrink-swell and low strength

Management measures:
- Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: Sawlit—IIw; Sawtown—IIe
Pasture management group: Sawlit and Sawtown—1
Woodland management group: Sawlit—10; Sawtown—8

TeE—Tenaha loamy fine sand, 5 to 15 percent slopes

Setting

Landform: Uplands
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Strongly sloping to moderately steep
Shape of areas: Elongated
Size of areas: 20 to 100 acres
Native vegetation: Pine

Composition

Tenaha and similar soils: 80 to 100 percent
Contrasting inclusions: 0 to 20 percent

Typical Profile

Surface layer:
0 to 4 inches—dark grayish brown loamy fine sand

Subsurface layer:
4 to 35 inches—light yellowish brown loamy fine sand

Subsoil layer:
35 to 44 inches—yellowish brown sandy clay loam

Underlying layer:
44 to 65 inches—pale brown soft sandstone with a loamy fine sand texture and a few yellowish brown bands and spots

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Moderate
Available water capacity: Low
Root zone: Deep
Natural soil fertility: Low
Water erosion hazard: Moderate to severe
Shrink-swell potential: Low

Contrasting Inclusions

- Cuthbert and Kirvin soils that do not have a thick, sandy surface layer and are in landscape positions similar to those of the Tenaha soil
- Iulus and Naconiche soils on narrow flood plains of small creeks

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
- Low soil fertility
- Droughtiness
- Slope

Management concerns:
- Production may be limited during dry years due to low available water capacity in the sandy surface layer
- Care should be taken not to overgraze
- Equipment use is limited on slopes above 10 percent due to the loose, sandy surface layer

Woodland

Limitations:
- Slope
- Low available water capacity
- Loose, sandy surface layer

Management concerns:
- Moderate erosion hazard
- Equipment limitations
- Seedling mortality

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe

Limitations:
- Percs slowly
- Poor filter

Management measures:
- An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods or contaminating groundwater due to seepage

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Slope

Management measures:
- Constructing buildings on less sloping areas, preserving plant cover during construction, and proper landscaping can help to reduce soil erosion and runoff problems

Local Roads and Streets

Limitation rating: Moderate
Limitations:
- Slope

Management measures:
- Cutting and filling may be needed to compensate for slope

Interpretive Groups

Land capability classification: VIe
Pasture management group: 8
Woodland management group: 3

ToC—Tonkawa fine sand, 0 to 8 percent slopes

Setting

Landform: Uplands
Landform position: Convex broad ridges
Distinctive landform features: None
Slope: Nearly level to moderately sloping
Shape of areas: Irregular
Size of areas: 30 to 400 acres
Native vegetation (fig. 14)*:* Pine

Composition

Tonkawa and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Typical Profile

Surface layer:
0 to 12 inches—dark grayish brown fine sand

Subsoil layer:
12 to 32 inches—brownish yellow fine sand
32 to 68 inches—reddish yellow fine sand with very pale brown spots
68 to 80 inches—very pale brown and yellow fine sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Negligible to low
Permeability: Rapid
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Low
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

- The well drained Lilbert and Tenaha soils that are in landscape positions similar to those of the Tonkawa soil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
- Low soil fertility
- Droughtiness

Management concerns:
- Production may be limited during dry years due to low available water capacity in the sandy surface layer
- Care should be taken not to overgraze

Woodland

Limitations:
- Low available water capacity
- Loose, sandy surface layer

Management concerns:
- Severe equipment limitations
- Plant competition
- Seedling mortality

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Poor filter

Management measures:
- An oversize drain field design can help to prevent groundwater pollution from seepage

Dwellings without Basements

Limitation rating: Slight

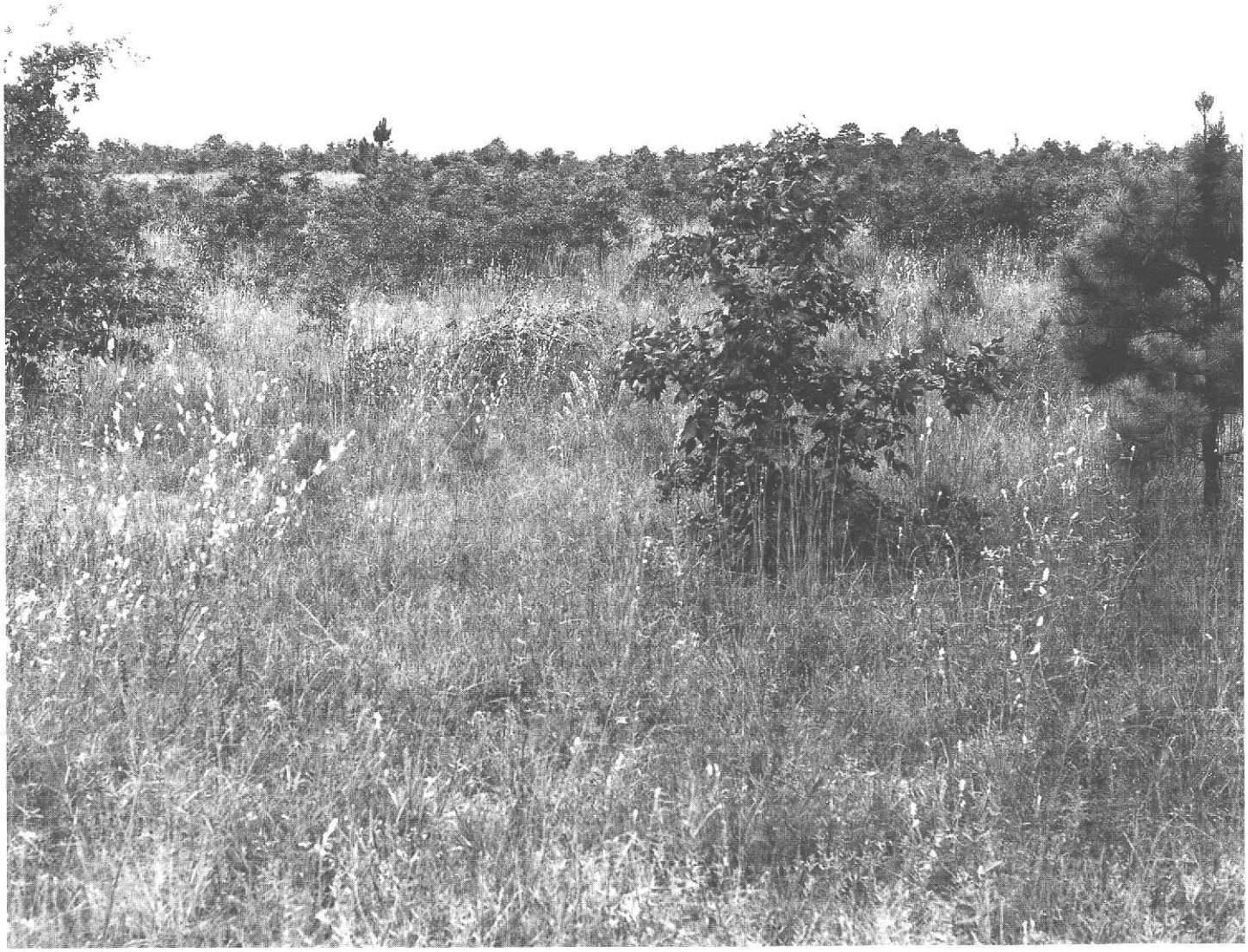

Figure 14.—Native vegetative in an area of Tonkawa fine sand, 0 to 8 percent slopes.

Limitations:
- No significant limitations

Management measures:
- Standard construction and landscaping techniques generally are adequate

Local Roads and Streets

Limitation rating: Slight
Limitations:
- No significant limitations

Management measures:
- Standard road building techniques generally are adequate

Interpretive Groups

Land capability classification: IVs
Pasture management group: 10
Woodland management group: 21

ToE—Tonkawa fine sand, 8 to 15 percent slopes

Setting

Landform: Uplands
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Strongly sloping to moderately steep
Shape of areas: Elongated
Size of areas: 20 to 100 acres
Native vegetation: Pine

Composition

Tonkawa and similar soils: 80 to 100 percent
Contrasting inclusions: 0 to 20 percent

Typical Profile

Surface layer:
0 to 8 inches—brown fine sand

Subsurface layer:
8 to 22 inches—yellowish brown fine sand

Subsoil layer:
22 to 46 inches—strong brown fine sand
46 to 66 inches—reddish yellow fine sand
66 to 80 inches—very pale brown fine sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Low
Permeability: Rapid
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Low
Water erosion hazard: Severe
Shrink-swell potential: Low

Contrasting Inclusions

- Naconiche soils on narrow flood plains of small creeks
- The well drained Tenaha soils in landscape positions similar to those of the Tonkawa soil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
- Low soil fertility
- Droughtiness
- Slope

Management concerns:
- Production may be limited during dry years due to low available water capacity in the sandy surface layer
- Care should be taken not to overgraze
- Equipment use is limited on slopes above 10 percent due to the loose, sandy surface layer

Woodland

Limitations:
- Low available water capacity
- Slope
- Loose, sandy surface layer

Management concerns:
- Severe equipment limitations
- Plant competition
- Seedling mortality
- Moderate erosion hazard

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Poor filter

Management measures:
- An oversize drain field design can help to prevent groundwater pollution from seepage

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Slope

Management measures:
- Constructing buildings on less sloping areas, preserving plant cover during construction, and proper landscaping can help to reduce soil erosion and runoff problems

Local Roads and Streets

Limitation rating: Moderate
Limitations:
- Slope

Management measures:
- Cutting and filling may be needed to compensate for slope

Interpretive Groups

Land capability classification: VIe
Pasture management group: 10
Woodland management group: 21

ToG—Tonkawa fine sand, 15 to 35 percent slopes

Setting

Landform: Uplands
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Moderately steep to steep
Shape of areas: Elongated
Size of areas: 20 to 60 acres
Native vegetation: Pine

Composition

Tonkawa and similar soils: 80 to 100 percent
Contrasting inclusions: 0 to 20 percent

Typical Profile

Surface layer:
0 to 6 inches—dark grayish brown fine sand

Subsoil layer:
6 to 40 inches—light yellowish brown fine sand
40 to 80 inches—very pale brown fine sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat excessively drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Low to medium
Permeability: Rapid
Available water capacity: Low
Root zone: Very deep
Natural soil fertility: Low
Water erosion hazard: Severe
Shrink-swell potential: Low

Contrasting Inclusions

- Naconiche soils that have a mucky texture and are on narrow flood plains of small creeks
- The well drained Tenaha soils on side slopes

Land Use

Dominant Uses: Woodland
Other Uses: None

Pasture and hayland

Limitations:
- Severe erosion hazard
- Slope

Management concerns:
- Areas generally are not suited for improved pasture

Woodland

Limitations:
- Low available water capacity
- Slope
- Loose, sandy surface layer

Management concerns:
- Severe equipment limitations
- Plant competition
- Seedling mortality
- Erosion hazard

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Poor filter
- Slope

Management measures:
- An oversize drain field design on the contour or an onsite sewage treatment plant generally is needed to prevent groundwater pollution or downslope seepage

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Slope

Management measures:
- Preserving the existing plant cover during construction and proper landscaping can help to reduce soil erosion and runoff problems
- Cutting and filling generally are needed to create a level building site

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Slope

Management measures:
- Cutting and filling generally are needed to compensate for slope

Interpretive Groups

Land capability classification: VIIe
Pasture management group: Not assigned
Woodland management group: 22

UtB—Ulto fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Landform position: Concave saddles
Distinctive landform features: None
Slope: Very gently sloping
Shape of areas: Irregular
Size of areas: 15 to 150 acres
Native vegetation: Pine

Composition

Ulto and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Typical Profile

Surface layer:
0 to 7 inches—dark brown fine sandy loam

Subsurface layer:
7 to 12 inches—brown fine sandy loam

Subsoil layer:
12 to 21 inches—yellowish red fine sandy loam

21 to 36 inches—yellowish red clay loam with strong brown iron accumulations
36 to 42 inches—strong brown clay loam with red iron accumulations
42 to 56 inches—yellowish red sandy clay loam with red iron accumulations

Underlying layer:
56 to 80 inches—red weakly consolidated sandstone with a sandy clay loam texture and thin shale strata

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Very low
Permeability: Moderate
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Moderate

Contrasting Inclusions

- The poorly drained Derly soils in depressional areas
- Redsprings soils that have a gravelly surface layer, a more clayey subsoil than the Ulto soil, and are on knobs and ridges
- Woodtell soils that have a redder, more clayey subsoil than the Ulto soil and are on knobs and ridges

Land Use

Dominant Uses: Pasture
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
- Seasonal droughtiness

Management concerns:
- Moderate available water capacity may limit production somewhat

Woodland

Limitations:
- No significant limitations

Management concerns:
- None

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Moderate
Limitations:
- Percs slowly

Management measures:
- An oversize drain field design helps to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Moderate
Limitations:
- Shrink-swell

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Low strength

Management measures:
- Special road base design and construction techniques generally are needed to compensate for low strength in the subsoil

Interpretive Groups

Land capability classification: IIe
Pasture management group: 7
Woodland management group: 8

WoB—Woden fine sandy loam, 1 to 3 percent slopes

Setting

Landform: Terraces
Landform position: Interstream divides
Distinctive landform features: None
Slope: Very gently sloping
Shape of areas: Oval to elongated
Size of areas: 10 to 50 acres
Native vegetation: Pine

Composition

Woden and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Typical Profile

Surface layer:
0 to 11 inches—brown fine sandy loam

Subsoil layer:
11 to 27 inches—red fine sandy loam with yellowish red lithochromic mottles
27 to 55 inches—red fine sandy loam with reddish yellow lithochromic mottles
55 to 80 inches—yellowish red fine sandy loam with light brown spots

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Negligible
Permeability: Moderately rapid
Available water capacity: Moderate
Root zone: Very deep
Natural soil fertility: Medium
Water erosion hazard: Slight
Shrink-swell potential: Low

Contrasting Inclusions

- Bernaldo soils that have a finer textured subsoil than the Woden soil and are on side slopes
- The poorly drained Derly soils in depressional areas
- Sawlit soils that are more clayey than the Woden soil and are in landscape positions similar to those of the Woden soil

Land Use

Dominant Uses: Pasture
Other Uses: Woodland and urban

Pasture and hayland

Limitations:
- No significant limitations

Management concerns:
- None

Woodland

Limitations:
- No significant limitations

Management concerns:
- None

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Slight
Limitations:
- No significant limitations

Management measures:
- A standard septic tank and a drain field design generally are adequate to dispose of wastewater properly

Dwellings without Basements

Limitation rating: Slight
Limitations:
- No significant limitations

Management measures:
- Standard construction and landscaping techniques generally are adequate

Local Roads and Streets

Limitation rating: Slight
Limitations:
- No significant limitations

Management measures:
- Standard road building techniques generally are adequate

Interpretive Groups

Land capability classification: IIe
Pasture management group: 1
Woodland management group: 4

WtB—Woodtell loam, 1 to 3 percent slopes

Setting

Landform: Uplands
Landform position: Convex heads of drains and interstream divides
Distinctive landform features: None
Slope: Very gently sloping
Shape of areas: Irregular
Size of areas: 25 to 125 acres
Native vegetation: Pine

Composition

Woodtell and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Typical Profile

Surface layer:
0 to 6 inches—dark yellowish brown loam

Subsoil layer:
6 to 28 inches—red clay with light yellowish brown iron accumulations
28 to 46 inches—red clay with yellowish brown iron accumulations and light brownish gray iron depletions
46 to 52 inches—light brownish gray clay with brownish yellow, yellowish red, and red iron accumulations

Underlying layer:
52 to 64 inches—light brownish gray shale with a clay loam texture and light brownish yellow and yellowish brown strata

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Medium
Permeability: Very slow
Available water capacity: Moderate

Root zone: Deep
Natural soil fertility: Medium
Water erosion hazard: Moderate
Shrink-swell potential: High

Contrasting Inclusions

- The moderately well drained Latex soils and the well drained Ulto soils on interstream divides
- The well drained Sawtown soils on mounds

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
- Seasonal droughtiness

Management concerns:
- Moderate available water capacity may limit production somewhat

Woodland

Limitations:
- Low soil strength

Management concerns:
- Moderate equipment limitations

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly

Management measures:
- An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Shrink-swell

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Shrink-swell
- Low strength

Management measures:
- Backfilling with suitable soil materials and special road base design generally are needed to prevent damage to roads and streets due to low strength and shrink-swell in the subsoil

Interpretive Groups

Land capability classification: IIIe
Pasture management group: 7
Woodland management group: 15

WtE—Woodtell loam, 5 to 15 percent slopes

Setting

Landform: Uplands
Landform position: Convex side slopes
Distinctive landform features: None
Slope: Moderately sloping to moderately steep
Shape of areas: Elongated
Size of areas: 50 to 150 acres
Native vegetation: Pine

Composition

Woodtell and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Typical Profile

Surface layer:
0 to 3 inches—dark brown loam

Subsurface layer:
3 to 8 inches—yellowish brown loam

Subsoil layer:
8 to 20 inches—red clay with strong brown iron accumulations
20 to 30 inches—red clay with light brownish gray iron depletions and light yellowish brown iron accumulations
30 to 36 inches—strong brown clay with grayish brown iron depletions and yellowish brown and yellowish red iron accumulations
36 to 42 inches—strong brown clay loam with grayish brown iron depletions and yellowish red iron accumulations
42 to 51 inches—brownish yellow clay loam with reddish yellow iron accumulations and thin strata of soft light gray siltstone

Underlying layer:
51 to 64 inches—pale yellow soft siltstone with a silty clay loam texture and yellowish brown glauconitic ironstone fragments

Soil Properties and Qualities

Depth class: Deep
Drainage class: Well drained
Water table: None within 6 feet
Hazard of flooding: None
Runoff: Very high
Permeability: Very slow
Available water capacity: Moderate
Root zone: Deep
Natural soil fertility: Medium
Water erosion hazard: Severe
Shrink-swell potential: High

Contrasting Inclusions

- Bernaldo soils that have a loamy subsoil and are in landscape positions similar to those of the Woodtell soil
- Iulus soils that are loamy throughout the profile and are on narrow flood plains of small creeks
- Laneville soils that are occasionally or frequently flooded
- Tenaha soils that have a sandy surface and subsurface layer 20 to 40 inches thick and are in landscape positions similar to those of the Woodtell soil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and urban

Pasture and hayland

Limitations:
- Droughtiness
- Very high rate of runoff
- Severe erosion hazard

Management concerns:
- Production may be limited during dry years due to moderate available water capacity
- Areas should be protected from erosion during establishment or renovation of pastures
- Care should be taken not to overgraze

Woodland

Limitations:
- Low soil strength
- Slope
- Very high rate of runoff

Management concerns:
- Moderate erosion hazard
- Equipment limitations

Urban Uses

Septic Tank Absorption Fields

Limitation rating: Severe
Limitations:
- Percs slowly

Management measures:
- An oversize drain field design or an onsite sewage treatment plant generally is needed to prevent the septic system from malfunctioning during rainy periods

Dwellings without Basements

Limitation rating: Severe
Limitations:
- Shrink-swell

Management measures:
- Backfilling with suitable soil materials and using a reinforced foundation design help to minimize the hazard of foundation cracking due to shrink-swell

Local Roads and Streets

Limitation rating: Severe
Limitations:
- Shrink-swell
- Low strength

Management measures:
- Backfilling with suitable soil materials and special road base design generally are needed to prevent damage to roads and streets due to low strength and shrink-swell in the subsoil

Interpretive Groups

Land capability classification: VIe
Pasture management group: 9
Woodland management group: 15

Prime Farmland

In this section, prime farmland is defined, and the soils in Rusk County that are considered prime farmland are listed.

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

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

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They are used for food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils usually receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 5 percent.

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

Some soils that have a high water table and all soils that are frequently flooded during the growing season qualify as prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. If applicable, the need for these measures is indicated in parentheses after the map unit name in the following list. Onsite evaluation is necessary to determine if the limitations have been overcome by corrective measures.

The soils identified as prime farmland in Rusk County are:

AyB	Attoyac fine sandy loam, 1 to 3 percent slopes
BeB	Bernaldo very fine sandy loam, 1 to 3 percent slopes
BwB	Bowie very fine sandy loam, 1 to 4 percent slopes
GaA	Gallime-Alazan complex, 0 to 2 percent slopes
Ha	Hannahatchee fine sandy loam, occasionally flooded
Iu	Iulus fine sandy loam, occasionally flooded
La	Laneville loam, occasionally flooded
LtB	Latex very fine sandy loam, 1 to 3 percent slopes
Ow	Owentown fine sandy loam, occasionally flooded
ReC	Redsprings gravelly fine sandy loam, 2 to 5 percent slopes
StB	Sawlit loam, 0 to 2 percent slopes
SwA	Sawlit-Sawtown complex, 0 to 2 percent slopes
UtB	Ulto fine sandy loam, 1 to 3 percent slopes
WoB	Woden fine sandy loam, 1 to 3 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, and highways and other transportation systems; 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; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under 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.

Yields per Acre

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

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

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

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the

Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The 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 woodland and 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, woodland, wildlife habitat, or recreation.

The capability classification of the map units in this survey area is given in the section "Detailed Soil Map Units" and in the yields table.

Pasture Management and Productivity

Raymond Dolezel, area soil scientist, Natural Resources Conservation Service, helped prepare this section.

Rusk County has about 214,000 acres of pastureland. Of this total, about 10,600 acres is native pasture, and the rest of the acreage is improved pasture.

At the turn of the century more than half of the land in the county was used as cropland. As acres of crops diminished, much of the cleared land was allowed to revert to native pasture.

Areas of native pasture are covered with plants that commonly reseed naturally. Brush must be controlled, and fertilizer and lime may be added occasionally. Common grasses in these pastures vary with types of soils. On the bottomland soils, natural grasses growing include carpetgrass, dallisgrass, vaseygrass, and various panicums. The loamy uplands may be dominated by various bluestems, such as broomsedge and pinehill. Overgrazed sandy uplands may be covered with broomsedge bluestem, needlegrass, and burgrass.

Several different plants have been introduced in areas of improved pasture. Improved bermudagrass, such as coastal, has greatly increased the yield that can be expected on most soils. On wetter bottomland soils, bahiagrass may offer the highest yield. In some cases, lovegrass may be better suited on very sandy soils.

For grazing, many areas of improved pasture are overseeded with legumes. On the wetter soils, white clover is best suited. Crimson clover, arrowleaf clover, or vetch is better suited on most upland soils.

Proper management is necessary on all soils. In east Texas, brush will infest all areas if it is not removed by shredding or chemical applications. Management includes proper grazing use or proper mowing schedules. Areas of improved pasture can be severely damaged if overgrazed. Liming and fertilization are also necessary if high yields are to be expected.

Pasture Management Groups

The soils in Rusk County have been grouped according to their suitability for pasture management. There are 13 groups of soils suited to pasture management and 1 group of soils not suited to pasture management. Each group is made up of soils with similar properties and that respond to similar management practices. The landscape position and chemical and physical properties of the soils were considered in assigning soils to each group. Also explained in each group are the yields, management problems, and plant adaptability that can be expected in areas of improved pasture. For example, Dreka and Estes soils are listed as poorly suited to the production of grasses and legumes under normal conditions. This means that in a natural state, without drainage and flooding protection, land users will have difficulty establishing improved grasses on these soils. However, these same soils may do well in areas of native pasture.

The term "animal unit months" is used to describe the production that might be expected. Proper management is necessary if high yields are expected. An animal unit month is the length of time that forage products from an acre will feed one adult animal. For example, eight animal unit months will feed a cow for eight months. Five months of this time may be from grazing, and three months may be from hay harvested from the same acre.

Pasture Management Group 1. The Alazan, Attoyac, Bernaldo, Besner, Gallime, Latex, Sawlit, Sawtown, and Woden soils in map units AyB, BeB, GaA, LtB, MvA, StB, SwA, and WoB are in this group. These nearly level and very gently sloping soils are on terraces. They have a loamy surface layer, a loamy subsoil, and are moderately well drained and well drained.

These soils have no major limitations for use as pasture and are very well suited to the production of grasses and legumes. Minor limitations of soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer.

Adapted grasses on these soils used for forage production include improved bermudagrass and bahiagrass, which can be overseeded with legumes, such as crimson clover, white dutch clover, arrowleaf clover, or vetch. With proper management, including liming, fertilizing, and rotational grazing, improved bermudagrass will produce about eight to nine animal unit months of grazing and hay in a normal year (fig. 15).

Pasture Management Group 2. The Hannahatchee, Iulus, Laneville, and Owentown soils in map units Ha, Iu, La, Lf, Mo, and Ow are in this group. These nearly level soils are on broad flood plains of smaller streams. They have a loamy surface layer, a loamy subsoil, are well drained and moderately well drained, and may be flooded annually.

These soils are very well suited to the production of grasses and legumes. Flooding and slight wetness in some years may interfere with establishment, maintenance, and harvesting of the forage produced.

Adapted grasses on these soils used for forage production include improved bermudagrass, fescue, and bahiagrass, which can be overseeded with legumes, such as crimson clover, white clover, or vetch. With proper management, including liming, fertilizing, and rotational grazing, fescue or bahiagrass will produce about eight to nine animal unit months of grazing and hay in a normal year.

Pasture Management Group 3. The Attoyac and Bernaldo soils in map units AyE and BeD are in this group. These moderately sloping to moderately steep soils are on stream terraces. They have a loamy surface layer, a loamy subsoil, and are well drained.

These soils are very well suited to the production of grasses and legumes. As slopes increase, water runoff is increased and less water is able to enter the root zone and be stored for plant production. Increased slope also increases the hazard of excessive erosion during pasture establishment or renovation or if the pasture is overgrazed.

Adapted grasses on these soils used for forage production include improved bermudagrass and bahiagrass, which can be overseeded with legumes, such as crimson clover or vetch. With proper management, including liming, fertilizing and rotational grazing, improved bermudagrass will produce about eight animal unit months of grazing and hay in a normal year.

Pasture Management Group 4. The Bowie soils in map unit BwB are in this group. These very gently sloping soils are on broad interstream divides on uplands. They have a loamy surface layer, a loamy subsoil, and are well drained.

These soils have no major limitations for use as pasture and are well suited to the production of grasses and legumes. However, a moderate capacity to store water slightly lowers potential forage production. Minor limitations of soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer.

Adapted grasses on these soils used for forage production include improved bermudagrass and bahiagrass, which can be overseeded with legumes, such as crimson clover or vetch. With proper management, including liming, fertilizing, and rotational grazing, improved bermudagrass will produce about seven animal unit months of grazing and hay in a normal year.

Pasture Management Group 5. The Bienville, Kawah, and Rentzel soils in map units BvB, KaA, and RzB are in

Figure 15.—An area of Sawlit loam, 0 to 2 percent slopes, produces forage for livestock.

this group. These nearly level and very gently sloping soils are on concave lower slopes and high stream terraces. They have a sandy surface layer, a loamy or sandy subsoil, and are somewhat excessively drained and somewhat poorly drained.

These soils have no major limitations for use as pasture and are moderately well suited to the production of grasses and legumes. Production is limited due to the thick, sandy surface layer allowing rapid movement of water and nutrients through the plant root zone. This results in low inherent soil fertility and limited water storage available for plant production. Minor limitations of soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer. Slightly wet conditions during the winter and early spring may interfere with harvesting hay, grazing rotation, or using equipment.

Adapted grasses on these soils used for forage production include weeping lovegrass and improved bermudagrass, which can be overseeded with legumes, such as vetch. With proper management, including liming, split applications of fertilizer, and rotational grazing, improved bermudagrass will produce about seven animal unit months of grazing and hay in a normal year.

Pasture Management Group 6. The Betis, Darco, and Lilbert soils in map units BtB, DaC, and LyC are in this group. These gently sloping to moderately sloping soils are on broad interstream divides on uplands. They have a thick, sandy surface layer, a loamy subsoil, and are excessively drained and well drained.

These soils are moderately well suited to the production of grasses and legumes. Production is limited due to the sandy surface layer allowing rapid movement of water and nutrients through the plant root zone. This results in low inherent soil fertility and limited water storage available for plant production.

Adapted grasses on these soils used for forage production include weeping lovegrass and improved bermudagrass, which can be overseeded with legumes, such as vetch. With proper management, including liming, fertilizing, and rotational grazing, improved bermudagrass will produce about five to six animal unit months of grazing and hay in a normal year (fig. 16).

Pasture Management Group 7. The Kirvin, Meth, Pirkey, Redsprings, Sacul, Ulto, and Woodtell soils in map units KfC, KgC, MtC, PrC, ReC, SaB, UtB, and WtB are in this group. These gently sloping soils are on broad interstream divides on uplands. They have a loamy surface layer, a clayey subsoil, and are well drained and moderately well drained.

These soils are moderately well suited to the production of grasses and legumes. Production is decreased slightly due to the clayey subsoil, which limits water intake and storage for plant production. Minor limitations of soil acidity and inadequate fertility are easily corrected with additions of lime and fertilizer.

Adapted grasses on these soils used for forage production include improved bermudagrass and bahiagrass, which can be overseeded with legumes, such as crimson

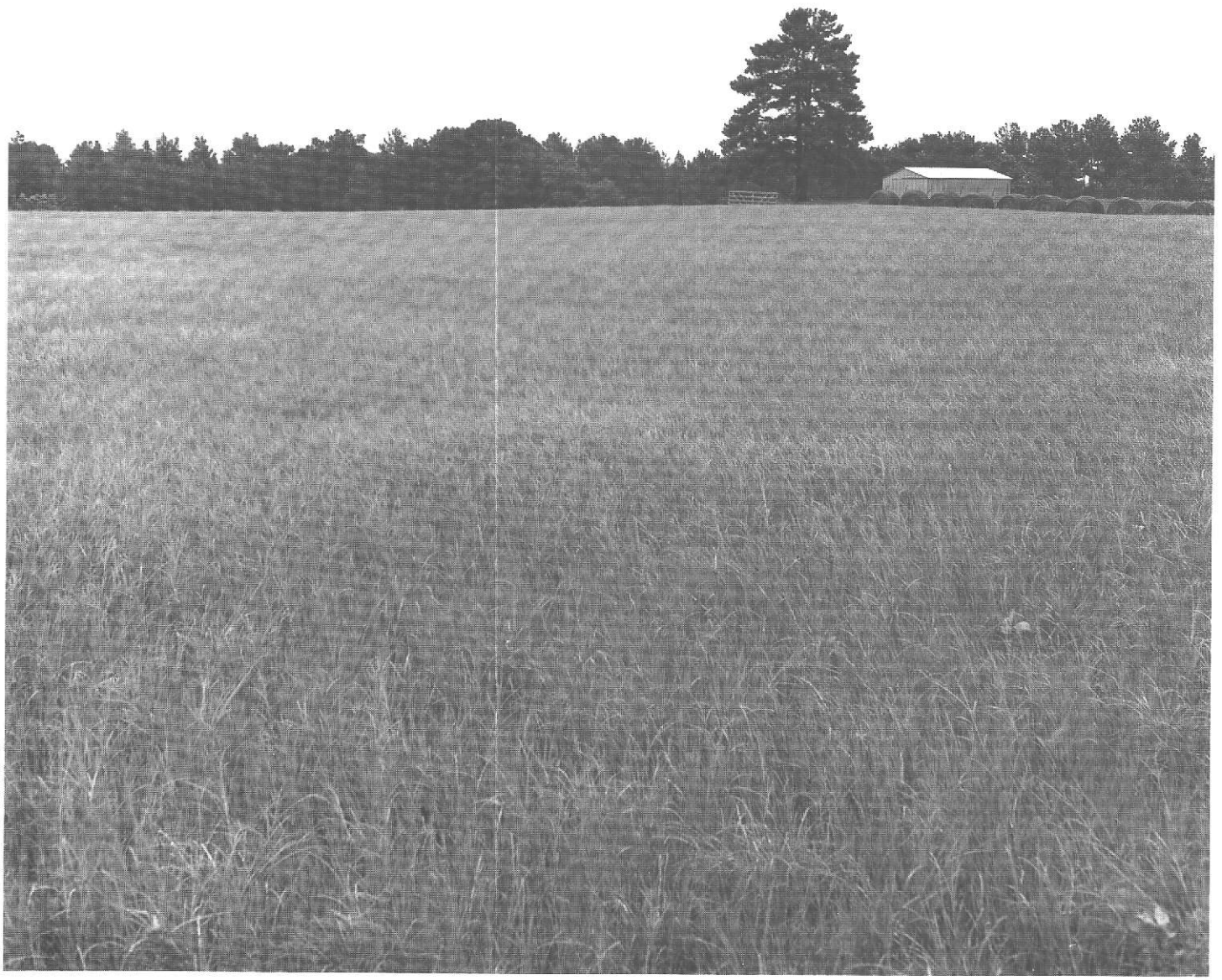

Figure 16.—A hay field of coastal bermudagrass in an area of Darco loamy fine sand, 1 to 8 percent slopes.

clover or vetch. With proper management, including liming, fertilizing, and rotational grazing, improved bermudagrass will produce about four to five animal unit months of grazing and hay in a normal year.

Pasture Management Group 8. The Darco and Tenaha soils in map units DaE and TeE are in this group. These strongly sloping to moderately steep soils are on side slopes on broad interstream divides on uplands. They have a thick, sandy surface layer, a loamy subsoil, and are excessively drained and well drained.

These soils are moderately well suited to the production of grasses and legumes. Production is limited due to the sandy surface layer allowing rapid movement of water and nutrients through the plant root zone. This results in low inherent soil fertility and limited water storage available for plant production. Also, as slopes increase above 10 percent, equipment use is impaired due to the loose, sandy surface.

Adapted grasses on these soils used for forage production include weeping lovegrass and improved bermudagrass, which can be overseeded with legumes, such as vetch. With proper management, including liming, fertilizing, and rotational grazing, improved bermudagrass will produce about four to five animal unit months of grazing and hay in a normal year.

Pasture Management Group 9. The Cuthbert, Kirvin, Maben, Pirkey, Redsprings, and Woodtell soils in map units CbE, CtE, KfE, MaE, PrD, ReE, and WtE are in this group. These strongly sloping to moderately steep soils are on broad interstream divides on uplands. They have a loamy or gravelly loamy surface layer, a clayey subsoil, and are well drained.

These soils are moderately suited to the production of grasses and legumes. Production is limited due to the clayey subsoil, which limits water intake and storage for plant production. Also, as slopes increase above 10 percent, water runoff is increased and less water is able to enter the root zone and be stored for plant production. Increased slope also increases the hazard of excessive erosion during pasture establishment or renovation or if the pasture is overgrazed.

Adapted grasses on these soils used for forage production include improved bermudagrass and bahiagrass, which can be overseeded with legumes, such as crimson clover or vetch. With proper management, including liming, fertilizing, and rotational grazing, improved bermudagrass will produce about three to four animal unit months of grazing and hay in a normal year.

Pasture Management Group 10. The Tonkawa soils in map units ToC and ToE are in this group. These gently sloping to strongly sloping soils are on broad interstream divides on uplands. They have a sandy texture to more than 80 inches and are somewhat excessively drained.

These soils are moderately suited to the production of grasses and legumes. Production is limited due to the sandy surface layer allowing rapid movement of water and nutrients through the plant root zone. This results in low inherent soil fertility and limited water storage available for plant production. Also, as slopes increase above 10 percent, equipment use is impaired due to the loose, sandy surface.

Adapted grasses on these soils used for forage production include weeping lovegrass and improved bermudagrass, which can be overseeded with legumes, such as vetch. With proper management, including liming, fertilizing, and rotational grazing, improved bermudagrass will produce about three to four animal unit months of grazing and hay in a normal year.

Pasture Management Group 11. The Derly and Mollville soils in map units DeA and MvA are in this group. These nearly level soils are in depressions on broad mounded stream terraces. They have a loamy surface layer, a clayey subsoil, are poorly drained, and may have water ponded on the surface during late winter and early spring.

These soils are poorly suited to the production of grasses and legumes. Production is limited due to severe wetness, water ponding on the surface, and poor internal soil drainage. The extreme wetness also interferes with establishment, maintenance, and harvesting of the forage produced.

Adapted grasses on these soils used for forage production include fescue and bahiagrass, which can be overseeded with legumes, such as white clover or vetch. With proper management, including liming, fertilizing, and rotational grazing, fescue or bahiagrass will produce about two animal unit months of grazing and hay in a normal year.

Pasture Management Group 12. The Dreka, Estes, and Mattex soils in map units Dr, Es, Me, and Mo are in this group. These nearly level soils are on broad flood plains of larger streams. They have a clayey surface layer, a clayey subsoil, are somewhat poorly drained, and may be flooded annually.

These soils are poorly suited to the production of grasses and legumes. Production is limited due to severe wetness, water ponding on the surface, flooding, and poor internal soil drainage. The extreme wetness also interferes with establishment, maintenance, and harvesting of the forage produced.

Adapted grasses on these soils used for forage production include fescue and bahiagrass, which can be overseeded with legumes, such as white clover or vetch.

With proper management, including liming, fertilizing, and rotational grazing, fescue or bahiagrass will produce about one to two animal unit months of grazing and hay in a normal year.

Pasture Management Group 13. The Kirvin graded soils and the Redsprings graded soils in map units KsC and RgC are in this group. These gently sloping to sloping soils are on broad interstream divides on uplands. The gravelly surface layer and the upper subsoil have been removed from these soils. The resulting surface is loamy to clayey with small piles of gravelly material left on the surface. These soils are well drained.

These soils are very poorly suited to the production of grasses and legumes. Production is decreased due to the exposed clayey subsoil, which limits water intake and storage for plant production. For a few years after the surface has been removed, it is difficult to establish pasture grasses due to the droughty surface layer. Minor limitations of acidity and inadequate fertility are easily corrected with the additions of lime and fertilizer. The surface may have rills or small gullies, which will hamper harvesting.

Adapted grasses on these soils used for forage production include improved bermudagrass and bahiagrass, which can be overseeded with legumes, such as crimson clover or vetch. With proper management, including liming, fertilizing, and rotational grazing, improved bermudagrass will produce about one animal unit month of grazing and hay in a normal year. On some areas, it may be necessary to plant lovegrass until soil tilth is replaced.

Not suited to pasture. This group includes soils that in their natural state are not suited to pasture management. The Cuthbert, Redsprings, and Tonkawa soils in map units CbG, CsG, ReG, and ToG are too steep to operate farm machinery in a safe manner. The Keechi and Naconiche soils in map units Kc and Na are too wet for pasture. Pits in map unit Pt have an uneven surface, and some areas have vertical side slopes.

Woodland Management and Productivity

Ray Stoner, forester, Natural Resources Conservation Service, helped prepare this section.

Rusk County has about 324,000 acres of woodland. In addition to producing commercial wood products, recreational opportunities and important wildlife habitat are provided. By far, the largest owner group is the nonindustrial, private landowner who owns 265,000 acres. Large industrial landowners own about 50,000 acres, and state and local governments own the remaining acreage of woodland.

Timber products are a major source of income for the county. Lumber, pulpwood, crossties, pallet material, stakes, and crates are manufactured from the timber produced. Several sawmills are located in the county. These include a large industrial pine lumber mill and a grade quality hardwood mill.

Plant habitats in Rusk County range from droughty, sandy sites to frequently flooded bottomlands. The plant communities, therefore, range from shortleaf pine/sandjack oak types to willow oak/green ash/sweetgum types. The major forest management problem in the county is the harvesting of timber without adequate reforestation follow-up.

This soil survey can be used by woodland managers in planning the use of soils for wood products. Table 6 summarizes the forest management/soils relationships and rates the soils for a number of factors to be considered in management. Only those soils suitable for wood crops are listed. A full explanation of these relationships and considerations is given in the discussion of the woodland management groups below. For convenience, soils with similar production capabilities and limitations are grouped together.

The table lists the *woodland management group* for those soils suitable for timber.

Slight, moderate, and *severe* are used to indicate the degree of the major soil limitations to be considered in management. These concerns or limitations are *erosion hazard, equipment limitation, seedling mortality, windthrow hazard,* and *plant competition.* Site factors such as soil texture, slope, wetness, and drainage determine the severity of the limitations. Along with further explanation of these limitations, alternatives that should be considered in management planning are given in the discussion of the woodland management groups below.

The *potential productivity* of *common trees* on a soil is expressed as a *site index.* This index is the average height, in feet, that the trees attain in 50 years.

The *productivity class* represents an expected volume produced by the most important trees, and is expressed in board feet (Doyle Rule) per acre per year. The annual yield figures apply to fully stocked, natural (unmanaged) stands over a 50-year period. Intermediate cutting management practices, such as thinning, can increase these yields.

Trees to plant are those that are used for reforestation. They are suited to the soils and can produce a commercial wood crop. The desired product, landscape 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 Management Groups

The soils in Rusk County that are suitable for wood crops have been placed in 22 groups according to their

suitability for woodland management. Each group is made up of soils with similar properties and that respond to similar management practices. The landscape position and chemical and physical properties of the soils were considered in assigning soils to each group.

Woodland Management Group 1. This group includes the Hannahatchee and Owentown soils in map units Ha, Mo, and Ow. These loamy soils are on small flood plains and may be flooded for brief periods. They are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, green ash, sweetgum, white oak, water oak, and cherrybark oak. The site index for loblolly pine, sweetgum, and bottomland oaks averages 100 feet. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 430 board feet per acre per year. The yield for sweetgum is approximately 310 board feet per acre per year. Although management can substantially increase these yields, it should also include attention to streamside management zone practices to protect water quality.

Harvesting or management operations may be temporarily interrupted due to brief periods of flooding, but this should cause no difficulty in long-range operations. Since areas of these soils may often be included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 2. This group includes the Iulus and Laneville soils in map units Iu, La, and Lf. These loamy soils are on small flood plains. They have a high water table during the winter and spring months and may also be flooded for brief durations during the same periods. They are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, water oak, cherrybark oak, white ash, and sweetgum. The site index for loblolly pine and sweetgum averages 100 feet, but can range from 95 to over 110 feet. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 430 board feet per acre per year. The yield for sweetgum is approximately 310 board feet per acre per year. Although management can substantially increase these yields, it should also include attention to streamside management zone practices to protect water quality.

Flooding and a high water table may restrict access for periods during the winter and spring months. Modified equipment, such as tandem-axled and four-wheel drive vehicles, may be needed for much of the year. Control of invading brush and undesirable species may be needed in regeneration operations. Since areas of these soils may often be included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 3. The Naconiche soils in map unit Na are in this group. They are on flood plains and are saturated throughout the year. They are best suited to the production of hardwood trees.

Common trees of the overstory are green ash, black gum, sweet bay, sweetgum, water oak, cherrybark oak, and willow oak. The site index for sweetgum and bottomland oaks averages 100 feet. The yield from an unmanaged, natural stand of sweetgum, over a 50-year period, is approximately 310 board feet per acre per year. Although management can substantially increase this yield, it should also include attention to streamside management zone practices to protect water quality.

Equipment use is greatly restricted due to wetness. Management and harvesting operations should be done only during dry periods. Specialized equipment and harvesting methods are needed. Control of undesirable, shade-tolerant species is necessary for successful regeneration efforts. Since areas of these soils may often be included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 4. This group includes the Attoyac, Bernaldo, and Woden soils in map units AyB, AyE, BeB, BeD, and WoB. These loamy soils are on stream terraces and are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, southern red oak, water oak, and white oak. The site index for loblolly pine averages 95 feet, but can range from 90 to over 100 feet. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 380 board feet per acre per year. The yield for sweetgum is approximately 260 board feet per acre per year. Management can substantially increase these yields.

There are no significant management problems associated with these soils. However, proper road design and layout, including the installation of water-control devices, such as water bars, are important on the steeper slopes of the Attoyac and Bernaldo soils.

Woodland Management Group 5. The Bienville soils in map unit BvB are in this group. These sandy soils are on stream terraces and are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, southern red oak, and white ash. The site index for loblolly pine averages 95 feet, but can range from 90 to 105 feet. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 380 board feet per acre per year. Management can substantially increase this yield.

The coarse texture of these soils may cause severe

problems with equipment use, especially during dry periods. Modified equipment, such as tandem-axled, four-wheel drive, and wide-tired vehicles, may be needed during dry periods. Successful establishment of planted pine requires attention to proper planting depth and soil compaction. Planting when the soil is moist should be helpful. Control of herbaceous weeds, either during site preparation or as a release during the first growing season, may also be needed.

Woodland Management Group 6. The Alazan soils in map unit GaA are in this group. They are on broad, mounded terraces and have a high water table during the winter months. These soils are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, water oak, willow oak, southern red oak, and white oak. The site index for loblolly pine and sweetgum averages 95 feet. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 380 board feet per acre per year. The yield for sweetgum is approximately 260 board feet per acre per year. Management can substantially increase these yields.

Some restriction of equipment use can be expected during the winter months due to a high water table. Care must be taken to prevent excessive rutting, especially on the flatter slopes. The abundant available moisture can lead to a competition problem for new pine seedlings. Site preparation or release that will control invading brush may be necessary. During road design and layout, attention should be given to avoid extremely flat or depressional areas and to not interrupt normal drainage. Maintenance will be necessary to fill ruts and holes. Since areas of these soils may often be included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 7. This group includes the Dreka, Estes, and Mattex soils in map units Dr, Es, Me, and Mo. These loamy and clayey soils are on broad flood plains and may be flooded for brief to long periods during the winter and spring months. They are best suited to the production of hardwood trees.

Common trees of the overstory are willow oak, cherrybark oak, green ash, American elm, and sweetgum. The site index for sweetgum averages 95 feet. The yield from an unmanaged, natural stand of sweetgum, over a 50-year period, is approximately 260 board feet per acre per year. Although management can substantially increase this yield, it should also include attention to streamside management zone practices to protect water quality.

Wetness greatly restricts access for much of the year. Specialized equipment and harvesting techniques are needed. Control of undesirable, shade-tolerant species is necessary in regeneration efforts. Since areas of these soils may often be included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 8. This group includes the Besner, Bowie, Gallime, Latex, Sawtown, and Ulto soils in map units BwB, GaA, LtB, MvA, SwA, and UtB. These loamy soils are on terraces and low upland sites and also occur as a mounded complex with other soils, such as the Mollville-Besner complex. They are suited to the production of both pine and hardwood trees (fig. 17).

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, southern red oak, water oak, and white oak. The site index for loblolly pine and sweetgum averages 90 feet. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 330 board feet per acre per year. The yield for sweetgum is approximately 210 board feet per acre per year. Management can substantially increase these yields.

There are no significant management problems associated with these soils. During road design and layout, attention should be given to avoid extremely flat or depressional areas.

Woodland Management Group 9. The Lilbert soils in map unit LyC are in this group. These sandy soils are on uplands and are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, post oak, white ash, sweetgum, and hickory. The site index for loblolly pine averages 90 feet, but can range from 80 to 95 feet depending on slope and slope position. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 330 board feet per acre per year. Management can substantially increase this yield.

The coarse texture of these soils may cause equipment limitations, particularly during dry periods. Modified equipment, such as tandem-axled, four-wheel drive, or wide-tired vehicles may be needed. Also, little available moisture may cause seedling mortality to be significant in dry years. Successful establishment of planted pine requires attention to proper planting depth and soil compaction. Planting when the soil is moist should be helpful. Control of herbaceous weeds, either during site preparation or as a release during the first growing season, may also be needed.

Woodland Management Group 10. This group includes the Kawah, Rentzel, and Sawlit soils in map units KaA, RzB, StB, and SwA. These soils are either on broad terraces or low upland sites and may be wet during the winter months due to a high water table. They are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, water oak, willow oak, southern

Figure 17.—A loblolly pine tree plantation in an area of Bowie very fine sandy loam, 1 to 4 percent slopes.

red oak, and white oak. The site index for loblolly pine and sweetgum averages 90 feet. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 330 board feet per acre per year. The yield for sweetgum is approximately 210 board feet per acre per year. Although management can substantially increase these yields, it should also include attention to streamside management zone practices to protect water quality on Rentzel soils.

Restriction of equipment use can be expected during the winter months due to a high water table. Care must be taken to prevent excessive rutting, especially on the flatter slopes. The abundant available moisture can lead to a competition problem for new pine seedlings. Site preparation or release that will control invading brush may be necessary. During road design and layout, attention should be given to avoid extremely flat or depressional areas and to not interrupt normal drainage. Maintenance will be necessary to fill ruts and holes. Since areas of the Rentzel soils may often be included in streamside management zones, road and trail construction should be limited.

Woodland Management Group 11. This group includes the Kirvin and Meth soils in map units KfC and MtC. These loamy soils are on gently sloping uplands and are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, southern red oak, sweetgum, and hickory. The site index for loblolly pine averages 85 feet, but can range from 80 to 90 feet. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 280 board feet per acre per year. Management can substantially increase this yield.

There are no significant management problems associated with these soils. On the steeper slopes, proper road design and layout that include the use of water-control devices, such as water bars and wing ditches, should be adequate.

Woodland Management Group 12. This group includes the Kirvin, Maben, and Sacul soils in map units KfE, MaE, and SaB. These loamy soils are on rolling uplands and are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, white ash, sweetgum, post oak, southern red oak, and white oak. The site index for loblolly pine averages 85 feet, but can vary significantly depending on slope position. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 280 board feet per acre per year. Management can substantially increase this yield.

As slopes increase, the potential for erosion increases. Therefore, care must be taken to avoid excessive uphill and downhill rutting during skidding and hauling. Intensive site preparation should be limited to gentler slopes, and machine tree planting should be done on the contour. Since clay occurs within 10 inches of the surface, particular attention must be given to tree planting methods that ensure proper root placement and soil compaction. In some cases, subsoiling before planting may be needed. The clayey subsoil may restrict equipment use during wet weather. During road design, consideration should be given to avoid the steeper slopes. If roads must be built on these slopes, long, uninterrupted grades should be avoided and adequate water-control devices, such as water bars and dips, should be installed. Care must be taken to empty wing ditches as often as possible, but always onto stable outlets. On the steeper sites, sloughing may be a problem. Cuts and fills should be kept to a minimum and shaped to as flat a slope as possible. When necessary, seeding problem areas, such as ditches and outlets, should be considered.

Woodland Management Group 13. The Tenaha soils in map unit TeE are in this group. These sandy soils are on uplands and are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, post oak, southern red oak, and white oak. The site index for loblolly pine averages 85 feet, but can vary depending on slope position. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 280 board feet per acre per year. Management can substantially increase this yield.

Generally, these soils are not very erosive. However, uphill and downhill rutting should be avoided, particularly on the steeper slopes. The coarse texture of these soils may restrict equipment use, particularly during dry periods. Modified equipment, such as tandem-axled, wide-tired, or four-wheel drive vehicles, may be needed, especially during the dry periods. The moderate available water capacity of these soils may result in significant seedling mortality during dry years. Successful establishment of planted pine requires attention to proper planting depth and soil compaction. Planting when the soil is moist should be helpful. Control of herbaceous weeds, either during site preparation or as a release during the first growing season, may also be necessary. As slopes increase, the need for proper road design, including the installation of water-control devices, such as water bars, becomes more important. Wing ditches should be used as often as possible, but released only onto stable outlets. If roads must be built on the steeper slopes, long, uninterrupted grades should be avoided. Revegetating disturbed areas may be needed on the steeper slopes.

Woodland Management Group 14. This group includes the Betis and Darco soils in map units BtB, DaC, and DaE. These sandy soils are on uplands and are best suited to the production of pine trees (fig. 18).

Common trees of the overstory are loblolly pine, shortleaf pine, post oak, and hickory. The site index for loblolly pine averages 85 feet, but can range from 80 to 90 feet depending on slope and slope position. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 280 board feet per acre per year. Management can substantially increase this yield.

Generally, these soils are not very erosive. However, to minimize erosion associated with logging, care must be taken to prevent uphill and downhill rutting during skidding and hauling on the steeper slopes. Machine planting should be done on the contour on the steeper slopes. The coarse texture of these soils may restrict equipment use during dry periods. Modified equipment, such as tandem-axled, four-wheel drive, and wide-tired vehicles, may be needed. Seedling mortality may be significant due to the low available water capacity of these soils. Successful establishment of planted pine requires attention to proper planting depth and soil compaction. Planting when the soil is moist should be helpful. Control of herbaceous weeds, either during site preparation or as a release during the first

Figure 18.—A stand of pine trees on Betis loamy fine sand, 1 to 5 percent slopes.

growing season, may also be needed. Some replanting may be necessary, especially following a particularly dry year. As slopes increase, the need for proper road design and construction becomes more important. Long, uninterrupted grades should be avoided, and water-control devices should be installed. Wing ditches should be used as often as possible, but released only onto stable outlets. Revegetating potential problem areas should be considered.

Woodland Management Group 15. This group includes the Cuthbert and Woodtell soils in map units CbE, WtB, and WtE. These loamy soils are on rolling uplands and are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, hickory, post oak, southern red oak, and white oak. The site index for loblolly pine averages 80 feet, but can range from 75 to 85 feet depending on slope position. The yield from an unmanaged,

natural stand of loblolly pine, over a 50-year period, is approximately 230 board feet per acre per year. Management can substantially increase this yield.

As slopes increase, the potential for erosion increases. Uphill and downhill rutting should be avoided during harvesting. Intensive site preparation should be restricted to the flatter slopes and machine planted on the contour. The clayey subsoil may restrict equipment use during wet periods. Modified equipment, such as four-wheel drive vehicles, may be needed. Rutting should be avoided on the flatter slopes of the Woodtell soils, and temporary restrictions may be needed during wet weather. The clayey subsoil may also cause problems in tree planting. Attention to planting methods is important to assure proper root placement and soil compaction. Subsoiling before machine planting may also improve seedling survival. As slopes increase, proper road design and construction, including the installation of water-control devices, such as water bars, dips, and wing ditches, becomes more important. Long, uninterrupted grades should be avoided. On the steeper sites, sloughing may be a problem. Cuts and fills should be kept to a minimum and shaped to as flat a slope as possible. Revegetating potential problem areas should be considered.

Woodland Management Group 16. This group includes the Cuthbert, Kirvin, and Redsprings soils in map units CtE, KgC, ReC, and ReE. These gravelly soils are on rolling uplands and are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, hickory, sweetgum, post oak, southern red oak, and white oak. The site index for loblolly pine averages 80 feet, but can range from 75 to 90 feet depending on slope position. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 230 board feet per acre per year. Management can substantially increase this yield.

As slopes increase, the potential for erosion also increases, particularly when the soil surface is disturbed. Management practices that will cause as little disturbance as possible should be chosen for sites with steeper slopes. On such sites, less intensive site preparation and regeneration methods, such as roller chopping, burning, or underplanting and deadening, should be considered. Intensive site preparation should be restricted to the flatter slopes. Also, harvesting methods should be modified on the steeper slopes to prevent excessive erosion. Uphill and downhill rutting should be avoided. The clayey subsoil may restrict equipment use, especially during wet periods. Modified equipment, such as four-wheel drive vehicles, may be needed. The clayey subsoil may also cause problems in tree planting. Attention to planting methods is important to assure proper root placement and soil compaction. Subsoiling on the flatter slopes prior to machine planting may be helpful in getting the proper planting depth. Proper road design and construction becomes important as the slopes increase. Water-control devices, such as water bars, dips, and wing ditches, must be installed on the steeper slopes. Care must be taken to empty these devices only onto stable outlets. Long, uninterrupted grades should be avoided. Seeding problem areas, such as ditches and ditch outlets, as well as other disturbed areas, may be needed.

Woodland Management Group 17. This group includes the Cuthbert and Redsprings soils in map units CbG and ReG. These soils are on steep uplands and are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, sweetgum, hickory, post oak, southern red oak, and white oak. The site index for loblolly pine averages 80 feet, but can range from 75 to 85 feet depending on slope position. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 230 board feet per acre per year. Management can substantially increase this yield.

The steep slopes of these soils can cause severe equipment limitations and increase the potential for erosion. Harvesting methods need to be adjusted to limit the use of equipment as much as possible. Skidding should either be restricted to selected trails or done on as gentle an uphill grade as possible. Traffic should be excluded or restricted during wet periods. Site preparation and tree planting should cause a minimum of disturbance to the site. Underplanting or hand planting followed by release should be considered. Attention to planting methods is important to assure proper root placement and soil compaction. Because the slopes on these soils exceed the recommended maximum grade for roads, construction should be avoided whenever possible. If this is not possible, adequate water-control devices, such as water bars, dips, and wing ditches, must be installed. Care must be taken to empty these devices only onto stable outlets. Seeding of the road surface may be necessary, but seeding of ditches and outlets, as well as other problem and disturbed areas, should be planned.

Woodland Management Group 18. This group includes the Derly and Mollville soils in map units DeA and MvA. These loamy soils are on nearly level terraces and may also be in depressional areas. They may be saturated during the winter months and are suited to the production of both pine and hardwood trees.

Common trees of the overstory are loblolly pine, water oak, willow oak, sweetgum, and green ash. The site index for loblolly pine, water oak, and sweetgum averages 80 feet. The yield from an unmanaged, natural stand of loblolly

pine, over a 50-year period, is approximately 230 board feet per acre per year. The yield for sweetgum is approximately 120 board feet per acre per year. Management can substantially increase these yields.

Wetness during much of the year may greatly restrict the use of equipment. Harvesting should be planned during drier periods, and modified equipment, such as tandem-axled, wide-tired and four-wheel drive vehicles, may be needed most of the time. Care should be taken to prevent excessive rutting and the blockage of drainageways. Mortality of pine seedlings may be significant, especially during wet years. Planting during the drier part of the planting season should be planned. In addition, bedding or mounding may also be beneficial. Competition to desirable seedlings from herbaceous and woody plants may be severe. Site preparation and release practices that will control this competition may be needed. These soils should be avoided whenever possible during road planning and construction. If road construction is necessary, crowning and raising the roadbed will be necessary. Maintenance should be planned and care should be taken to prevent ponding.

Woodland Management Group 19. The Cuthbert soils in map unit CsG are in this group. They are on steep uplands and are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, hickory, post oak, southern red oak, and white oak. The site index for loblolly pine averages 75 feet, but can vary depending on slope position. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 180 board feet per acre per year. Management can substantially increase this yield.

The stony surface and steep slopes of these soils may severely limit equipment use and increase the potential for erosion. Harvesting methods need to be adjusted to limit the use of equipment as much as possible. Skidding should either be restricted to selected trails or done on as gentle an uphill grade as possible. Cabling should be considered. Traffic should be excluded or restricted during wet periods. Site preparation and tree planting operations should cause a minimum of disturbance to the site. Underplanting or hand planting followed by release should be considered. Attention to planting methods is important to assure proper root placement and soil compaction. Planting can also be hindered by the presence of rocks on the surface. Hand planting may be the only way to assure proper seedling placement in many situations. Because the slopes on these soils exceed the recommended maximum grade for roads and the rocks can make road construction excessively expensive, construction should be avoided whenever possible. If this is not possible, adequate water-control devices, including water bars and wing ditches, must be installed. Care must be taken to empty these devices only onto stable outlets. Seeding of the road surface may be necessary, but seeding of ditches and outlets, as well as other problem and disturbed areas, should be planned.

Woodland Management Group 20. This group includes the Kirvin and Redsprings soils in map units KsC and RgC. These soils are on uplands, and the surface layer has been removed for gravel. They are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, post oak, southern red oak, and hickory. The site index for loblolly pine averages 65 feet, but can vary depending on the amount of site disturbance. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 95 board feet per acre per year.

The lack of a surface layer and the clayey texture of these soils cause all phases of management to have special concerns. Stabilizing these soils against erosion will often be needed because of sparse vegetation. Seeding may be needed. Since clay may occur at the surface, attention to tree planting methods is important. Subsoiling prior to planting may be required, and attention must be given to root placement and soil compaction. Harvesting methods that will minimize soil disturbance should be planned. The use of equipment may be restricted during wet periods. Roads built on these soils must have adequate water-control devices, such as water bars, dips, and wing ditches, installed. Care must be taken to empty these devices only onto stable outlets, and seeding of outlets and ditches may be necessary.

Woodland Management Group 21. The Tonkawa soils in map units ToC and ToE are in this group. These very deep sandy soils are on uplands and are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, post oak, and hickory. The site index for loblolly pine averages 65 feet, but can vary depending on slope position on the steeper Tonkawa soils. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 95 board feet per acre per year. Management can increase this yield.

The coarse texture of these soils may cause a severe limitation on equipment use, particularly during dry periods. Modified equipment, such as tandem-axled, four-wheel drive, or wide-tired vehicles, may be needed. Generally, erosion is not a severe problem. However, it can easily become one whenever runoff water is confined. Therefore, uphill and downhill rutting must be avoided during harvesting, skidding, and hauling. Site preparation should be kept to a minimum to maintain as much of the organic matter as possible on the soil surface. Site preparation

burning should be avoided. To minimize the impact of site preparation and still achieve control of competing vegetation, the use of herbicides for release should be considered. Control of herbaceous competition during the first growing season may be important to successful seedling establishment. Because these soils are droughty, seedling mortality should be expected to be high and replanting should be planned. Measures, such as planting in furrows, plowing on the contour, and root treatments with absorbents, may be helpful. These very deep sandy soils cause serious problems in road construction and maintenance. Whenever possible, permanent roads should be kept to a minimum and constant maintenance should be planned. During road construction, V-shaped ditches should be avoided and water-control devices must have stable outlets. Temporary roads should be retired after use by reshaping, if necessary; revegetating; and restricting access.

Woodland Management Group 22. The Tonkawa soils in map unit ToG are in this group. These very deep sandy soils are on hilly uplands and are best suited to the production of pine trees.

Common trees of the overstory are loblolly pine, shortleaf pine, post oak, and hickory. The site index for loblolly pine averages 65 feet, but can vary depending on slope position. The yield from an unmanaged, natural stand of loblolly pine, over a 50-year period, is approximately 95 board feet per acre per year. Management can increase this yield.

The steep slopes of these soils may cause erosion to be a serious problem, particularly if water is confined in channels, such as ruts, ditches, or roads. Uphill and downhill rutting must be avoided during harvesting operations. Skidding should be done on a gentle, uphill grade. Site preparation methods should be planned to keep as much of the organic material as possible on the soil surface. Seedling mortality may be variable depending on slope position, with best survival on the lower slopes. If seedlings are machine planted, they should be planted on the contour. Control of herbaceous competition during the first growing season should be considered. Because the slopes of these soils exceed the maximum recommended grade for roads, construction should be avoided whenever possible. Temporary roads and trails should be retired after use by reshaping, if necessary; seeding; and restricting further access. Problem and disturbed areas should be seeded.

Wildlife Habitat

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

Fish and wildlife in Rusk County are products of the land that provides their basic habitat requirements—food, water, and cover. Soils, climate, topography and, to a large degree, man's influence have an effect on the quality and quantity of habitat available.

The Texas Parks and Wildlife Department has identified four major habitat types in Rusk County: (1) willow oak/water oak/blackgum forest, (2) young forest/grassland, (3) pine/hardwood forest, and (4) native/introduced grass. In addition to these habitat types, aquatic habitat exists as fresh marshes, upland depressional wetlands, and open water habitat, including Lake Cherokee, Martin Creek Lake, Lake Striker, Angelina and Sabine Rivers, and many smaller creeks and drainages, such as Johnson and Beaver Run Creeks.

The *willow oak/water oak/blackgum forest* habitat type occurs in the flood plains and associated terraces of the rivers and other drainages in the county. Characteristic soils of the flood plains are Iulus, Mattex, Laneville, and Keechi. Associated plant species in the flood plains include overcup oak, red maple, black willow, palmetto, elderberry, Alabama supplejack, greenbrier, and trumpet creeper. Plant species for the Keechi soils are fresh marshes with a giant cutgrass, soft rush, smartweed, and buttonbush plant association. Examples of terrace soils include Attoyac, Bernaldo, Bienville, Mollville, and Sawlit. Plant species associated with the terrace soils include loblolly pine, white oak, beech, hackberry, American elm; and water hickory and water locust in the wetter, depressional areas of soils, such as Mollville.

These flood plain and terrace areas are some of the most productive wildlife lands in the county and provide habitat to migratory and resident waterfowl, white-tailed deer, eastern wild turkey, beaver, raccoon, mink, bobcat, gray and fox squirrels, woodpeckers, and songbirds. Alligators, water snakes, frogs, toads, turtles, and salamanders are also present in these areas.

Improvement practices applicable to this habitat type include selective thinning of hardwoods, hardwood reforestation where needed, and installation of structures to create shallow water areas for waterfowl.

The *young forest/grassland* habitat type is not soil or site specific. This habitat type usually develops in the 7 to 10 years following clearcutting and replanting. Plant species vary, but generally consists of loblolly pine, shortleaf pine, various oaks, sweetgum, and hickory. Shrubs, grasses, and forbs in this habitat type include sumac, sassafrass, blackberry, greenbrier, hawthorn, yaupon, tickclover, lespedeza, ragweed, dogfennel, broomsedge and pinehill bluestem, vaseygrass, and Florida paspalum. This habitat type provides food and cover for deer, turkey, cottontail rabbit, and woodcock. On sandy soils, such as Darco and Tonkawa, the abundance of annual forbs and perennial legumes and the lack of dense

herbaceous cover offer the potential for production of bobwhite quail and mourning doves.

As this habitat type ages, practices that can help maintain or improve its quality are annual disking, creation of food plots, and selective thinning.

The *pine/hardwood forest* is the largest habitat type in the county. This habitat type generally occurs on upland soils, such as Kirvin, Sacul, Woodtell, and Cuthbert, and is not specific to topography. Plant species associated with this habitat include loblolly pine, shortleaf pine, sweetgum, white oak, red oak, hickory, American beautyberry, dogwood, yaupon, greenbrier, longleaf uniola, beaked panicum, lespedeza, and tickclover. White-tailed deer, turkey, fox squirrel, raccoon, opossum, bobcat, owls, hawks, woodpeckers, and songbirds may be found in this habitat. While soils and topography may influence the types and amounts of vegetation present, the quality of this habitat is influenced most by the density of canopy in the overstory and midstory. As canopy cover increases, the diversity of understory plant species decreases.

Selective thinning, creating forest openings, planting supplemental food plots, prescribed burning, and proper woodland grazing are practices that can improve the quality of this habitat.

The *native/introduced grass* habitat type in Rusk County is not a natural condition. This habitat type develops through natural succession on abandoned cropland and cutover areas or through the intentional conversion of cropland or forest land to grassland for hay or grazing. This habitat type is normally found on the loamy and sandy uplands, as well as some of the better drained bottomland terraces. Typical soils in this habitat type include Attoyac, Bienville, Bowie, Sacul, Woodtell, and Darco.

The native grass habitat is usually composed of grasses, forbs, shrubs, and vines. Little and broomsedge bluestems, switchgrass, partridge pea, tickclover, lespedeza, yankee-weed, giant ragweed, greenbrier, dewberry, and yaupon are common plant associates. This habitat type provides food and cover for turkey, quail, white-tailed deer, cottontail rabbit, coyote, meadowlark, and red-tailed hawk. The native grassland is very important as fawning habitat for deer and nesting habitat for wild turkey.

Introduced grass habitat is much more common in the county and usually consists of either bermudagrass or bahiagrass. These are commonly overseeded in the fall to cool-season annual grasses, such as ryegrass or Elbon rye, and to cool-season legumes, such as white clover, crimson clover, or arrowleaf clover. These cool-season grasses and legumes provide supplemental foods for deer, turkey, rabbits, and geese.

Control of woody vegetation through mowing, application of herbicides, or prescribed burning is essential for the maintenance of this habitat type. Annual disking, supplemental food plots, and controlled grazing are other practices that may be used to maintain or improve habitat quality.

The aquatic habitat of lakes, rivers, and creeks along with the many farm ponds and watershed structures occurring in the county provide habitat for largemouth bass; channel, blue, and yellow catfish; crappie; and bluegill. Beaver, blue and green herons; common and cattle egrets; wood ducks; and migratory waterfowl, such as mallard, teal, gadwall, scaup, and redhead ducks, also use these aquatic habitats. Watershed structures and numerous farm ponds in the county also provide aquatic habitat to upland wildlife species, waterfowl, fish, and reptiles. Soils suitable for farm pond construction include Kirvin, Sacul, Sawlit, and Woodtell (fig. 19). These ponds are usually stocked with largemouth bass, channel catfish, and bluegills.

Farm ponds in Rusk County may require the application of agricultural limestone to ensure good productivity. Other practices useful in maintaining or improving quality pond habitat include aquatic weed control, fertilization, proper fish stocking and harvesting, and the installation of siphon or trickle tubes.

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

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

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

Figure 19.—An area of Woodtell loam, 1 to 3 percent slopes, produces pasture grasses and provides a site for a livestock farm pond.

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 barley.

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

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 bluestem, goldenrod, beggarweed, croton, and partridge pea.

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, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian olive, autumn olive, and crabapple.

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

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are American beautyberry, yaupon, sumac, and greenbrier.

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, wildrice, cattail, maidencane, 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 beaver 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, meadowlark, field sparrow, cottontail, and red fox.

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

Surface Mine Reclamation

Norman P. Bade, conservation agronomist, Natural Resources Conservation Service, helped prepare this section.

Current Texas regulations require all mined soils be reclaimed according to a prepared and approved reclamation plan, which includes vegetation of the area. The applicant is responsible for the success of the vegetation following its establishment for a designated period of time. National and state regulations need to be considered in the planning, site selection and design, and application of any reclamation procedures.

The objectives of reclamation are to restore the soil to a condition capable of supporting its intended use, to prevent permanent damage, and to control erosion and sedimentation. Because mining results in major soil disturbances, more soil amendments, plant material seed and sprigs, and subsequent management are generally needed in the initial stages of reclamation.

Successful reclamation of strip-mined soils depends on an understanding of the chemical, physical, and biological properties of soils. Soil properties are altered when the soil is disturbed. This can have an adverse effect on alternative land use and productivity if the reconstruction method does not provide for the selection of the best available soil material for use as surface soil. High levels of acidity and low organic matter are major conditions that also need to be considered in soil reconstruction.

Lignite deposits underlie many of the soils in the survey area. Strip mining the lignite deposits results in large acreages of disturbed lands. Surface mining for lignite is accomplished by clearing existing vegetation, removing all overburden using large draglines, mining the lignite, and replacing the overburden.

Lignite coal mining is becoming a major industry in the northeastern part of the survey area. One of the soils in this mining area is Kirvin fine sandy loam, 2 to 5 percent slopes.

Depending on the reclamation process, the soil is reconstructed and revegetated. In one instance, after mining the lignite and replacing the mixed overburden, the spoil mounds are graded to its planned contour and revegetated.

In another instance, such as in this county, the topsoil is stockpiled before mining. After the lignite is removed, the mixed spoil mounds are smoothed to a planned contour. Selected oxidized materials are then placed on this contour about 42 inches thick. At least 6 inches of topsoil is added on this material. The reconstructed oxidized materials are at least 48 inches thick over the buried mixed overburden. This soil is then revegetated to the planned post-mine use. An example is the Pirkey soil series.

Following reconstruction, the land can be used as cropland, pastureland, and woodland; as habitat for wildlife; for recreational activities, orchards, or residential or industrial development. The selected post-mine land use determines the plant materials and the reclamation procedures.

Some mined areas have been reclaimed and planted to coastal bermudagrass. The reclaimed soil is Pirkey very fine sandy loam, 1 to 5 percent slopes.

The method of reconstruction is important to the success of reclamation efforts. Replacement of stockpiled topsoil, when adequate amounts and quality are available, helps retain vegetation material and seeds native to the area and organic matter and microbiological activity normally in the surface layer. The random mixing of all overburden material can alter many of the soil properties, resulting in initially increased erosion potential, decreased organic matter, and crusting of soils. Testing chemical properties of the soil is needed because unoxidized geologic material from the greater depths may contain acid-forming pyrites.

Revegetation of mined lands requires a good seedbed, adequate amounts of fertilizer, and selection of plants that control erosion and provide for the land's intended use. Plants commonly used for cover and forage include coastal, common, and "Tifton 44" bermudagrass; "Selection 75" kleingrass; and "Pensacola" bahiagrass. Other important species include "Lehmann" lovegrass, "Alamo" switchgrass, and "Lometa" indiangrass. Legumes, such as "Yuchi" arrowleaf clover, crimson clover, "Okinawa" sericea lespedeza, and hairy vetch, increase forage capabilities and provide needed nitrogen for other species. Other forbs and legumes, such as bushsunflower, singletary pea, Engelmann daisy, and "Aztec" Maxmilian sunflower, provide diversity and increase wildlife habitat.

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 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 9 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, 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 10 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.

The table 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.

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

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

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help 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 the table, 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 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

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

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

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

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

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

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent

water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

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; and subsidence of organic layers. 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, and sulfur. Availability of drainage outlets is not considered in the ratings.

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.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 16.

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

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under 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 (3) and the system adopted by the American Association of State Highway and Transportation Officials (2).

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.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 16.

Rock fragments larger than 10 inches in diameter and 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 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

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

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, 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 the basis of 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*, greater 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. Losses are expressed in tons per acre per year. These 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 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

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

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, 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 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are 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 mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

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

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

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

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

The table 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 generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than a 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* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding 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 is 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 the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in the table are the depth to the seasonal high water table; the kind of water table, that is, *perched, artesian,* or *apparent*; and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in the table.

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.

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.

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

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors 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 the amount of sulfates in the saturation extract.

Physical and Chemical Analyses and Clay Mineralogy of Selected Soils

The results of physical analysis of several typical pedons in the survey area are given in table 17, the results of chemical analysis in table 18, and clay mineralogy in table 19. The data are for soils sampled at carefully selected sites. The pedons are typical of the series and 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 *(32)*.

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 or 1/10 bar (4B1), 15 bars (4B2).
Bulk density—of less than 2 mm material, saran-coated clods field moist (4A1a), 1/3 bar (4A1d), ovendry (4A1h).
Organic carbon—wet combustion. Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c).
Extractable cations—ammonium acetate pH 7.0, atomic absorption; calcium (6N2e), magnesium (6O2d), sodium (6P2d), potassium (6Q2b).
Base saturation—sum of cations, TEA, pH 8.2 (5C3).
Reaction (pH)—1:1 water dilution (8C1f).
Aluminum saturation (5G1)
Clay mineralogy (7A2i)

Engineering Index Test Data

Table 16 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the Soil Mechanics Laboratory, Fort Worth, Texas.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(31)*. 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 on 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 Entisol.

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 Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning deposited by water, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

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

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 class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, siliceous, nonacid, thermic Typic Fluvaquents.

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

Soil Series and Their Morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(30)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(31)* and in "Keys to Soil Taxonomy" *(33)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

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

Alazan Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape: Coastal plains
Landform: Terraces
Parent material: Loamy alluvium from rivers and streams
Slope range: 0 to 2 percent
Taxonomic class: Fine-loamy, siliceous, thermic Aquic Glossudalfs

Typical Pedon

Alazan loam, in an area of Gallime-Alazan complex, 0 to 2 percent slopes, in an area of native pasture; from the intersection of Texas Highway 149 and Texas Highway 43 in Tatum, 2 miles northwest on Texas Highway 149, 0.1 mile east on County Road 2187, 0.1 mile north on County Road 2144, 0.1 mile west on County Road 2196, 250 feet north of road:

A—0 to 5 inches; dark brown (10YR 4/3) loam; weak fine subangular blocky structure; hard, very friable; common fine and medium roots; few fine pores; strong brown and reddish stains along some root channels; moderately acid; clear smooth boundary.

E—5 to 10 inches; pale brown (10YR 6/3) loam; common fine distinct brownish yellow (10YR 6/6) and few fine prominent yellowish red (5YR 5/6) iron accumulations; weak fine subangular blocky structure; hard, very friable; few fine and medium roots; few fine pores; few faint grayish brown (10YR 5/2) worm casts; strongly acid; clear smooth boundary.

Bt/E1—10 to 30 inches; strong brown (7.5YR 5/6) sandy clay loam; few medium distinct grayish brown (10YR 5/2) and few fine distinct yellowish red (5YR 4/6) iron accumulations; moderate medium subangular blocky structure; hard, firm; few fine roots and pores; few thin clay films on faces of peds; about 15 percent, by volume, streaks, coatings, and pockets of albic material (E); few fine iron-manganese concretions; about 5 percent of the matrix is brittle; strongly acid; gradual irregular boundary.

Bt/E2—30 to 80 inches; reddish yellow (7.5YR 6/8) sandy clay loam; few medium distinct yellowish red (5YR 4/6) iron accumulations and few fine prominent light brownish gray iron depletions; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm; few fine roots and pores; few thin clay films on faces of peds; about 30 percent, by volume, streaks, coatings, and pockets of albic material (E); few iron-manganese concretions; about 10 percent of the matrix is brittle; strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 18 to 25 percent
Other distinctive soil features: Silt content in the control section ranges from 25 to 45 percent
Concentrated minerals: None

A horizon:
Color—Dark grayish brown, dark gray, brown, dark brown, or grayish brown
Redoximorphic features—None
Texture—Loam
Reaction—Very strongly acid to moderately acid
Other features—None

E horizon:
Color—Pale brown, light brownish gray, light yellowish brown, or very pale brown
Redoximorphic features—None
Texture—Very fine sandy loam or loam
Reaction—Very strongly acid or strongly acid
Other features—None

Bt/E horizon:
Color—Yellowish brown, brownish yellow, brown, strong brown, light brown, light yellowish brown, or reddish yellow
Redoximorphic features—Few to many iron accumulations in shades of brown and red and iron depletions in shades of gray
Texture—Loam or sandy clay loam
Reaction—Very strongly acid or strongly acid in the upper part and strongly acid to slightly acid in the lower part
Other features—5 to 50 percent, by volume, streaks, pockets, and coatings of albic material (E); 5 to 20 percent of the matrix is brittle in most pedons
Thickness—More than 20 inches

Attoyac Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plains
Landform: Terraces
Parent material: Loamy alluvium from rivers and streams
Slope range: 1 to 15 percent
Taxonomic class: Fine-loamy, siliceous, thermic Typic Paleudalfs

Typical Pedon

Attoyac fine sandy loam, 1 to 3 percent slopes, in an area of woodland; from the intersection of U.S. Highway 84 and Farm Road 225 west of Mount Enterprise, 1.2 miles south on Farm Road 225, 1.2 miles west and south on a county road, 0.5 mile west and southwest on a private road, 100 feet east of road:

A1—0 to 8 inches; brown (10YR 4/3) fine sandy loam; weak fine subangular blocky structure; soft, very friable; common fine and medium roots; slightly acid; clear smooth boundary.

A2—8 to 14 inches; brown (7.5YR 5/4) fine sandy loam; weak fine subangular blocky structure; soft, very friable; common fine and few medium roots; many fine and few medium and coarse pores; slightly acid; clear smooth boundary.

Bt1—14 to 31 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium subangular blocky structure; hard, firm; few fine roots; few pores of all sizes; many patchy clay films on faces of peds; moderately acid; clear smooth boundary.
Bt2—31 to 52 inches; red (2.5YR 4/6) sandy clay loam; few fine prominent strong brown (7.5YR 5/6) and common fine and medium distinct dark red (10R 4/6) lithochromic mottles; moderate medium subangular blocky structure; very hard, firm; few fine roots; many patchy clay films on faces of peds; many clean sand grains; moderately acid; clear smooth boundary.
Bt3—52 to 80 inches; yellowish red (5YR 4/6) sandy clay loam; common medium distinct strong brown (7.5YR 5/6) and common medium distinct red (2.5YR 4/6) lithochromic mottles; moderate medium subangular blocky structure; very hard, firm; few fine roots; many patchy clay films on faces of peds; few pale brown (10YR 6/3) skeletans; many clean sand grains; moderately acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 18 to 25 percent
Other distinctive soil features: Silt content in the control section is more than 20 percent
Concentrated minerals: None

A horizon:
Color—Brown, dark brown, dark yellowish brown, yellowish red, reddish brown, strong brown, or yellowish brown
Redoximorphic features—None
Texture—Fine sandy loam
Reaction—Strongly acid to slightly acid, unless limed
Other features—None

Bt horizon:
Color—Dark red, red, or yellowish red
Redoximorphic features—None to common lithochromic mottles in shades of brown and red in the lower part of some pedons
Texture—Sandy clay loam or loam
Reaction—Very strongly acid to moderately acid
Other features—Up to 5 percent skeletans and small pockets of clean sand in the lower part of some pedons

Bernaldo Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plains
Landform: Terraces
Parent material: Loamy alluvium from rivers and streams
Slope range: 1 to 8 percent
Taxonomic class: Fine-loamy, siliceous, thermic Glossic Paleudalfs

Typical Pedon

Bernaldo very fine sandy loam, 1 to 3 percent slopes, in an area of improved pasture; from the intersection of Farm Road 3135 and Farm Road 1251 about 7 miles northeast of Henderson in Church Hill community, 2.3 miles east on Farm Road 1251, 0.1 mile south of road:

Ap—0 to 4 inches; dark brown (10YR 4/3) very fine sandy loam; weak fine subangular blocky structure; soft, very friable; common fine and medium roots; few fine pores; few fine ironstone pebbles; few dark grayish brown organic stains; slightly acid; clear smooth boundary.
E—4 to 17 inches; yellowish brown (10YR 5/4) very fine sandy loam; weak fine subangular blocky structure; soft, very friable; few fine and medium roots; few fine pores; few fine ironstone pebbles; slightly acid; clear smooth boundary.
Bt1—17 to 25 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; hard, firm; few fine and medium roots; common fine and medium pores; common thin clay films on faces of peds; few fine ironstone pebbles; slightly acid; clear smooth boundary.
Bt2—25 to 49 inches; strong brown (7.5YR 5/8) sandy clay loam; few medium prominent red (2.5YR 4/6) and common medium faint strong brown (7.5YR 5/6) iron accumulations; moderate medium subangular blocky structure; hard, firm; few fine roots; few fine and medium pores; 2 percent, by volume, of plinthite; common thin clay films on faces of peds; few fine ironstone pebbles; slightly acid; clear smooth boundary.
Bt/E—49 to 80 inches; brownish yellow (10YR 6/8) sandy clay loam; few fine prominent yellowish red (5YR 5/8) and few medium faint yellowish brown (10YR 5/6) iron depletions; weak medium subangular blocky structure; hard, friable; few fine roots; few thin clay films on faces of peds; about 12 percent, by volume, streaks of albic material (E); few fine ironstone pebbles; moderately acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 15 to 30 percent
Other distinctive soil features: None to few ironstone pebbles throughout the profile; iron depletions with chroma of 2 or less at more than 30 inches deep
Concentrated minerals: None

A or Ap horizon:
Color—Brown, dark brown, yellowish brown, light yellowish brown, or dark yellowish brown

Redoximorphic features—None
Texture—Very fine sandy loam
Reaction—Strongly acid to slightly acid
Other features—None

E horizon:
Color—Pale brown, light brown, light yellowish brown, yellowish brown, very pale brown, grayish brown, or light brownish gray
Redoximorphic features—None
Texture—Very fine sandy loam
Reaction—Strongly acid to slightly acid
Other features—None

Bt horizon:
Color—Yellowish brown, yellowish red, light yellowish brown, brownish yellow, or strong brown
Redoximorphic features—None to common iron accumulations in shades of red and brown and iron depletions in shades of gray
Texture—Sandy clay loam, loam, or clay loam
Reaction—Very strongly acid to slightly acid
Other features—0 to 2 percent, by volume, of plinthite

Bt/E horizon:
Color—Yellowish brown, yellowish red, light yellowish brown, brownish yellow, or strong brown
Redoximorphic features—Few to many iron accumulations in shades of red and brown and iron depletions in shades of gray; or the horizon is variegated in these colors
Texture—Fine sandy loam, loam, or sandy clay loam
Reaction—Very strongly acid to slightly acid
Other features—5 to 15 percent, by volume, streaks, pockets, and coatings of albic material (E); up to 15 percent of the matrix is brittle in some pedons

Besner Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plains
Landform: Stream terraces
Parent material: Old alluvial sediments from wind-reworked river and stream deposits
Slope range: 0 to 1 percent
Taxonomic class: Coarse-loamy, siliceous, thermic Typic Glossudalfs

Typical Pedon

Besner fine sandy loam, in an area of Mollville-Besner complex, 0 to 1 percent slopes, in an area of woodland; from the intersection of U.S. Highway 79 and Texas Highway 42 about 8 miles southwest of Henderson, 0.7 mile southwest on U.S. Highway 79, 2.5 miles west on County Road 476, 0.7 mile west on County Road 4194, 45 feet southwest of road:

A—0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine subangular blocky structure; soft, very friable; common fine and medium roots and pores; strongly acid; clear smooth boundary.
E1—4 to 21 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine subangular blocky structure; soft, very friable; common fine and medium roots and pores; moderately acid; clear smooth boundary.
E2—21 to 32 inches; light yellowish brown (10YR 6/4) fine sandy loam; few medium pale brown (10YR 6/3) spots; weak fine subangular blocky structure; soft, very friable; few fine and medium roots; common fine and medium pores; moderately acid; clear wavy boundary.
Bt/E1—32 to 60 inches; light yellowish brown (10YR 6/4) loam; common medium distinct strong brown (7.5YR 5/6) iron depletions; weak fine subangular blocky structure; soft, very friable; few fine roots: few thin clay films on faces of peds; 20 percent, by volume, streaks, pockets, and coatings of albic material (E); few yellowish red (5YR 4/6) root stains; very strongly acid; clear irregular boundary.
Bt/E2—60 to 80 inches; variegated yellowish brown (10YR 5/4 and 5/8) sandy clay loam; moderate medium subangular blocky structure; slightly hard, friable; few fine roots; few thin clay films on faces of peds; 30 percent, by volume, streaks, pockets, and coatings of albic material (E); very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 14 to 18 percent
Other distinctive soil features: Fine sand or coarser texture ranges from 16 to 22 percent in the control section
Concentrated minerals: None
Reaction: Very strongly acid to slightly acid throughout the profile

A horizon:
Color—Dark grayish brown, grayish brown, brown, or dark brown
Redoximorphic features—None
Texture—Fine sandy loam
Other features—None

E horizon:
Color—Grayish brown, yellowish brown, pale brown, brown, light yellowish brown, or very pale brown
Redoximorphic features—None
Texture—Fine sandy loam
Other features—None
Thickness—Combined thickness of the A and E horizons ranges from 20 to 40 inches

Bt horizon (where present):
Color—Light yellowish brown, brownish yellow, yellowish brown, brown, strong brown, light brown, or reddish yellow
Redoximorphic features—None
Texture—Loam or fine sandy loam
Other features—None

Bt/E horizon:
Color—Light yellowish brown, brownish yellow, yellowish brown, brown, strong brown, light brown, or reddish yellow
Redoximorphic features—Iron accumulations in shades of red and brown (Bt) at more than 30 inches deep
Texture—Loam or sandy clay loam
Other features—20 to 30 percent, by volume, streaks, pockets, and coatings of albic material (E)

Betis Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Landscape: Coastal plains
Landform: Uplands
Parent material: Coastal plains sediments from sandy marine deposits
Slope range: 1 to 5 percent
Taxonomic class: Sandy, siliceous, thermic Psammentic Paleudults

Typical Pedon

Betis loamy fine sand, 1 to 5 percent slopes (fig. 20), in an area of woodland; from the intersection of U.S. Highway 84 and Farm Road 225 west of Mount Enterprise, 2.95 miles south on Farm Road 225, 0.45 mile west on County Road 4236, 125 feet north of road:

A—0 to 9 inches; brown (10YR 4/3) loamy fine sand; weak fine granular structure; soft, very friable; many fine, medium, and coarse roots; very strongly acid; clear smooth boundary.
E1—9 to 23 inches; light yellowish brown (10YR 6/4) loamy fine sand; single grained; soft, very friable; common fine, medium, and coarse roots; moderately acid; gradual wavy boundary.
E2—23 to 49 inches; pale brown (10YR 6/3) loamy fine sand; few small pink (7.5YR 7/4) spots; single grained; soft, very friable; few fine roots; moderately acid; gradual wavy boundary.
E&Bt—49 to 80 inches; light yellowish brown (10YR 6/4) loamy fine sand; single grained; soft, very friable; few fine roots; strong brown (7.5YR 5/8) fine sandy loam lamellae 3/8 to 1/2 inch thick; few clay bridges and coated sand grains in lamellae; moderately acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 5 to 15 percent
Redoximorphic features: None
Other distinctive soil features: Base saturation ranges from 20 to 35 percent at 80 inches deep
Concentrated minerals: None
Reaction: Very strongly acid to moderately acid throughout the profile, except where limed

A horizon:
Color—Dark grayish brown, dark yellowish brown, grayish brown, brown, or yellowish brown
Texture—Loamy fine sand
Other features—None

E horizon:
Color—Pale brown, brown, yellowish brown, or light yellowish brown
Texture—Loamy fine sand or fine sand
Other features—None

Bw horizon (where present):
Color—Strong brown or yellowish brown
Texture—Loamy fine sand or fine sand
Other features—Few or common randomly distributed pockets of clean sand grains

E&Bt horizon:
Color—Brown, pale brown, very pale brown, light yellowish brown, or yellowish brown (E); strong brown or yellowish brown (Bt)
Texture—Loamy fine sand or fine sand (E); loamy fine sand or fine sandy loam (Bt)
Other features—A series of lamellae with a composite thickness of more than 6 inches (Bt)

Bienville Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Landscape: Coastal plains
Landform: Terraces
Parent material: Sandy alluvium from rivers and streams
Slope range: 0 to 2 percent
Taxonomic class: Sandy, siliceous, thermic Psammentic Paleudalfs

Typical Pedon

Bienville loamy fine sand, 0 to 2 percent slopes, in a wildlife food plot area; from the intersection of Texas Highway 149 and Texas Highway 43 in Tatum, 0.2 mile northwest on Texas Highway 149 to County Road 2210, 5.5 miles north on County Road 2210 to a private road, 1.7

miles north and east on a private road, 100 feet north of road:

A—0 to 12 inches; dark brown (10YR 4/3) loamy fine sand; weak coarse subangular blocky structure parting to weak fine granular; soft, very friable; common fine and medium roots; common very dark grayish brown (10YR 3/2) organic stains; strongly acid; clear smooth boundary.

E—12 to 26 inches; yellowish brown (10YR 5/4) loamy fine sand; weak coarse prismatic structure parting to weak fine granular; soft, very friable; few fine and medium roots; moderately acid; clear smooth boundary.

B/E—26 to 40 inches; yellowish brown (10YR 5/6) loamy fine sand; few medium strong brown (7.5YR 5/6) spots; weak coarse prismatic structure parting to weak fine granular; soft, very friable; common medium spots of very pale brown (10YR 7/3) uncoated sand grains (E); moderately acid; clear smooth boundary.

Bt—40 to 80 inches; strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) loamy fine sand; weak coarse prismatic structure parting to weak fine granular; soft, very friable; few medium spots of pale brown (10YR 6/3) uncoated sand grains; few coated sand grains and some clay bridging of sand grains; moderately acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 5 to 20 percent
Redoximorphic features: None
Other distinctive soil features: None
Concentrated minerals: None

A horizon:
Color—Dark brown, brown, grayish brown, dark grayish brown, or dark yellowish brown
Texture—Loamy fine sand
Reaction—Strongly acid to slightly acid
Other features—None

E horizon:
Color—Brown, light brown, pale brown, very pale brown, yellowish brown, light yellowish brown, or dark yellowish brown
Texture—Loamy fine sand
Reaction—Strongly acid to slightly acid
Other features—None

B/E horizon (and E/B horizon, where present):
Color—Strong brown, yellowish brown, reddish brown, yellowish red, or dark yellowish brown (B); light yellowish brown, pale brown, brown, very pale brown, or light brown (E)
Texture—Loamy fine sand
Reaction—Very strongly acid to moderately acid
Other features—Spots and pockets (B)

Bt horizon:
Color—Reddish brown, yellowish red, light reddish brown, reddish yellow, brown, strong brown, light brown, yellowish brown, or brownish yellow
Texture—Loamy fine sand
Reaction—Very strongly acid to moderately acid
Other features—Spots of uncoated sand (E material) in most pedons; lamellae in some pedons

Bowie Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape: Coastal plains
Landform: Uplands
Parent material: Coastal plains sediments from loamy marine deposits
Slope range: 1 to 4 percent
Taxonomic class: Fine-loamy, siliceous, thermic Plinthic Paleudults

Typical Pedon

Bowie very fine sandy loam, 1 to 4 percent slopes, in an area of improved pasture; from the traffic circle in Henderson, 2.75 miles northeast on Texas Highway 43, 0.4 mile north on County Road 217, 75 feet east of road:

Ap—0 to 7 inches; brown (10YR 4/3) very fine sandy loam; weak medium granular structure; soft, very friable; many fine and medium roots; strongly acid; clear smooth boundary.

E—7 to 10 inches; pale brown (10YR 6/3) very fine sandy loam; weak medium subangular blocky structure; slightly hard, friable; common fine roots; strongly acid; clear smooth boundary.

Bt1—10 to 20 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; slightly hard, firm; common fine roots; few thin clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—20 to 49 inches; strong brown (7.5YR 5/6) sandy clay loam; common medium distinct yellowish red (5YR 5/8) lithochromic mottles; moderate medium subangular blocky structure; slightly hard, firm; common fine roots; few thin clay films on faces of peds; very strongly acid; gradual smooth boundary.

Btv/E1—49 to 63 inches; yellowish brown (10YR 5/8) fine sandy loam; many coarse prominent red (2.5YR 4/8) iron accumulations; weak coarse prismatic structure parting to weak medium subangular blocky; hard, firm; few fine roots; 8 percent, by volume, of plinthite; common patchy clay films on faces of peds; about 20 percent of the matrix is streaks, pockets, and coatings

of albic material (E); about 15 percent of the matrix is brittle and contains vesicular pores that are lined with clay; strongly acid; gradual irregular boundary.

Btv/E2—63 to 80 inches; variegated red (2.5YR 4/8) and yellowish brown (10YR 5/8) fine sandy loam; weak coarse prismatic structure parting to weak fine subangular blocky; hard, firm; few fine roots; 7 percent, by volume, of plinthite; common patchy clay films on faces of peds; 10 percent of the matrix is streaks, pockets, and coatings of albic material (E); 10 percent of the matrix is brittle; strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 18 to 35 percent
Other distinctive soil features: Ironstone pebbles less than 2 centimeters in diameter range from 0 to 5 percent, by volume, in some pedons
Concentrated minerals: None

A or Ap horizon:
- Color—Brown, dark brown, grayish brown, dark grayish brown, or dark yellowish brown
- Redoximorphic features—None
- Texture—Very fine sandy loam
- Reaction—Strongly acid to slightly acid
- Other features—None

E horizon:
- Color—Pale brown, brown, light yellowish brown, dark yellowish brown, yellowish brown, or light brown
- Redoximorphic features—None
- Texture—Very fine sandy loam
- Reaction—Strongly acid to slightly acid
- Other features—None
- Thickness—Combined thickness of the A and E horizons ranges from 8 to 15 inches

Bt horizon:
- Color—Yellowish brown, light yellowish brown, brownish yellow, strong brown, or reddish yellow
- Redoximorphic features—None to many lithochromic mottles in shades of red, brown, and yellow
- Texture—Sandy clay loam or clay loam
- Reaction—Very strongly acid or strongly acid
- Other features—0 to 4 percent, by volume, of nodular plinthite

Btv horizon (where present):
- Color—Yellowish brown, light yellowish brown, brownish yellow, strong brown, or reddish yellow
- Redoximorphic features—None to many iron accumulations in shades of red, brown, and yellow
- Texture—Sandy clay loam or clay loam
- Reaction—Very strongly acid or strongly acid
- Other features—5 to 15 percent, by volume, of nodular plinthite

Btv/E horizon:
- Color—Yellowish brown, light yellowish brown, brownish yellow, strong brown, or reddish yellow
- Redoximorphic features—Iron accumulations in shades of brown and yellow and iron depletions in shades of gray at more than 30 inches deep; or the horizon is variegated in these colors
- Texture—Fine sandy loam, sandy clay loam, or clay loam
- Reaction—Very strongly acid or strongly acid
- Other features—5 to 20 percent, by volume, streaks, pockets, and coatings of albic material (E); 5 to 15 percent, by volume, of nodular plinthite; 10 to 20 percent brittle peds in some pedons

Cuthbert Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape: Coastal plains
Landform: Uplands
Parent material: Stratified acidic, loamy, and clayey residuum from soft sandstone and shale
Slope range: 5 to 40 percent
Taxonomic class: Clayey, mixed, thermic Typic Hapludults

Typical Pedon

Cuthbert fine sandy loam, 5 to 15 percent slopes, in an area of woodland; from the intersection of U.S. Highway 259 and County Road 3267 about 4.75 miles south of Mount Enterprise, 0.5 mile north on U.S. Highway 259, 1.8 miles southwest on a private timber company road, 340 feet south of a pipeline, 200 feet east of pipeline:

A—0 to 6 inches; dark brown (10YR 4/3) fine sandy loam; weak fine subangular blocky structure; soft, friable; many fine and medium and few coarse roots; common fine and medium pores; few ironstone pebbles; strongly acid; clear smooth boundary.

E—6 to 8 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine subangular blocky structure; soft, friable; many fine and medium and few coarse roots and pores; few ironstone pebbles; strongly acid; clear smooth boundary.

Bt1—8 to 14 inches; yellowish red (5YR 5/6) clay; few medium distinct strong brown (7.5YR 5/6) lithochromic mottles; moderate medium subangular blocky structure; hard, firm; common fine and medium roots; common fine pores; common distinct red (2.5YR 4/6) clay films on faces of peds; few mica flakes; very strongly acid; gradual wavy boundary.

Bt2—14 to 19 inches; yellowish red (5YR 5/8) clay; few fine distinct strong brown (7.5YR 5/6) and common coarse

Figure 20.—Profile of Betis loamy fine sand.

Figure 21.—Profile of Darco loamy fine sand.

prominent red (2.5YR 4/6) lithochromic mottles; weak medium subangular blocky structure; slightly hard, firm; few fine roots; few distinct clay films on faces of peds; few mica flakes; very strongly acid; gradual wavy boundary.

Bt3—19 to 32 inches; yellowish red (5YR 5/8) sandy clay loam; few medium distinct red (2.5YR 5/8) and common medium distinct strong brown (7.5YR 5/8) lithochromic mottles; weak medium subangular blocky structure; slightly hard, firm; few fine and medium roots; few fine pores; few thin distinct clay films on faces of peds; few light brownish gray (10YR 6/2) shale bits; very strongly acid; gradual wavy boundary.

BC—32 to 36 inches; reddish yellow (7.5YR 6/6) sandy clay loam; common medium distinct yellowish red (5YR 5/6) and reddish yellow (5YR 6/8) lithochromic mottles; weak medium subangular blocky structure; slightly hard, firm; few fine and medium roots; common light brownish gray (10YR 6/2) shale bits and strata; few mica flakes; very strongly acid; clear wavy boundary.

C1—36 to 48 inches; stratified red (2.5YR 5/6), strong brown (7.5YR 5/8), and light yellowish brown (10YR 6/4) weakly consolidated sandstone and sandy clay loam and light brownish gray (10YR 6/2) shale and clay loam; massive; slightly hard, friable; few fine roots; few mica flakes; very strongly acid; clear smooth boundary.

C2—48 to 60 inches; stratified reddish yellow (5YR 6/6 and 7.5YR 7/6) and light red (2.5YR 6/8) weakly consolidated sandstone and sandy clay loam and light brownish gray (10YR 6/2) shale and clay loam; massive; slightly hard, friable; few fine roots; few mica flakes; very strongly acid.

Range in Characteristics

Solum thickness: 20 to 40 inches
Clay content in the control section: 35 to 60 percent
Other distinctive soil features: Ironstone and sandstone flags and channers cover from less than 1 percent to about 20 percent of the surface; these are mainly flat, angular fragments 1 inch to 6 inches thick and 3 to 36 inches across the long axis
Concentrated minerals: None

A and E horizons:
- Color—Grayish brown, dark grayish brown, very dark grayish brown, brown, dark brown, yellowish brown, dark yellowish brown, pale brown, light yellowish brown, very pale brown, or light brown
- Redoximorphic features—None
- Texture—Fine sandy loam
- Reaction—Very strongly acid to slightly acid
- Other features—From less than 2 percent to about 15 percent, by volume, of gravel or channers

Bt horizon:
- Color—Dark red, red, yellowish red, reddish brown, or dark reddish brown
- Redoximorphic features—Few or common lithochromic mottles in shades of yellow and brown
- Texture—Clay, sandy clay loam, or sandy clay
- Reaction—Very strongly acid or strongly acid
- Other features—Up to 15 percent, by volume, of gravel or channers; gray shale fragments occur in the lower part of some pedons

BC horizon:
- Color—Reddish, brownish, or yellowish colors; or the horizon is variegated in shades of red, yellow, brown, and gray
- Redoximorphic features—Lithochromic mottles in shades of red, yellow, brown, and gray
- Texture—Stratified clay loam or sandy clay loam (B); weakly consolidated sandstone with a texture of fine sandy loam or weakly consolidated shale with a texture of clay loam (C)
- Reaction—Extremely acid or very strongly acid
- Other features—Up to 15 percent, by volume, of gravel or channers

C horizon:
- Color—Light brownish gray, grayish brown, yellowish red, brownish yellow, red, light red, light yellowish brown, reddish yellow, light reddish brown, or strong brown
- Redoximorphic features—None
- Texture—Sandy clay loam, fine sandy loam, or clay loam
- Reaction—Extremely acid or very strongly acid
- Other features—Sandstone or shale with some weathered glauconitic material

Darco Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderate
Landscape: Coastal plains
Landform: Uplands
Parent material: Coastal plains sediments from sandy and loamy marine deposits
Slope range: 1 to 15 percent
Taxonomic class: Loamy, siliceous, thermic Grossarenic Paleudults

Typical Pedon

Darco loamy fine sand, 1 to 8 percent slopes (fig. 21), in a woodland clearcut area; from the intersection of U.S. Highway 84 and U.S. Highway 259 in Mount Enterprise, 4.8 miles south on U.S. Highway 259 to County Road 3267, 2.7

miles east on County Road 3267 to Old Prospect Church, 0.25 mile east on a logging road to a property line, 500 feet south along property line, 50 feet west of property line:

Ap—0 to 10 inches; dark brown (10YR 4/3) loamy fine sand; weak fine granular structure; soft, very friable; common fine and medium and few coarse roots; few fine vesicular pores; common fine rounded ironstone pebbles; strongly acid; clear smooth boundary.

E1—10 to 27 inches; brown (10YR 5/3) loamy fine sand; single grained; soft, very friable; common fine and medium and few coarse roots; few fine vesicular pores; common fine rounded ironstone pebbles; strongly acid; diffuse smooth boundary.

E2—27 to 41 inches; pale brown (10YR 6/3) loamy fine sand; single grained; soft, very friable; common fine and medium roots; few fine vesicular pores; common fine rounded ironstone pebbles; very strongly acid; diffuse smooth boundary.

E3—41 to 54 inches; pale brown (10YR 6/3) loamy fine sand; single grained; soft, very friable; common fine and medium roots; few fine vesicular pores; few fine rounded iron-manganese concretions; strongly acid; clear wavy boundary.

Bt1—54 to 64 inches; strong brown (7.5YR 5/6) fine sandy loam; common fine and medium distinct yellowish red (5YR 4/6) lithochromic mottles; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable; few fine and medium roots; common fine vesicular pores; few faint patchy clay films on faces of peds; 1 to 5 percent, by volume, streaks, pockets, and coatings of albic material (E); few fine rounded iron-manganese concretions; strongly acid; gradual wavy boundary.

Bt2—64 to 80 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium distinct grayish brown (10YR 5/2), common medium prominent red (2.5YR 4/6), and few medium and coarse distinct brownish yellow (10YR 6/8) lithochromic mottles; weak medium subangular blocky structure; hard, friable; few fine and medium roots; common fine vesicular pores; few faint patchy clay films on faces of peds; few fine rounded iron-manganese concretions; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 15 to 30 percent
Other distinctive soil features: None to common ironstone pebbles, nodules, and concretions throughout the profile
Concentrated minerals: None

A or Ap horizon:
Color—Grayish brown, dark grayish brown, very dark grayish brown, dark brown, or brown
Redoximorphic features—None
Texture—Loamy fine sand
Reaction—Very strongly acid to slightly acid
Other features—None

E horizon:
Color—Pale brown, brown, light yellowish brown, dark yellowish brown, or yellowish brown
Redoximorphic features—None
Texture—Loamy fine sand
Reaction—Very strongly acid to slightly acid
Other features—None
Thickness—Combined thickness of the A and E horizons ranges from 40 to 72 inches

Bt horizon:
Color—Red, yellowish red, strong brown, dark yellowish brown, or yellowish brown
Redoximorphic features—Lithochromic mottles in shades of brown, red, and yellow in most pedons; iron depletions with chroma of 2 or less are below a depth of 50 inches in some pedons
Texture—Fine sandy loam or sandy clay loam
Reaction—Very strongly acid or strongly acid
Other features—0 to 3 percent, by volume, of plinthite nodules; up to 5 percent, by volume, streaks, pockets, and coatings of albic material (E)

Derly Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landscape: Coastal plains
Landform: Terraces
Parent material: Loamy and clayey alluvium from rivers and streams
Slope range: 0 to 1 percent
Taxonomic class: Fine, smectitic, thermic Typic Glossaqualfs

Typical Pedon

Derly silt loam, 0 to 1 percent slopes, in a wooded depressional area; from the intersection of U.S. Highway 259 and U.S. Highway 79 in Henderson, 3.2 miles south on U.S. Highway 259, 0.35 mile south on County Road 317, 0.65 mile east on County Road 311, 0.3 mile north and west on County Road 312D, 300 feet south of road:

A—0 to 4 inches; brown (10YR 5/3) silt loam; common medium and coarse distinct gray (10YR 6/1) and grayish brown (10YR 5/2) iron depletions; moderate medium subangular blocky structure; friable; common fine and medium roots; few pores of all sizes; common iron-manganese concretions; common medium and

coarse dark brown and dark yellowish brown root stains; strongly acid; clear wavy boundary.

Eg—4 to 7 inches; light brownish gray (10YR 6/2) silt loam; common fine and medium distinct yellowish brown (10YR 5/6) iron accumulations; moderate medium subangular blocky structure; friable; common fine and medium roots; few pores of all sizes; common iron-manganese concretions; common medium dark yellowish brown (10YR 4/6) root stains; strongly acid; clear wavy boundary.

Btg/E—7 to 11 inches; grayish brown (10YR 5/2) clay loam; common fine and medium distinct yellowish brown (10YR 5/8) iron accumulations; moderate medium subangular blocky structure; firm; common fine and medium roots; few fine and medium pores; few patchy clay films on faces of peds; 20 percent, by volume, streaks, pockets, and coatings of albic material (E); few round iron-manganese concretions; very strongly acid; clear smooth boundary.

Btg1—11 to 29 inches; grayish brown (10YR 5/2) clay; common medium distinct light yellowish brown (2.5Y 6/4) iron accumulations; moderate medium subangular blocky structure; very firm; few fine roots; few patchy clay films on faces of peds; few spots and streaks of albic material along old root channels; very strongly acid; gradual smooth boundary.

Btg2—29 to 42 inches; dark grayish brown (10YR 4/2) clay; moderate medium subangular blocky structure; very firm; few fine roots; few patchy clay films on faces of peds; few soft yellow (10YR 7/6) spots and streaks along old root channels; strongly acid; gradual smooth boundary.

Btg3—42 to 53 inches; dark grayish brown (10YR 4/2) clay; few fine distinct brownish yellow (10YR 6/8) iron accumulations; moderate medium subangular blocky structure; very firm; few fine roots: few patchy clay films on faces of peds; few streaks and coats of albic material between peds; few yellowish red (5YR 5/8) root stains; strongly acid; clear wavy boundary.

Btg4—53 to 57 inches; grayish brown (10YR 5/2) clay; common medium distinct brownish yellow (10YR 6/8) iron accumulations; moderate medium subangular blocky structure; very firm; few fine roots; few patchy clay films on faces of peds; few yellowish red (5YR 5/8) root stains; few white (10YR 8/2) masses; moderately acid; clear smooth boundary.

Btg5—57 to 80 inches; variegated light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/8) clay; common medium distinct dark grayish brown (10YR 4/2) iron depletions; moderate medium subangular blocky structure; very firm; few fine and medium roots; few thin clay films on faces of peds; moderately acid.

Range in Characteristics

Solum thickness: More than 80 inches

Clay content in the control section: 35 to 50 percent

Other distinctive soil features: Common iron-manganese concretions in most pedons

Concentrated minerals: None

A horizon:

Color—Brown, grayish brown, dark grayish brown, or very dark grayish brown

Redoximorphic features—Few or common iron accumulations in shades of brown and iron depletions in shades of gray

Texture—Silt loam

Reaction—Very strongly acid to slightly acid

Other features—Common dark brown and dark yellowish brown root stains

Eg horizon:

Color—Grayish brown, light brownish gray, or light gray

Redoximorphic features—Depleted matrix with few or common iron accumulations in shades of brown and yellow

Texture—Silt loam

Reaction—Very strongly acid to moderately acid

Other features—Common dark brown and dark yellowish brown root stains

Btg/E horizon:

Color—Dark grayish brown, grayish brown, or light brownish gray

Redoximorphic features—Depleted matrix with few or common iron accumulations in shades of red, brown, and yellow

Texture—Clay loam, silty clay loam, or clay

Reaction—Very strongly acid to moderately acid

Other features—15 to 35 percent, by volume, streaks, pockets, and coatings of albic material (E)

Btg horizon:

Color—Dark grayish brown, light brownish gray, or grayish brown

Redoximorphic features—Depleted matrix with few or common iron accumulations in shades of red, brown, and yellow; or the horizon is variegated in these colors

Texture—Clay or clay loam

Reaction—Very strongly acid to moderately acid in the upper part and strongly acid to neutral in the lower part

Other features—Few streaks and coatings of albic material in some pedons

BCt horizon (where present):

Color—Dark grayish brown or grayish brown

Redoximorphic features—Few or common iron accumulations in shades of red, brown, and yellow and iron depletions in shades of gray

Texture—Loam or clay loam

Reaction—Strongly acid to neutral
Other features—None

Dreka Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Landscape: Coastal plains
Landform: Flood plains
Parent material: Stratified loamy and clayey alluvium from rivers and streams
Slope range: 0 to 1 percent
Taxonomic class: Fine-silty, siliceous, nonacid, thermic Aeric Fluvaquents

Typical Pedon

Dreka loam, frequently flooded, in an area of native pasture; from the intersection of Farm Road 3135 and County Road 336 about 12 miles east of Henderson in Church Hill community, 1.6 miles south on County Road 336, 500 feet east of road:

A—0 to 10 inches; brown (10YR 5/3) loam; many medium and coarse distinct brown (7.5YR 4/4) and many fine and medium distinct dark gray (10YR 4/1) iron depletions; moderate fine and medium subangular blocky structure; very hard, friable; many fine and medium roots; few fine and medium pores; many soft black concretions; slightly acid; clear smooth boundary.

Bg1—10 to 16 inches; grayish brown (10YR 5/2) loam; many medium and coarse distinct strong brown (7.5YR 4/6), common medium faint brown (10YR 5/3), and few medium prominent yellowish red (5YR 5/8) iron accumulations; moderate medium subangular blocky structure; very hard, friable; few fine and medium roots; few fine pores; few concretions and masses of iron-manganese; slightly acid; clear smooth boundary.

Bg2—16 to 23 inches; light brownish gray (10YR 6/2) loam; common medium and coarse distinct strong brown (7.5YR 4/6) iron accumulations; weak medium subangular blocky structure; very hard, firm; few fine and medium roots; common fine and medium pores; few concretions and masses of iron-manganese; slightly alkaline; clear smooth boundary.

Bg3—23 to 49 inches; gray (10YR 5/1) loam; many medium and coarse distinct dark yellowish brown (10YR 4/4) and few medium distinct brownish yellow (10YR 6/6) iron accumulations; weak medium subangular blocky structure; very hard, firm; few fine and medium roots; few fine pores; few concretions and masses of iron-manganese; slightly alkaline; clear smooth boundary.

2Bgb1—49 to 63 inches; gray (10YR 5/1) silty clay; common medium and coarse distinct dark yellowish brown (10YR 4/4) and few fine distinct yellowish brown (10YR 5/6) iron accumulations; weak medium angular blocky structure; very hard, very firm; few fine and medium roots; common concretions and masses of iron-manganese; slightly alkaline; gradual smooth boundary.

2Bgb2—63 to 80 inches; dark gray (10YR 4/1) silty clay; few fine and medium distinct light yellowish brown (2.5Y 6/4) and few fine distinct olive yellow (2.5Y 6/8) iron accumulations; weak medium angular blocky structure; very hard, very firm; few fine roots; few concretions and masses of iron-manganese; slightly alkaline.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 18 to 30 percent
Other distinctive soil features: Clayey discontinuity at 40 to 60 inches deep; depleted matrix with iron accumulations and iron-manganese concretions at 4 to 16 inches deep
Concentrated minerals: Electrical conductivity is 0 to 2.0 in the A, Bw (where present), and Bg horizons and 0 to 4.0 in the 2Bgb horizon
Reaction: Moderately acid to slightly alkaline throughout the profile

A horizon:
Color—Very dark grayish brown, dark brown, dark yellowish brown, dark grayish brown, brown, grayish brown, or yellowish brown
Redoximorphic features—Few to many iron depletions in shades of gray and iron accumulations in shades of brown or yellow
Texture—Loam
Other features—Few to many iron-manganese concretions and masses

Bw horizon (where present):
Color—Brown, yellowish brown, pale brown, light yellowish brown, or light olive brown
Redoximorphic features—Few to many iron depletions in shades of gray and iron accumulations in shades of brown or yellow; few red iron accumulations in some pedons
Texture—Loam, silt loam, clay loam, or silty clay loam; or the horizon is stratified with these textures
Other features—Few to many iron-manganese concretions and masses
Thickness—4 to 6 inches

Bg horizon:
Color—Gray, grayish brown, light gray, or light brownish gray
Redoximorphic features—Depleted matrix with few to

many iron accumulations in shades of brown or yellow; few red iron accumulations in some pedons
Texture—Loam, silt loam, clay loam, or silty clay loam; or the horizon is stratified with these textures
Other features—Few to many iron-manganese concretions and masses

2Bgb horizon:
Color—Dark gray, dark grayish brown, grayish brown, gray, light gray, or light brownish gray
Redoximorphic features—Depleted matrix with none to common iron accumulations in shades of brown, red, or yellow; iron depletions in shades of gray or blue in some pedons
Texture—Clay loam, clay, or silty clay
Other features—Clay content ranges from 35 to 50 percent; few to many iron-manganese concretions and masses

Estes Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landscape: Coastal plains
Landform: Flood plains
Parent material: Acidic, clayey, and loamy alluvium from rivers and streams
Slope range: 0 to 1 percent
Taxonomic class: Fine, smectitic, thermic Aeric Dystraquerts

Typical Pedon

Estes clay, frequently flooded, in an area of woodland; from the junction of Texas Highway 149 and Texas Highway 43 in Tatum, 0.2 mile northwest on Texas Highway 149 to junction with County Road 2210, 1.1 miles north on County Road 2210 to junction with County Road 2218, 2 miles east and north on County Road 2218, 3 miles north and west on county line road, 500 feet southwest on Sabine River bottom:

A—0 to 4 inches; dark grayish brown (10YR 4/2) clay; weak fine subangular blocky structure; very hard, firm; common fine and few medium roots; few fine and medium pores; common medium and coarse black and dark yellowish brown root stains; very strongly acid; clear smooth boundary.
Bw—4 to 9 inches; variegated strong brown (7.5YR 4/6) and grayish brown (10YR 5/2) clay; moderate medium subangular blocky structure; very hard, very firm; few fine and medium roots; few fine pores; very strongly acid; clear smooth boundary.
Bg—9 to 23 inches; grayish brown (10YR 5/2) clay; many fine and medium distinct strong brown (7.5YR 5/6) iron accumulations; moderate medium subangular blocky structure; very hard, very firm; few fine and medium roots and pores; common masses of iron-manganese; very strongly acid; gradual smooth boundary.
Bssg1—23 to 36 inches; grayish brown (10YR 5/2) clay; common medium distinct strong brown (7.5YR 5/6) iron accumulations; moderate medium subangular blocky structure; very hard, very firm; few fine and medium roots and pores; common slickensides; common masses of iron-manganese; very strongly acid; gradual smooth boundary.
Bssg2—36 to 60 inches; grayish brown (10YR 5/2) clay; many fine and medium distinct strong brown (7.5YR 4/6) iron accumulations; moderate medium subangular blocky structure; very hard, very firm; few fine and medium roots; few fine pores; few soft iron-manganese concretions; few clean sand grains; common slickensides; very strongly acid; clear smooth boundary.
BCg—60 to 80 inches; light brownish gray (10YR 6/2) sandy clay loam; common medium prominent red (2.5YR 4/6) and few medium distinct strong brown (7.5YR 4/6) iron accumulations; massive; very hard, very firm; common masses of gypsum; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 40 to 50 percent
Other distinctive soil features: Intersecting slickensides at less than 40 inches deep
Concentrated minerals: None

A horizon:
Color—Dark brown, dark grayish brown, grayish brown, or brown
Redoximorphic features—None to common iron accumulations in shades of brown and iron depletions in shades of gray
Texture—Clay
Reaction—Extremely acid to strongly acid
Other features—None

Bw horizon:
Color—Pale brown, light yellowish brown, yellowish brown, brown, or dark yellowish brown
Redoximorphic features—Few to many iron accumulations in shades of brown and iron depletions in shades of gray; or the horizon is variegated in these colors in some pedons
Texture—Clay
Reaction—Extremely acid or very strongly acid
Other features—None

Bg horizon:
Color—Light brownish gray, dark gray, light gray, gray, grayish brown, or dark grayish brown
Redoximorphic features—Depleted matrix with few to many iron accumulations in shades of brown, red, and yellow at 4 to 20 inches deep
Texture—Clay or silty clay
Reaction—Extremely acid or very strongly acid
Other features—Pressure faces or small slickensides range from none to few; threads, films, masses, or crystals of salt (gypsum or barite) in the lower part of some pedons

Bssg horizon:
Color—Grayish brown, dark gray, dark grayish brown, gray, light gray, or light brownish gray
Redoximorphic features—Depleted matrix with few to many iron accumulations in shades of brown, red, and yellow at 4 to 20 inches deep
Texture—Clay
Reaction—Extremely acid or very strongly acid
Other features—Pressure faces and slickensides range from common or many

BCg horizon:
Color—Gray, light gray, or light brownish gray
Redoximorphic features—Depleted matrix with few to many iron accumulations in shades of brown, red, and yellow at 4 to 20 inches deep
Texture—Clay loam, silty clay loam, or sandy clay loam
Reaction—Extremely acid or very strongly acid
Other features—Threads, films, masses, or crystals of salt (gypsum or barite) in some pedons

Gallime Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plains
Landform: Terraces
Parent material: Loamy alluvium from rivers and streams
Slope range: 0 to 2 percent
Taxonomic class: Fine-loamy, siliceous, thermic Glossic Paleudalfs

Typical Pedon

Gallime very fine sandy loam, in an area of Gallime-Alazan complex, 0 to 2 percent slopes, in an area of native pasture; from the intersection of Texas Highway 149 and Texas Highway 43 in Tatum, 2 miles northwest on Texas Highway 149, 0.1 mile east on County Road 2187, 0.1 mile north on County Road 2144, 0.1 mile west on County Road 2196, 300 feet north on mound:

A—0 to 8 inches; dark brown (10YR 4/3) very fine sandy loam; moderate medium subangular blocky structure; soft, very friable; few fine and medium roots and pores; few dark grayish brown spots; moderately acid; clear smooth boundary.
E—8 to 24 inches; yellowish brown (10YR 5/4) very fine sandy loam; moderate medium subangular blocky structure; soft, very friable; few fine roots; few fine and medium pores; slightly acid; clear smooth boundary.
Bt—24 to 29 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; soft, very friable; few fine roots; few fine and medium pores; few thin clay films on faces of peds; moderately acid; gradual smooth boundary.
Bt/E1—29 to 52 inches; brownish yellow (10YR 6/8) sandy clay loam; few fine prominent yellowish red (5YR 5/8) iron accumulations; moderate medium subangular blocky structure; hard, firm; few fine roots; few fine and medium pores; few thin clay films on faces of peds; 5 percent, by volume, streaks and coatings of albic material (E); moderately acid; gradual wavy boundary.
Bt/E2—52 to 80 inches; brownish yellow (10YR 6/6) sandy clay loam; few fine prominent yellowish red (5YR 5/8) and many coarse distinct strong brown (7.5YR 5/8) iron accumulations; weak medium subangular blocky structure; hard, firm; few fine roots; 2 percent, by volume, of plinthite; few thin clay films on faces of peds; 10 percent, by volume, streaks, pockets, and coatings of albic material (E); few ironstone pebbles; 10 percent of the matrix is brittle; moderately acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 18 to 35 percent
Other distinctive soil features: 5 to 15 percent, by volume, streaks and pockets of albic material at 25 to 60 inches deep; iron depletions with chroma of 2 or less at more than 30 inches deep
Concentrated minerals: None

A horizon:
Color—Very dark grayish brown, dark brown, brown, dark grayish brown, grayish brown, or dark yellowish brown
Redoximorphic features—None
Texture—Very fine sandy loam
Reaction—Strongly acid to slightly acid, unless limed
Other features—None
Thickness—Where the color is very dark grayish brown, thickness is less than 7 inches

E horizon:
Color—Grayish brown, brown, yellowish brown, light brownish gray, light gray, pale brown, or very pale brown

Redoximorphic features—None
Texture—Very fine sandy loam
Reaction—Strongly acid to slightly acid, unless limed
Other features—None
Thickness—Combined thickness of the A and E horizons ranges from 20 to 40 inches

Bt horizon:
Color—Yellowish brown, light yellowish brown, brownish yellow, brown, strong brown, light brown, or reddish yellow
Redoximorphic features—None to common iron depletions in shades of gray and iron accumulations in shades of red or brown
Texture—Loam or sandy clay loam
Reaction—Very strongly acid to moderately acid
Other features—None

Bt/E horizon:
Color—Colors in shades of brown, red, yellow, and gray
Redoximorphic features—None
Texture—Clay loam, sandy clay loam, or loam
Reaction—Very strongly acid to moderately acid
Other features—5 to 15 percent, by volume, streaks, pockets, and coatings of albic material (E); 0 to 3 percent, by volume, of plinthite nodules; 0 to 15 percent brittle peds; none to few ironstone pebbles

Hannahatchee Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plains
Landform: Flood plains
Parent material: Recent, loamy alluvium from rivers and streams
Slope range: 0 to 1 percent
Taxonomic class: Fine-loamy, siliceous, thermic Dystric Fluventic Eutrochrepts

Typical Pedon

Hannahatchee fine sandy loam, occasionally flooded, in an area of woodland; from the junction of Farm Road 3055 and U.S. Highway 84 west of Mount Enterprise, 2 miles southwest on Farm Road 3055, 0.4 mile northwest to creek bottom:

A—0 to 6 inches; reddish brown (5YR 4/4) fine sandy loam; weak medium subangular blocky structure; slightly hard, friable; many fine and medium roots; few fine and medium pores; moderately acid; clear smooth boundary.
Bw1—6 to 21 inches; dark reddish brown (5YR 3/4) loam; weak medium subangular blocky structure; slightly hard, friable; common fine and medium roots; few fine and medium pores; moderately acid; gradual wavy boundary.
Bw2—21 to 56 inches; yellowish red (5YR 4/6) loam; weak medium subangular blocky structure; slightly hard, friable; few fine roots; few fine and medium pores; few fine black concretions; moderately acid; gradual wavy boundary.
Bw3—56 to 80 inches; yellowish red (5YR 5/6) sandy clay loam; common medium distinct red (2.5YR 4/6) and few fine distinct reddish yellow (7.5YR 6/6) lithochromic mottles; weak medium subangular blocky structure; hard, firm; few fine roots; common black concretions and stains; moderately acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 15 to 25 percent
Other distinctive soil features: 0 to 5 percent ironstone fragments and concretions
Concentrated minerals: None
Reaction: Moderately acid to neutral throughout the profile

A horizon:
Color—Reddish brown, yellowish red, dark brown, or brown
Redoximorphic features—None
Texture—Fine sandy loam
Other features—Few fine pebbles in some pedons

Bw horizon:
Color—Dark reddish brown, reddish brown, yellowish red, brown, or strong brown
Redoximorphic features—Lithochromic mottles range from none to common in shades of brown, yellow, and red
Texture—Fine sandy loam, sandy clay loam, or loam
Other features—None to common concretions in some pedons

Iulus Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape: Coastal plains
Landform: Flood plains
Parent material: Stratified loamy and sandy alluvium from rivers and streams
Slope range: 0 to 1 percent
Taxonomic class: Coarse-loamy, siliceous, thermic Fluvaquentic Dystrochrepts

Typical Pedon

Iulus fine sandy loam, occasionally flooded, in an area of

woodland; from the intersection of Texas Highway 42 and Texas Highway 323 in New London, 1.15 miles southeast on Texas Highway 323, 0.40 mile east and north on an oil field road to a property line fence, 500 feet northeast (50 feet west of creek channel):

A—0 to 4 inches; brown (10YR 4/3) fine sandy loam; weak fine subangular blocky structure; soft, very friable; common fine and medium roots; strongly acid; clear smooth boundary.

Bw1—4 to 17 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine subangular blocky structure; soft, very friable; few fine and medium roots; strongly acid; clear wavy boundary.

Bw2—17 to 24 inches; dark yellowish brown (10YR 4/4) fine sandy loam; common medium distinct brownish yellow (10YR 6/6) iron accumulations and light brownish gray (10YR 6/2) iron depletions; weak fine subangular blocky structure; soft, very friable; few fine roots; strongly acid; gradual wavy boundary.

Bw3—24 to 35 inches; dark yellowish brown (10YR 4/4) fine sandy loam; many medium distinct grayish brown (10YR 5/2) iron depletions; weak fine subangular blocky structure; soft, very friable; few fine roots; strongly acid; gradual wavy boundary.

Bg1—35 to 48 inches; variegated light brownish gray (10YR 6/2), yellowish red (5YR 4/6), and strong brown (7.5YR 5/6) fine sandy loam; weak fine subangular blocky structure; soft, very friable; few fine roots; very strongly acid; gradual wavy boundary.

Bg2—48 to 80 inches; light brownish gray (10YR 6/2) fine sandy loam; many medium prominent strong brown (7.5YR 5/8) iron accumulations; weak fine subangular blocky structure; soft, very friable; few fine roots; strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 5 to 18 percent
Other distinctive soil features: Thin bedding planes and buried A horizon in some pedons; few fine black and brown concretions in some pedons
Concentrated minerals: None
Reaction: Strongly acid or very strongly acid throughout the profile, except for surface layers that are limed

A horizon:
Color—Brown, dark grayish brown, dark yellowish brown, grayish brown, yellowish brown, or dark brown
Redoximorphic features—None
Texture—Fine sandy loam
Other features—None

Bw horizon:
Color—Yellowish brown, brown, strong brown, or dark yellowish brown
Redoximorphic features—None to many iron accumulations in shades of brown, yellow, or red and few to many iron depletions in shades of gray at less than 20 inches deep
Texture—Sandy loam or loam
Other features—None

Bg horizon:
Color—Shades of gray
Redoximorphic features—Depleted matrix with few to many iron accumulations in shades of brown, yellow, or red; or the horizon is variegated in these colors in some pedons
Texture—Sandy loam or loam; some pedons have texture of sandy clay loam below 40 inches
Other features—Thin gravelly or sandy strata in some pedons

Kawah Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Rapid
Landscape: Coastal plains
Landform: Uplands
Parent material: Coastal plains sediments from sandy marine deposits
Slope range: 0 to 2 percent
Taxonomic class: Thermic, coated Aquic Quartzipsamments

Typical Pedon

Kawah fine sand, 0 to 2 percent slopes, in an area of woodland; from the intersection of U.S. Highway 259 and south boundary of Rusk County, 0.3 mile north on U.S. Highway 259, 3.7 miles east on County Road 3267 to intersection with County Road 3197, 2.4 miles southeast on County Road 3197, 600 feet north of road:

A1—0 to 6 inches; dark gray (10YR 4/1) fine sand; weak fine granular structure; soft, very friable; many fine and medium and common coarse roots; slightly acid; clear smooth boundary.

A2—6 to 15 inches; grayish brown (10YR 5/2) fine sand; weak medium subangular blocky structure; soft, very friable; many fine and medium and common coarse roots; slightly acid; clear smooth boundary.

Bw—5 to 30 inches; pale brown (10YR 6/3) fine sand; few fine distinct strong brown (7.5YR 4/6) iron accumulations; weak coarse and very coarse prismatic structure parting to single grained; soft, very friable;

few fine and medium roots; moderately acid; clear smooth boundary.
Bg1—30 to 58 inches; light gray (10YR 7/2) fine sand; weak coarse and very coarse prismatic structure parting to single grained; soft, very friable; few fine roots; strongly acid; gradual smooth boundary.
Bg2—58 to 80 inches; light gray (10YR 7/2) fine sand; weak coarse and very coarse prismatic structure parting to single grained; soft, very friable; few fine roots; common black masses of iron-manganese; strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 1 to 5 percent
Other distinctive soil features: 5 to 10 percent silt plus clay at 10 to 40 inches deep
Concentrated minerals: None

A horizon:
Color—Dark gray, grayish brown, dark grayish brown, or gray
Redoximorphic features—None
Texture—Fine sand
Reaction—Strongly acid to slightly acid
Other features—None

Bw horizon:
Color—Yellowish brown, brown, pale brown, light yellowish brown, brownish yellow, yellow, or very pale brown
Redoximorphic features—None to common iron accumulations in shades of red, brown, or yellow in the lower part
Texture—Fine sand
Reaction—Very strongly acid to moderately acid
Other features—None

Bg horizon:
Color—Light gray, gray, light brownish gray, or white
Redoximorphic features—Depleted matrix with none to few iron accumulations in shades of red or brown at 20 to 40 inches deep
Texture—Fine sand
Reaction—Extremely acid to strongly acid
Other features—None

Keechi Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Slow
Landscape: Coastal plains
Landform: Flood plains
Parent material: Stratified loamy and sandy alluvium from rivers and streams
Slope range: 0 to 1 percent
Taxonomic class: Coarse-loamy, siliceous, nonacid, thermic Typic Fluvaquents

Typical Pedon

Keechi fine sandy loam, frequently flooded, in an area of woodland; from the square in Henderson, 9.8 miles west on Farm Road 13, 0.4 mile south on County Road 476, 0.2 mile east on an oil company access road to Johnson Creek bottom, 75 feet north of road:

A—0 to 3 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; soft, very friable; many roots of all sizes; neutral; clear smooth boundary.
Ag—3 to 7 inches; gray (10YR 5/1) fine sandy loam; weak fine granular structure; soft, very friable; many roots of all sizes; many strong brown (7.5YR 5/8), red (2.5YR 4/8), and yellowish red (5YR 5/6) root stains; neutral; clear smooth boundary.
Bg1—7 to 11 inches; gray (10YR 5/1) fine sandy loam; few medium distinct light olive brown (2.5Y 5/6) and common coarse prominent strong brown (7.5YR 5/8) iron accumulations; massive; soft, very friable; common fine and medium roots; common medium and coarse dark yellowish brown (10YR 3/6) root stains; neutral; gradual wavy boundary.
Bg2—11 to 22 inches; light brownish gray (2.5Y 6/2) fine sandy loam; few medium distinct brownish yellow (10YR 6/6) iron accumulations; massive; soft, very friable; few fine roots; few fine yellowish red (5YR 4/6) root stains; neutral; gradual wavy boundary.
Bg3—22 to 52 inches; gray (10YR 6/1) fine sandy loam; few fine distinct brownish yellow (10YR 6/6) iron accumulations; massive; soft, very friable; few fine roots; few fine yellowish red (5YR 4/6) root stains; neutral; gradual wavy boundary.
Bg4—52 to 64 inches; gray (10YR 6/1) fine sandy loam; many medium distinct light olive brown (2.5Y 5/4) iron accumulations; massive; soft, very friable; few fine roots; neutral; gradual wavy boundary.
2Bgb—64 to 80 inches; gray (10YR 6/1) clay loam; many medium and coarse distinct yellowish brown (10YR 5/4 and 5/6) and dark yellowish brown (10YR 4/6) iron accumulations; weak coarse subangular blocky structure; slightly hard, firm; few fine roots; few coarse pores; neutral.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 10 to 18 percent
Other distinctive soil features: Discontinuity with more than 30 percent clay at 40 to 80 inches deep
Concentrated minerals: None
Reaction: Strongly acid to neutral throughout the profile

A horizon:
Color—Pale brown, brown, dark brown, dark grayish brown, very dark grayish brown, grayish brown, yellowish brown, dark yellowish brown, olive brown, or very dark gray
Redoximorphic features—None
Texture—Fine sandy loam
Other features—None

Ag horizon:
Color—Light gray, gray, light brownish gray, or grayish brown
Redoximorphic features—Depleted matrix with none to many iron accumulations in shades of red, brown, or yellow at 1 to 9 inches deep
Texture—Fine sandy loam, loamy fine sand, or sandy loam
Other features—None

Bg horizon:
Color—Light brownish gray, light gray, or gray
Redoximorphic features—Depleted matrix with few to many iron accumulations in shades of red, brown, or yellow at 1 to 9 inches deep
Texture—Fine sandy loam or loam
Other features—Thin strata of loamy fine sand, sandy clay loam, or fine sand in some pedons
Thickness—Combined thickness of the A, Ag, and Bg horizons ranges from 40 to 80 inches

2Bgb horizon:
Color—Light gray, gray, or dark gray
Redoximorphic features—Depleted matrix with none to many iron accumulations in shades of brown
Texture—Clay loam or sandy clay loam
Other features—None

Kirvin Series

Depth class: Deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape: Coastal plains
Landform: Uplands
Parent material: Clayey residuum from stratified loamy and shaly material
Slope range: 2 to 15 percent
Taxonomic class: Clayey, mixed, thermic Typic Hapludults

Typical Pedon

Kirvin fine sandy loam, 2 to 5 percent slopes, in a pine plantation area; from the intersection of U.S. Highway 84 and Farm Road 95 east of Mount Enterprise, 0.9 mile south on Farm Road 95, 1.1 miles southwest on County Road 3266, 0.75 mile southwest on County Road 3265, 200 feet southeast on County Road 3191, 75 feet north of road:

Ap—0 to 5 inches; brown (7.5YR 5/4) fine sandy loam; weak fine subangular blocky structure; soft, very friable; common fine and medium roots; few fine and medium pores; 3 percent, by volume, ironstone gravel; strongly acid; clear smooth boundary.
Bt1—5 to 18 inches; red (2.5YR 4/6) clay; few fine prominent strong brown (7.5YR 5/8) lithochromic mottles; moderate medium subangular blocky structure; very hard, firm; common fine and medium and few coarse roots; few fine and medium pores; common distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.
Bt2—18 to 31 inches; red (2.5YR 4/8) clay; common medium distinct yellowish red (5YR 5/6) lithochromic mottles; weak medium subangular blocky structure; hard, firm; common fine and few medium and coarse roots; few fine and medium pores; few distinct clay films; few fine light brownish gray (10YR 6/2) shale bits; very strongly acid; gradual wavy boundary.
Bt3—31 to 36 inches; red (2.5YR 4/8) clay; few fine prominent strong brown (7.5YR 5/6) lithochromic mottles; weak medium subangular blocky structure; hard, firm; few fine and medium roots; few fine pores; few faint clay films on faces of peds; common light brownish gray (10YR 6/2) shale bits and strata; very strongly acid; gradual wavy boundary.
BCt—36 to 48 inches; red (2.5YR 4/8) sandy clay loam; few medium distinct red (10R 4/8) and common medium prominent strong brown (7.5YR 5/8) lithochromic mottles; weak medium subangular blocky structure; slightly hard, firm; few fine and medium roots; common thin clay films on faces of peds; few weathered glauconitic fragments; common light brownish gray (10YR 6/2) shale bits and strata; very strongly acid; gradual wavy boundary.
C1—48 to 57 inches; stratified light brownish gray (2.5Y 6/2) weakly consolidated shale and clay loam and few thin pockets and strata of red (2.5YR 4/6), yellowish red (5YR 5/6), and reddish yellow (7.5YR 6/8) sandstone and sandy clay loam; massive; hard, firm; few fine and medium roots; few weathered glauconitic fragments; very strongly acid; gradual wavy boundary.
C2—57 to 65 inches; stratified yellowish red (5YR 5/6 and 5/8) and yellowish brown (10YR 5/8) weakly consolidated sandstone and fine sandy loam and few thin strata of light brownish gray (2.5Y 6/2) shale and clay loam; massive; soft, friable; very strongly acid.

Range in Characteristics

Solum thickness: 40 to 60 inches
Clay content in the control section: 35 to 50 percent
Other distinctive soil features: Up to 1 percent channers or flags on the surface of some pedons
Concentrated minerals: None

A or Ap horizon:
Color—Dark brown, yellowish brown, brown, dark grayish brown, or dark yellowish brown; yellowish red in some pedons
Redoximorphic features—None
Texture—Fine sandy loam, gravelly fine sandy loam, or clay loam
Reaction—Strongly acid to neutral
Other features—1 to 35 percent, by volume, ironstone pebbles

E horizon (where present):
Color—Brown, grayish brown, or yellowish brown
Redoximorphic features—None
Texture—Fine sandy loam or gravelly fine sandy loam
Reaction—Strongly acid to neutral
Other features—1 to 35 percent, by volume, ironstone pebbles

Bt horizon:
Color—Red, dark red, reddish brown, or yellowish red
Redoximorphic features—Yellowish, brownish, or grayish lithochromic mottles range from none to common; grayish platy shale fragments in some pedons
Texture—Clay, sandy clay, or clay loam
Reaction—Extremely acid to strongly acid
Other features—1 to 10 percent, by volume, ironstone pebbles

BCt horizon:
Color—Reddish, yellowish, or brownish colors; or the horizon is variegated in these or grayish colors
Redoximorphic features—Yellowish, brownish, or grayish lithochromic mottles range from none to common; grayish platy shale fragments in some pedons
Texture—Sandy clay loam, clay loam, or clay
Reaction—Extremely acid or very strongly acid
Other features—Thin strata and fragments of sandstone, shale, or partially weathered glauconitic material range from none to common

C horizon:
Color—Reddish, yellowish, or brownish colors
Redoximorphic features—None
Texture—Soft, weathered sandstone with texture of fine sandy loam or sandy clay loam that is stratified with shaly or weathered glauconitic material with texture of clay loam; proportions are variable
Reaction—Extremely acid or very strongly acid
Other features—Roots penetrate the material but are concentrated along fractures or cleavage planes; some pedons have clay flows along vertical fractures

Laneville Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Landscape: Coastal plains
Landform: Flood plains
Parent material: Loamy and clayey alluvium from rivers and streams
Slope range: 0 to 1 percent
Taxonomic class: Fine-silty, siliceous, thermic Fluvaquentic Eutrochrepts

Typical Pedon

Laneville loam, frequently flooded (fig. 22), in an area of woodland; from the intersection of Farm Road 225 and Farm Road 1798 in Laneville, 0.8 mile south on Farm Road 225, 1 mile west and south on a private road, 150 feet southeast in flood plain of Buckner Creek:

A1—0 to 4 inches; brown (10YR 5/3) loam; weak medium subangular blocky structure parting to weak fine granular; slightly hard, friable; many fine and medium roots between peds; many fine and medium vesicular and tubular pores; distinct reddish brown (5YR 4/4) iron stains in some root channels and pore linings; few rounded ironstone pebbles mainly less than ½ inch in diameter; few worm casts; strongly acid; clear smooth boundary.

A2—4 to 15 inches; yellowish brown (10YR 5/4) silt loam; common fine and medium faint brown (10YR 5/3) iron depletions; weak fine and medium subangular blocky structure; hard, friable; common fine and medium roots; many fine and medium vesicular and tubular pores; few light gray (10YR 7/2) silt coats on faces of some peds; few rounded ironstone pebbles mainly less than ½ inch in diameter; few worm casts; few fine masses of iron-manganese; strongly acid; clear smooth boundary.

Bw1—15 to 22 inches; variegated dark yellowish brown (10YR 4/6), yellowish brown (10YR 5/8), and grayish brown (10YR 5/2) clay loam; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; hard, friable; common fine roots; many fine and medium vesicular and tubular pores; few light gray (10YR 7/2) silt coats on faces of some peds; few rounded ironstone pebbles mainly less than ½ inch in diameter; few worm casts; few fine soft masses of iron-manganese; very strongly acid; clear smooth boundary.

Bw2—22 to 36 inches; variegated yellowish brown (10YR 5/6), grayish brown (10YR 5/2), and strong brown (7.5YR 5/8) clay loam; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; hard, friable; common fine roots; many fine and medium vesicular and tubular pores; few

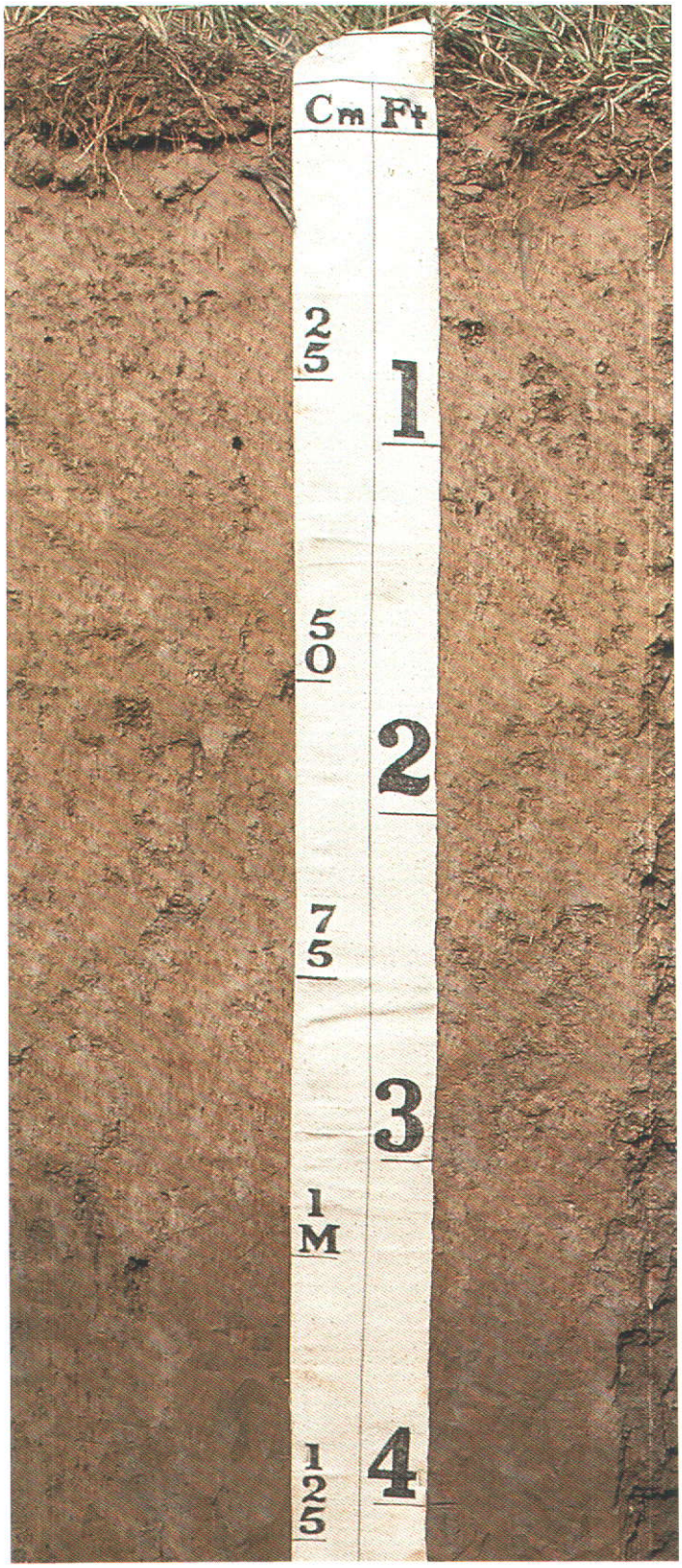

Figure 22.—Profile of Laneville loam.

Figure 23.—Profile of Latex very fine sandy loam.

light gray (10YR 7/2) silt coats on faces of some peds; few rounded ironstone pebbles mainly less than 1/2 inch in diameter; few worm casts; few fine masses of iron-manganese; extremely acid; clear smooth boundary.

2Bgb1—36 to 42 inches; gray (10YR 5/1) clay loam; many medium prominent strong brown (7.5YR 5/8) and common medium prominent red (2.5YR 4/8) iron accumulations; weak coarse prismatic structure parting to moderate medium and coarse angular blocky; very hard, very firm; common fine roots; common fine and medium vesicular and tubular pores; few rounded ironstone pebbles mainly less than 1/2 inch in diameter; few worm casts; extremely acid; clear smooth boundary.

2Bgb2—42 to 50 inches; gray (10YR 5/1) clay loam; common medium prominent strong brown (7.5YR 5/8) and red (2.5YR 4/8) iron accumulations; moderate medium and coarse angular blocky structure; very hard, very firm; common fine roots; common fine vesicular and tubular pores; few intersecting slickensides; few rounded ironstone pebbles mainly less than 1/2 inch in diameter; few worm casts; extremely acid; clear smooth boundary.

2Bgb3—50 to 80 inches; gray (10YR 5/1) clay loam; many fine and medium prominent red (2.5YR 4/8) and common fine prominent light olive brown (2.5Y 5/6) iron accumulations; weak coarse angular blocky structure; very hard, very firm; few fine roots; common vesicular and tubular pores; few intersecting slickensides; few rounded ironstone pebbles mainly less than 1/2 inch in diameter; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 25 to 35 percent
Other distinctive soil features: Clayey discontinuity at 30 to 50 inches deep
Concentrated minerals: None

A horizon:
- Color—Very dark grayish brown, dark yellowish brown, dark grayish brown, brown, dark brown, grayish brown, or yellowish brown
- Redoximorphic features—None to common iron accumulations in shades of brown, red, and yellow
- Texture—Loam
- Reaction—Strongly acid to slightly acid; neutral or slightly acid in the lower part of some pedons
- Other features—0 to 5 percent, by volume, rounded ironstone pebbles; few to 5 percent iron-manganese concretions and masses

Bw horizon:
- Color—Variegated in shades of brown and yellow
- Redoximorphic features—Few to many iron depletions with chroma of 2 or less at 4 to 18 inches deep; reddish iron accumulations in some pedons
- Texture—Loam, clay loam, or silty clay loam
- Reaction—Extremely acid to strongly acid; neutral or slightly acid in the lower part of some pedons
- Other features—0 to 5 percent, by volume, rounded ironstone pebbles; few to 5 percent iron-manganese concretions and masses

2Ab horizon (where present):
- Color—Very dark grayish brown, dark yellowish brown, dark grayish brown, brown, dark brown, grayish brown, or yellowish brown
- Redoximorphic features—None to common iron accumulations in shades of brown, red, and yellow
- Texture—Loam or clay loam
- Reaction—Extremely acid to moderately acid; neutral or slightly acid in the lower part of some pedons
- Other features—None

2Bgb horizon:
- Color—Dark gray, dark grayish brown, gray, light brownish gray, or grayish brown
- Redoximorphic features—Depleted matrix with common or many iron accumulations in shades of red, yellow, and brown
- Texture—Clay loam or clay
- Reaction—Extremely acid to moderately acid; neutral or slightly acid in the lower part of some pedons
- Other features—None

Latex Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landscape: Coastal plains
Landform: Uplands
Parent material: Coastal plains sediments from loamy marine deposits
Slope range: 1 to 3 percent
Taxonomic class: Fine-loamy, siliceous, thermic Glossic Paleudalfs

Typical Pedon

Latex very fine sandy loam, 1 to 3 percent slopes (fig. 23), in an area of woodland; from the junction of Farm Road 839 and County Road 4255 in New Salem near Lake Striker, 3.8 miles north on County Road 4255 to a private road, 0.4 mile east on a private road, 220 feet south of road:

A—0 to 3 inches; yellowish brown (10YR 5/4) very fine sandy loam; weak fine granular structure; soft, very friable; few roots of all sizes; few fine and medium pores; moderately acid; clear smooth boundary.

E—3 to 9 inches; light yellowish brown (10YR 6/4) very fine sandy loam; weak fine granular structure; soft, very friable; few roots of all sizes; few fine and medium pores; strongly acid; clear wavy boundary.

Bt1—9 to 15 inches; yellowish brown (10YR 5/6) clay loam; weak medium subangular blocky structure; slightly hard, firm; few fine and medium roots; few fine pores; few thin clay films on faces of peds; few fine ironstone pebbles; very strongly acid; clear smooth boundary.

Bt2—15 to 23 inches; yellowish brown (10YR 5/6) clay loam; common medium prominent yellowish red (5YR 5/8) iron accumulations; weak medium subangular blocky structure; hard, firm; few fine and medium roots; few fine pores; few thin dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine ironstone pebbles; very strongly acid; gradual smooth boundary.

Bt3—23 to 36 inches; yellowish brown (10YR 5/6) clay loam; common fine and medium prominent red (2.5YR 4/6) iron accumulations; weak medium subangular blocky structure; hard, firm; few fine roots and pores; 2 percent, by volume, of plinthite; few thin dark yellowish brown (10YR 4/4) clay films on faces of peds; 3 percent brittle bodies; very strongly acid; clear smooth boundary.

Bt/E—36 to 46 inches; yellowish brown (10YR 5/6) clay loam; common medium and coarse prominent red (2.5YR 4/6) iron accumulations; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm; few fine roots and pores; few thin clay films on faces of peds; 10 percent, by volume, streaks and pockets of albic material (E); 10 percent brittle bodies; very strongly acid; clear smooth boundary.

2Btg—46 to 80 inches; light brownish gray (10YR 6/2) clay; many coarse prominent red (2.5YR 4/6) and few fine distinct brownish yellow (10YR 6/8) iron accumulations; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard, very firm; few fine roots; few thin clay films on faces of peds; about 3 percent, by volume, streaks of albic material between peds; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches

Clay content in the control section: 18 to 35 percent

Other distinctive soil features: Clayey discontinuity at 36 to 60 inches deep

Concentrated minerals: None

A horizon:
- Color—Dark grayish brown, dark brown, brown, dark yellowish brown, or yellowish brown
- Redoximorphic features—None
- Texture—Very fine sandy loam
- Reaction—Very strongly acid to moderately acid, unless limed
- Other features—None

E horizon:
- Color—Pale brown, light yellowish brown, brown, light brown, or yellowish brown
- Redoximorphic features—None
- Texture—Very fine sandy loam
- Reaction—Very strongly acid or strongly acid
- Other features—None

Bt horizon:
- Color—Strong brown, yellowish brown, brownish yellow, or reddish yellow
- Redoximorphic features—None to common iron accumulations in shades of red and brown
- Texture—Clay loam, sandy clay loam, or loam
- Reaction—Very strongly acid or strongly acid
- Other features—Up to 3 percent, by volume, of plinthite segregations in some pedons

Bt/E horizon:
- Color—Strong brown, yellowish brown, brownish yellow, or reddish yellow (Bt)
- Redoximorphic features—Few or common iron accumulations in shades of red, brown, and yellow and iron depletions in shades of gray are below 30 inches in some pedons
- Texture—Clay loam, sandy clay loam, or loam (Bt)
- Reaction—Very strongly acid or strongly acid
- Other features—5 to 10 percent, by volume, streaks and pockets of albic material (E); 0 to 5 percent, by volume, ironstone pebbles; 0 to 15 percent brittle peds

2Bt/E horizon (where present):
- Color—Red, dark yellowish brown, yellowish brown, dark red, or yellowish red
- Redoximorphic features—Few to many iron depletions in shades of gray and iron accumulations in shades of red, brown, and yellow at more than 30 inches deep; or the horizon is variegated in these colors
- Texture—Clay or clay loam
- Reaction—Very strongly acid
- Other features—Slickensides and pressure faces range from none to few; 5 to 15 percent, by volume, streaks, pockets, and coatings of albic material (E)

2Btg horizon:
- Color—Gray, light gray, or light brownish gray
- Redoximorphic features—Depleted matrix with few to many iron accumulations in shades of yellow, red, or brown; or the horizon is variegated in these colors
- Texture—Clay or silty clay
- Reaction—Very strongly acid
- Other features—Up to 4 percent, by volume, streaks and coatings of albic material

Lilbert Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape: Coastal plains
Landform: Uplands
Parent material: Coastal plains sediments from sandy and loamy marine sediments
Slope range: 2 to 5 percent
Taxonomic class: Loamy, siliceous, thermic Arenic Plinthic Paleudults

Typical Pedon

Lilbert loamy fine sand, 2 to 5 percent slopes, in a loblolly pine plantation area; from the traffic circle in Henderson, 10.5 miles northeast on Texas Highway 43, 0.15 mile north on a private road, 200 feet east of road:

A—0 to 10 inches; brown (10YR 4/3) loamy fine sand; weak fine subangular blocky structure; soft, very friable; many fine and medium roots; few ironstone pebbles; few dark grayish brown (10YR 4/2) root stains; moderately acid; clear smooth boundary.

E—10 to 29 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine subangular blocky structure; soft, very friable; few fine, medium, and coarse roots; few fine and medium pores; few dark grayish brown (10YR 4/2) root stains; slightly acid; clear wavy boundary.

Bt—29 to 38 inches; yellowish brown (10YR 5/6) sandy clay loam; few fine distinct yellowish red (5YR 5/8) iron accumulations; weak medium subangular blocky structure; slightly hard, firm; few fine and medium roots and pores; few thin clay films on faces of peds; few dark yellowish brown (10YR 4/4) root stains; few light yellowish brown spots; strongly acid; gradual smooth boundary.

Btv1—38 to 49 inches; yellowish brown (10YR 5/8) sandy clay loam; common fine prominent red (2.5YR 4/6) and few medium prominent yellowish red (5YR 5/8) iron accumulations; weak medium subangular blocky structure; slightly hard, firm; few fine and medium roots; common fine pores; 6 percent, by volume, of plinthite; few thin clay films on faces of peds; strongly acid; gradual smooth boundary.

Btv2—49 to 80 inches; brownish yellow (10YR 6/8) sandy clay loam; many medium and coarse prominent red (2.5YR 4/6), few medium prominent yellowish red (5YR 5/6), and few medium prominent dark reddish brown (2.5YR 3/4) iron accumulations; weak medium subangular blocky structure; hard, firm; few fine roots; few fine and medium pores; 10 percent, by volume, of plinthite; few thin patchy clay films on faces of peds; strongly acid.

Range in Characteristics

Solum thickness: More than 60 inches
Clay content in the control section: 18 to 35 percent
Other distinctive soil features: 5 to 15 percent, by volume, of plinthite segregations at 30 to 60 inches deep
Concentrated minerals: None

A horizon:
- Color—Very dark grayish brown, dark grayish brown, dark brown, grayish brown, or brown
- Redoximorphic features—None
- Texture—Loamy fine sand
- Reaction—Very strongly acid to slightly acid
- Other features—None

E horizon:
- Color—Brown, yellowish brown, pale brown, light yellowish brown, or very pale brown
- Redoximorphic features—None
- Texture—Loamy fine sand
- Reaction—Very strongly acid to slightly acid
- Other features—None
- Thickness—Combined thickness of the A and E horizons ranges from 20 to 40 inches

Bt horizon:
- Color—Strong brown, yellowish brown, brownish yellow, yellowish red, or reddish yellow
- Redoximorphic features—None to common iron accumulations in shades of red or brown
- Texture—Sandy clay loam
- Reaction—Very strongly acid or strongly acid
- Other features—0 to 4 percent, by volume, of plinthite segregations

Btv horizon:
- Color—Strong brown, yellowish brown, brownish yellow, yellowish red, or reddish yellow
- Redoximorphic features—Few to many iron accumulations in shades of red, yellow, or brown and iron depletions in shades of gray at more than 30 inches deep; or the horizon is variegated in these colors
- Texture—Sandy clay loam
- Reaction—Very strongly acid to moderately acid
- Other features—5 to 15 percent, by volume, of plinthite segregations; up to 15 percent brittle peds; streaks, pockets, and coatings of albic material in some pedons

Maben Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately slow

Landscape: Coastal plains
Landform: Uplands
Parent material: Clayey residuum from stratified marine sediments that consist of loamy material, clay, and shale
Slope range: 5 to 15 percent
Taxonomic class: Fine, mixed, thermic Ultic Hapludalfs

Typical Pedon

Maben fine sandy loam, 5 to 15 percent slopes (fig. 24), in a pasture; from the traffic circle in Henderson, 9 miles east on U.S. Highway 79, 0.9 mile north on County Road 341 to a private road, 0.4 mile west and northwest on a private road, 200 feet north on side slope:

A—0 to 4 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; soft, very friable; many fine and medium roots; moderately acid; clear smooth boundary.

Bt1—4 to 15 inches; yellowish red (5YR 5/8) clay; few fine distinct strong brown (7.5YR 5/6) lithochromic mottles; weak medium subangular blocky structure; hard, firm; few fine and medium roots; common thin clay films on faces of peds; few fine pebbles; few brown worm casts; very strongly acid; gradual wavy boundary.

Bt2—15 to 27 inches; red (2.5YR 4/6) clay; few medium distinct strong brown (7.5YR 5/6), few fine prominent yellowish brown (10YR 5/6), and common medium distinct light yellowish brown (10YR 6/4) lithochromic mottles; weak medium subangular blocky structure; very hard, firm; few fine roots and pores; few thin clay films on faces of peds; many soft small bits and fragments of grayish brown (10YR 5/2) shale; very strongly acid; gradual wavy boundary.

Bt3—27 to 34 inches; yellowish red (5YR 5/6) clay; common medium and coarse distinct strong brown (7.5YR 5/6) lithochromic mottles; weak medium subangular blocky structure; very hard, firm; few fine roots; few thin clay films on faces of peds; many soft small bits and fragments of grayish brown (10YR 5/2) shale; very strongly acid; gradual wavy boundary.

Bt/C—34 to 38 inches; variegated reddish yellow (7.5YR 6/8), grayish brown (10YR 5/2), and yellowish red (5YR 5/8) clay loam; weak medium subangular blocky structure; hard, firm; few fine roots and pores; few thin clay films on faces of peds; light olive gray (5Y 6/2) silty material (C); few fine mica flakes; very strongly acid; clear wavy boundary.

C—38 to 60 inches; stratified light olive gray (5Y 6/2) soft shale, siltstone, and silty clay loam; few yellowish brown (10YR 5/8) strata; massive, parting along bedding planes; hard, firm; few fine roots; few fine mica flakes; very strongly acid.

Range in Characteristics

Solum thickness: 20 to 40 inches
Clay content in the control section: 35 to 55 percent
Other distinctive soil features: None
Concentrated minerals: None

A horizon:
- Color—Brown, dark brown, or dark yellowish brown
- Redoximorphic features—None
- Texture—Fine sandy loam
- Reaction—Strongly acid or moderately acid
- Other features—None

E horizon (where present):
- Color—Dark yellowish brown, pale brown, light brownish gray, grayish brown, brown, or yellowish brown
- Redoximorphic features—None
- Texture—Fine sandy loam or loam
- Reaction—Strongly acid or moderately acid
- Other features—None

Bt horizon:
- Color—Dark reddish brown, reddish brown, yellowish red, red, or dark red
- Redoximorphic features—None to common lithochromic mottles in shades of brown and yellow
- Texture—Clay or clay loam
- Reaction—Very strongly acid to moderately acid
- Other features—Soft bits and fragments of gray shale range from none to many

Bt/C horizon (and BC or B/C horizon, where present):
- Color—Dark reddish brown, reddish brown, yellowish red, red, or dark red; or the horizon is variegated in shades of yellow, gray, and red
- Redoximorphic features—Lithochromic mottles in shades of gray, brown, yellow, and red
- Texture—Clay, clay loam, silty clay loam, or silty clay; strata of loam or sandy clay loam in some pedons
- Reaction—Very strongly acid to moderately acid
- Other features—Up to 50 percent, by volume, soft, weathered siltstone or shale

C horizon:
- Color—Shades of gray
- Redoximorphic features—None to many lithochromic mottles in shades of red, gray, and yellow
- Texture—Stratified fine sand, loam, silty clay loam, clay, and soft, weathered shale and siltstone
- Reaction—Very strongly acid to moderately acid
- Other features—Soft, weathered shale or siltstone may contain mica

Mattex Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landscape: Coastal plains
Landform: Flood plains
Parent material: Loamy alluvium from rivers and streams
Slope range: 0 to 1 percent
Taxonomic class: Fine-loamy, siliceous, acid, thermic Aeric Fluvaquents

Typical Pedon

Mattex clay loam, frequently flooded, in an area of native pasture; from the traffic circle in Henderson, 4.2 miles north on U.S. Highway 259, 5 miles north on Farm Road 2276, 0.6 mile west on Farm Road 850, 125 feet north of road on west side of Chambers Creek:

A—0 to 8 inches; dark brown (10YR 4/3) clay loam; common medium faint dark grayish brown (10YR 4/2) iron depletions; moderate medium subangular blocky structure; slightly hard, friable; many fine and medium roots; common fine and medium pores; many reddish brown (5YR 4/4) and yellowish red (5YR 4/6) coatings along root channels; strongly acid; clear smooth boundary.

Bg1—8 to 13 inches; dark gray (10YR 4/1) loam; common medium distinct dark yellowish brown (10YR 4/4) iron accumulations; moderate fine subangular blocky structure; slightly hard, friable; many fine and medium roots; common fine and medium pores; common strong brown (7.5YR 4/6) coatings along root channels; very strongly acid; clear smooth boundary.

Bg2—13 to 26 inches; grayish brown (10YR 5/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) iron accumulations; moderate fine subangular blocky structure; slightly hard, friable; common fine and medium roots; common fine pores; few yellowish red (5YR 4/6) coatings along root channels; very strongly acid; clear smooth boundary.

Bg3—26 to 34 inches; gray (10YR 5/1) sandy clay loam; common medium and coarse prominent yellowish brown (10YR 5/6) iron accumulations; weak medium subangular blocky structure; slightly hard, friable; few fine and medium roots and pores; few yellowish red (5YR 5/6) coatings along root channels; very strongly acid; clear smooth boundary.

Bg4—34 to 44 inches; variegated light brownish gray (10YR 6/2) and gray (10YR 5/1) very fine sandy loam; common coarse prominent yellowish brown (10YR 5/6) iron accumulations; weak medium subangular blocky structure; slightly hard, friable; few fine roots and pores; few yellowish red (5YR 5/6) coatings along root channels; very strongly acid; clear smooth boundary.

2Bgb—44 to 80 inches; dark gray (10YR 4/1) clay loam; many medium and coarse prominent red (2.5YR 4/6) and dark yellowish brown (10YR 4/6) and common medium prominent strong brown (7.5YR 5/8) iron accumulations; moderate medium subangular blocky structure; very hard, very firm; few fine roots and pores; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 20 to 34 percent
Other distinctive soil features: Clayey discontinuity at 35 to 50 inches deep
Concentrated minerals: Organic carbon content ranges from 0.2 to 0.4 percent at a depth of 50 inches

A horizon:
- Color—Brown, dark brown, dark grayish brown, dark gray, or grayish brown; some pedons have A horizons less than 6 inches thick that are very dark gray or very dark grayish brown
- Redoximorphic features—None
- Texture—Clay loam or loam
- Reaction—Very strongly acid to moderately acid; slightly acid or neutral below a depth of 60 inches in some pedons
- Other features—None to common iron-manganese masses and concretions

Bw horizon (where present):
- Color—Brown, dark brown, dark yellowish brown, yellowish brown, pale brown, light yellowish brown, or brownish yellow
- Redoximorphic features—None to common iron accumulations in shades of yellow, brown, or red and iron depletions in shades of gray
- Texture—Loam, sandy clay loam, or clay loam
- Reaction—Extremely acid to strongly acid; slightly acid or neutral below a depth of 60 inches in some pedons
- Other features—None to common iron-manganese masses and concretions

Bg horizon:
- Color—Dark gray, dark grayish brown, gray, grayish brown, light gray, or light brownish gray
- Redoximorphic features—Depleted matrix with few to many iron accumulations in shades of brown or yellow and none to few iron accumulations in shades of red at 4 to 19 inches deep
- Texture—Loam, very fine sandy loam, sandy clay loam, or clay loam

Reaction—Extremely acid to strongly acid; slightly acid or neutral below a depth of 60 inches in some pedons
Other features—None to common iron-manganese masses and concretions

2Bgb horizon:
Color—Dark gray, dark grayish brown, gray, grayish brown, light gray, or light brownish gray
Redoximorphic features—Depleted matrix with few to many iron accumulations in shades of red, brown, or yellow at 4 to 19 inches deep
Texture—Clay loam or clay
Reaction—Very strongly acid to moderately acid; slightly acid or neutral below a depth of 60 inches in some pedons
Other features—Clay content is 35 to 50 percent; 20 to 35 percent clay below a depth of 60 inches in some pedons

Meth Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape: Coastal plains
Landform: Uplands
Parent material: Coastal plains sediments from loamy and clayey marine sediments
Slope range: 2 to 5 percent
Taxonomic class: Fine, mixed, thermic Ultic Hapludalfs

Typical Pedon

Meth fine sandy loam, 2 to 5 percent slopes, in a pasture; from the traffic circle in Henderson, 8.2 miles east on U.S. Highway 79, 0.8 mile south on County Road 347; 800 feet east of road:

Ap—0 to 12 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; soft, very friable; few fine and medium roots; few fine pores; 5 percent, by volume, ironstone pebbles; moderately acid; clear smooth boundary.
Bt1—12 to 24 inches; red (2.5YR 4/6) clay; few fine prominent yellowish brown (10YR 5/6) lithochromic mottles; moderate medium subangular blocky structure; very hard, firm; few fine roots; few fine and medium pores; few small pressure faces; many thick dark reddish brown (2.5YR 3/4) clay films on faces of peds; few ironstone pebbles; moderately acid; gradual wavy boundary.
Bt2—24 to 51 inches; red (2.5YR 4/6) clay; common medium prominent yellowish brown (10YR 5/6) lithochromic mottles; weak medium subangular blocky structure; very hard, firm; few fine roots and pores; many thick dark reddish brown (2.5YR 3/4) clay films on faces of peds; common fine ironstone pebbles; strongly acid; gradual wavy boundary.
Bt3—51 to 80 inches; red (2.5YR 4/6) sandy clay loam; few medium prominent yellowish brown (10YR 5/6) lithochromic mottles; weak medium subangular blocky structure; hard, firm; few fine roots; few thin clay films on faces of peds; few spots of light brownish gray (10YR 6/2) partially weathered shale; strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 35 to 55 percent
Other distinctive soil features: None
Concentrated minerals: 0 to 10 percent, by volume, ironstone pebbles throughout the profile

A or Ap horizon:
Color—Grayish brown, dark grayish brown, brown, dark brown, yellowish brown, or dark yellowish brown
Redoximorphic features—None
Texture—Fine sandy loam
Reaction—Strongly acid or moderately acid
Other features—None

E horizon (where present):
Color—Grayish brown, dark grayish brown, brown, dark brown, yellowish brown, or dark yellowish brown
Redoximorphic features—None
Texture—Fine sandy loam, very fine sandy loam, or sandy loam
Reaction—Strongly acid or moderately acid
Other features—None

Bt horizon:
Color—Red, dark red, reddish brown, dark reddish brown, or yellowish red
Redoximorphic features—None to common lithochromic mottles in shades of brown and yellow
Texture—Clay or clay loam in the upper part and sandy clay loam or fine sandy loam in the lower part
Reaction—Very strongly acid to moderately acid
Other features—Up to 5 percent, by volume, streaks or pockets of yellowish or grayish, less clayey material in the lower part

BC horizon (where present):
Color—Shades of red, brown, or yellow
Redoximorphic features—Lithochromic mottles in shades of red, yellow, and gray
Texture—Sandy loam, sandy clay loam, or fine sandy loam
Reaction—Very strongly acid to moderately acid
Other features—None

Mollville Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landscape: Coastal plains
Landform: Terraces
Parent material: Stratified loamy alluvium from rivers and streams
Slope range: 0 to 1 percent
Taxonomic class: Fine-loamy, siliceous, thermic Typic Glossaqualfs

Typical Pedon

Mollville loam, in an area of Mollville-Besner complex, 0 to 1 percent slopes, in an area of woodland; from the intersection of U.S. Highway 79 and Texas Highway 42 about 8 miles southwest of Henderson, 0.7 mile southwest on U.S. Highway 79, 2.5 miles west on County Road 476, 0.7 mile west on County Road 4194, 30 feet south of road:

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam; moderate medium subangular blocky structure; hard, friable; many fine and medium roots; few pores of all sizes; many fine and medium dark yellowish brown (10YR 4/6) root stains; few medium spots of light brownish gray (10YR 6/2) clean sand; very strongly acid; clear smooth boundary.

A2—4 to 8 inches; grayish brown (10YR 5/2) loam; moderate medium subangular blocky structure; hard, friable; common fine and medium roots; few fine and medium pores; many fine and medium dark yellowish brown (10YR 4/6) root stains; few medium spots of light brownish gray (10YR 6/2) clean sand; very strongly acid; gradual wavy boundary.

Eg—8 to 13 inches; light brownish gray (10YR 6/2) loam; moderate medium subangular blocky structure; hard, friable; common medium roots; few fine and medium pores; common medium yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) and few medium strong brown (7.5YR 5/6) root stains; very strongly acid; gradual wavy boundary.

Btg/E1—13 to 21 inches; grayish brown (10YR 5/2) loam; common medium and coarse distinct yellowish brown (10YR 5/6) iron accumulations; moderate medium subangular blocky structure; hard, friable; few fine roots; few thin clay films on faces of peds; 35 percent, by volume, streaks, pockets, and coatings of albic material (E); common strong brown (7.5YR 5/6) root stains; strongly acid; gradual wavy boundary.

Btg/E2—21 to 34 inches; grayish brown (10YR 5/2) clay loam; common medium prominent strong brown (7.5YR 5/6) iron accumulations; moderate medium subangular blocky structure; very hard, firm; few fine roots; few thin clay films on faces of peds; 20 percent, by volume, streaks, pockets, and coatings of albic material (E); common dark reddish brown (5YR 3/3) root stains; strongly acid; gradual wavy boundary.

Btg/E3—34 to 55 inches; grayish brown (10YR 5/2) clay loam; many medium and coarse strong brown (7.5YR 4/6) iron accumulations; moderate medium subangular blocky structure; very hard, firm; few fine roots; few thin clay films on faces of peds; 15 percent, by volume, streaks, pockets, and coatings of albic material (E); few dark yellowish brown (10YR 4/4) root stains; few ironstone nodules; strongly acid; gradual wavy boundary.

Btg—55 to 80 inches; grayish brown (10YR 5/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) iron accumulations; moderate medium subangular blocky structure; very hard, firm; few fine roots; few thin clay films on faces of peds; about 4 percent, by volume, streaks and coatings of albic material; strongly acid.

Range in Characteristics

Solum thickness: 60 to more than 80 inches
Clay content in the control section: 20 to 35 percent
Other distinctive soil features: Glossic horizon at 6 to 20 inches deep
Concentrated minerals: None

A horizon:
- Color—Grayish brown, dark grayish brown, very dark grayish brown, gray, or dark gray
- Redoximorphic features—None
- Texture—Loam
- Reaction—Very strongly acid to moderately acid
- Other features—None

Eg horizon:
- Color—Grayish brown, light brownish gray, or light gray
- Redoximorphic features—Depleted matrix with iron accumulations in shades of brown
- Texture—Loam, very fine sandy loam, or fine sandy loam
- Reaction—Very strongly acid to moderately acid
- Other features—None

Btg/E horizon:
- Color—Gray, light brownish gray, or grayish brown; some ped exteriors are dark grayish brown or very dark grayish brown in the upper part
- Redoximorphic features—Depleted matrix with few to many iron accumulations in shades of brown, yellow, and red at 2 to 8 inches deep
- Texture—Loam, clay loam, or sandy clay loam
- Reaction—Very strongly acid to moderately acid
- Other features—15 to 35 percent, by volume, streaks, pockets, and coatings of albic material (E)

Btg horizon:
Color—Gray, light brownish gray, or grayish brown; some ped exteriors are dark grayish brown or very dark grayish brown in the upper part
Redoximorphic features—Depleted matrix with few to many iron accumulations in shades of brown, yellow, and red at 2 to 8 inches deep
Texture—Loam, clay loam, or sandy clay loam
Reaction—Very strongly acid to moderately acid
Other features—0 to 4 percent, by volume, streaks, pockets, and coatings of albic material (E)

2Cg horizon (where present):
Color—Grayish colors
Redoximorphic features—Depleted matrix with few to many iron accumulations in shades of brown, yellow, and red at 2 to 8 inches deep
Texture—Loamy fine sand or fine sandy loam
Reaction—Moderately acid to slightly alkaline
Other features—None

Naconiche Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderately rapid
Landscape: Coastal plains
Landform: Flood plains
Parent material: Sandy alluvium from rivers and streams
Slope range: 0 to 2 percent
Taxonomic class: Sandy, siliceous, thermic Cumulic Humaquepts

Typical Pedon

Naconiche mucky sandy loam, frequently flooded, in an area of woodland; from Mount Enterprise about 5 miles south on U.S. Highway 259, 1.5 miles east on Old Prospect Road to Morrow Creek bottom, 400 feet south of road:

A1—0 to 12 inches; very dark gray (7.5YR 3/0) mucky sandy loam; common medium white (10YR 8/2) spots of sand; massive; many fine, medium, and coarse roots; about 20 percent decomposing leaves, roots, and twigs; extremely acid; abrupt smooth boundary.
A2—12 to 19 inches; black (7.5YR 2/0) mucky fine sandy loam; massive; few fine and medium roots; about 10 percent decomposing leaves, roots, and twigs; extremely acid; abrupt smooth boundary.
A3—19 to 29 inches; very dark gray (7.5YR 3/0) sand; single grained; common fine and medium roots; extremely acid; abrupt smooth boundary.
A4—29 to 32 inches; dark gray (10YR 4/1) sand; common white (10YR 8/2) spots of loamy fine sand; single grained; few fine and medium roots; extremely acid; abrupt smooth boundary.
A5—32 to 36 inches; black (10YR 2/1) loamy sand; few white (10YR 8/2) spots of sand; massive; few fine and medium roots; extremely acid; abrupt smooth boundary.
Cg—36 to 40 inches; light gray (10YR 7/1) sand; single grained; few fine and medium roots; few medium rounded masses of iron-manganese; very strongly acid; abrupt smooth boundary.
Ab1—40 to 45 inches; black (10YR 2/1) sand; single grained; few fine and medium roots; few medium rounded masses of iron-manganese; extremely acid; abrupt smooth boundary.
Ab2—45 to 52 inches; very dark grayish brown (10YR 3/2) mucky fine sandy loam; few dark brown (10YR 4/3) and black (10YR 2/1) streaks and spots; massive; few fine and medium roots; extremely acid; abrupt smooth boundary.
C´g—52 to 57 inches; light gray (10YR 7/1) sand; single grained; few fine and medium roots; moderately acid; abrupt smooth boundary.
A´b—57 to 67 inches; black (N 2/0) and very dark gray (10YR 3/1) loamy fine sand; common white (10YR 8/2) spots; massive; few fine and medium roots; extremely acid; abrupt smooth boundary.
C´´g—67 to 73 inches; white (10YR 8/2) fine sand; single grained; few fine and medium roots; moderately acid; abrupt smooth boundary.
A´´b—73 to 80 inches; dark grayish brown (10YR 4/2) fine sand; single grained; few fine and medium roots; very strongly acid.

Range in Characteristics

Solum thickness: 24 to 40 inches
Clay content in the control section: 2 to 12 percent
Other distinctive soil features: Umbric epipedon to at least 24 inches deep
Concentrated minerals: Organic matter content is 2 to 15 percent within the upper 16 inches
Reaction: Extremely acid to moderately acid throughout the profile

A, Ab, A´b, and A´´b horizons:
Color—Very dark brown, dark brown, black, very dark gray, dark gray, dark grayish brown, or very dark grayish brown
Redoximorphic features—Iron accumulations in shades of brown and iron depletions in shades of gray
Texture—Mucky sandy loam in the upper part and sand, loamy sand, or mucky fine sandy loam in the lower part
Other features—None to common streaks and spots of black organic matter accumulation and white or gray clay depletions; none to few iron-manganese concretions and masses
Thickness—24 to 40 inches

Figure 24.—Profile of Maben fine sandy loam.

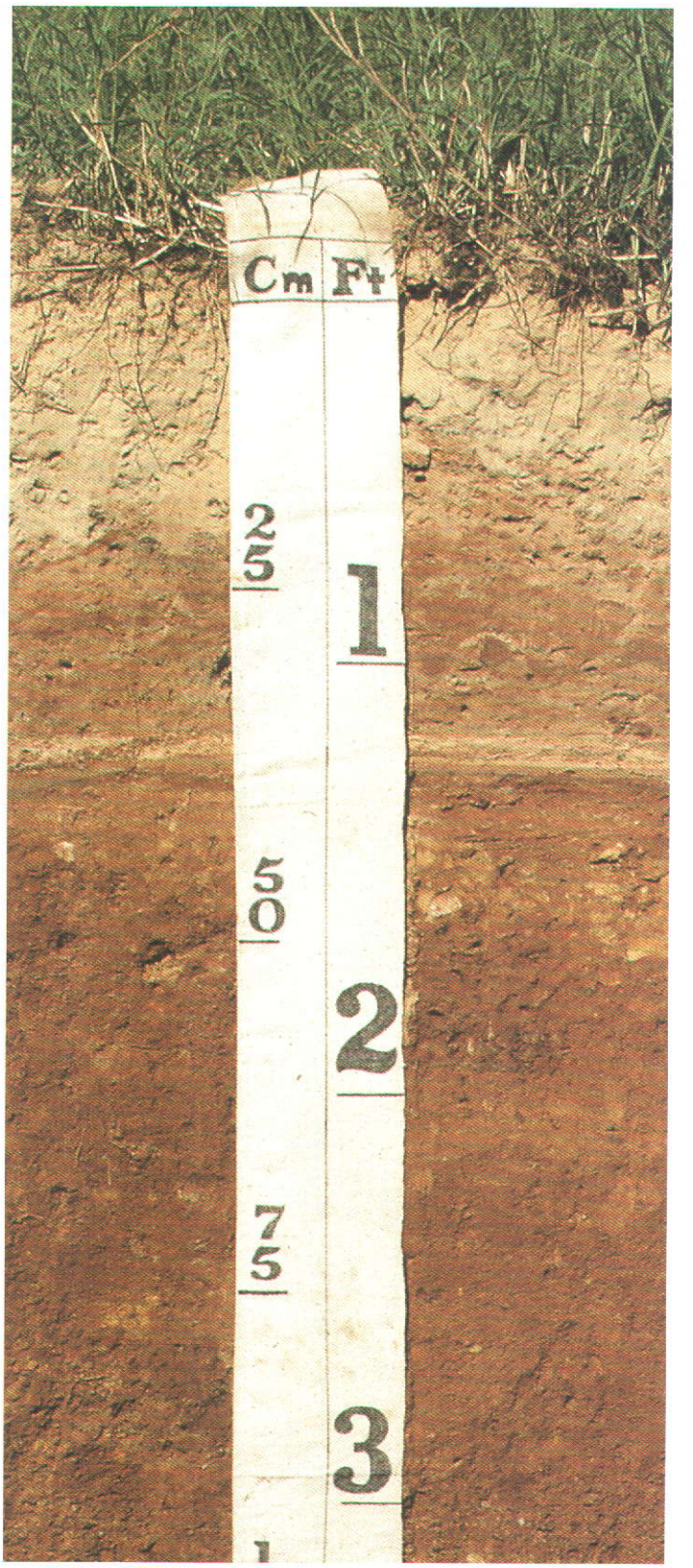

Figure 25.—Profile of Pirkey very fine sandy loam.

Cg, C´g, and C´´g horizons:
Color—Gray, light gray, white, or light brownish gray
Redoximorphic features—Depleted matrix with iron accumulations in shades of brown
Texture—Stratified sand or fine sand
Other features—None to few iron-manganese concretions and masses

Owentown Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape: Coastal plains
Landform: Flood plains
Parent material: Loamy alluvium from rivers and streams
Slope range: 0 to 1 percent
Taxonomic class: Coarse-loamy, siliceous, thermic Fluventic Dystrochrepts

Typical Pedon

Owentown fine sandy loam, occasionally flooded, in an area of woodland; from the intersection of Texas Highway 43 and Texas Highway 149 in Tatum, 5.3 miles northwest on Texas Highway 149 to Farm Road 782, 1.3 miles south on Farm Road 782 to County Road 2196, 0.8 mile east on County Road 2196, 100 feet south of road to near creek:

A—0 to 16 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; slightly hard, very friable; many fine, medium, and coarse roots; few fine and medium pores; moderately acid; clear smooth boundary.
Bw1—16 to 40 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; slightly hard, very friable; few fine and medium roots; strongly acid; clear smooth boundary.
Bw2—40 to 53 inches; brownish yellow (10YR 6/8) loam; common light yellowish brown (10YR 6/4) spots; weak medium subangular blocky structure; slightly hard, very friable; few fine roots; strongly acid; gradual smooth boundary.
Bw3—53 to 80 inches; brownish yellow (10YR 6/6) loam; common medium faint light yellowish brown (10YR 6/4) iron depletions; few very pale brown (10YR 7/3) spots; weak medium subangular blocky structure; slightly hard, very friable; few fine roots; moderately acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 6 to 18 percent
Other distinctive soil features: None
Concentrated minerals: None
Reaction: Strongly acid or moderately acid throughout the profile

A horizon:
Color—Dark yellowish brown, brown, dark brown, or dark grayish brown
Redoximorphic features—None
Texture—Fine sandy loam
Other features—None

Bw horizon:
Color—Yellowish brown, strong brown, brownish yellow, dark yellowish brown, dark brown, or brown
Redoximorphic features—None to common iron depletions in shades of gray and iron accumulations in shades of yellow, brown, and red at 24 to 48 inches deep
Texture—Loam or fine sandy loam; strata of loamy fine sand or sandy clay loam in some pedons
Other features—Few black concretions and few fine pebbles occur in some pedons

BC horizon (where present):
Color—Shades of brown and gray
Redoximorphic features—None to common iron accumulations in shades of yellow and red
Texture—Loamy fine sand, fine sandy loam, or loam
Other features—Strata of sandy clay loam in some pedons

Pirkey Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Landscape: Coastal plains
Landform: Uplands
Parent material: Reconstructed oxidized materials resulting from lignite mining operations
Slope range: 1 to 12 percent
Taxonomic class: Fine-loamy, siliceous, acid, thermic Ultic Udarents

Typical Pedon

Pirkey very fine sandy loam, 1 to 5 percent slopes (fig. 25), in an area of hayland; from the traffic circle in Henderson, 3.5 miles northeast on Texas Highway 43, 0.8 mile north on Farm Road 1716 to Tumco mine plant entry road, 1 mile west on entry road to intersection, 0.7 mile north and west:

Ap—0 to 7 inches; yellowish brown (10YR 5/4) very fine sandy loam; few medium yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) spots; moderate medium granular structure; slightly hard, friable; many fine and

medium roots; few fine ironstone pebbles; very strongly acid; abrupt smooth boundary.

A/C—7 to 15 inches; yellowish brown (10YR 5/4)(A) and few spots of yellowish red (5YR 4/6)(C) very fine sandy loam; massive; slightly hard, friable; many very fine, fine, and medium roots; few fine ironstone pebbles; strongly acid; abrupt smooth boundary.

C1—15 to 22 inches; red (2.5YR 4/8) sandy clay loam; few medium and coarse strong brown (7.5YR 5/8) and few medium light brownish gray (10YR 6/2) spots; massive; slightly hard, friable; common fine and very fine roots; few fine ironstone pebbles; very strongly acid; gradual smooth boundary.

C2—22 to 35 inches; red (2.5YR 4/8) sandy clay loam; few fine strong brown (7.5YR 5/8) spots; massive; slightly hard, friable; few very fine and fine roots; few coarse dark red (2.5YR 3/6) clay balls; 5 percent, by volume, fine ironstone pebbles; extremely acid; gradual smooth boundary.

C3—35 to 55 inches; red (2.5YR 4/6) sandy clay loam; common fine and medium strong brown (7.5YR 5/8) and common fine light gray (10YR 7/2) spots; massive; hard, firm; few very fine and fine roots; 5 percent, by volume, fine ironstone pebbles; very strongly acid; gradual smooth boundary.

2C—55 to 80 inches; dark grayish brown (4Y 4/2) very fine sandy loam; common medium and coarse dark gray (5Y 4/1) and few red (2.5YR 4/6) spots; few light gray (5Y 7/1) lenses; massive; very hard, firm; few very fine and fine roots; few fine ironstone pebbles; few medium bits of lignite; extremely acid.

Range in Characteristics

Solum thickness: Less than 10 inches
Clay content in the control section: 18 to 35 percent
Other distinctive soil features: The soil is disturbed and contains remnants of argillic horizon materials at 0 to 48 or more inches deep
Concentrated minerals: Unoxidized materials and lignite fragments range from 0 to 10 percent within the upper 48 inches

A or Ap and A/C horizons:
- Color—Yellowish brown, brown, dark brown, grayish brown, and dark grayish brown; if topsoil substitutes have been used, then A horizon colors are similar to C horizon colors
- Redoximorphic features—None
- Texture—Very fine sandy loam
- Reaction—Very strongly acid to slightly acid
- Other features—0 to 5 percent, by volume, ironstone pebbles

C horizon:
- Color—Brown, strong brown, dark brown, dark yellowish brown, yellowish brown, light yellowish brown, brownish yellow, yellowish red, red, reddish brown, light reddish brown, reddish brown, or light red
- Redoximorphic features—None to common red, yellow, brown, or gray spots
- Texture—Stratified clay, sandy clay, clay loam, sandy clay loam, or loam; clay balls in some pedons
- Reaction—Extremely acid to strongly acid
- Other features—0 to 5 percent, by volume, ironstone pebbles

2C horizon:
- Color—Black, very dark brown, very dark grayish brown, dark grayish brown, very dark gray, or dark gray
- Redoximorphic features—None to many red, brown, yellow, or gray spots
- Texture—Fine sandy loam to silty clay
- Reaction—Ultra acid to neutral
- Other features—Unoxidized materials and lignite fragments range from 0 to 50 percent

Redsprings Series

Depth class: Deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape: Coastal plains
Landform: Uplands
Parent material: Residuum from glauconitic marine sediments
Slope range: 2 to 40 percent
Taxonomic class: Fine, kaolinitic, thermic Ultic Hapludalfs

Typical Pedon

Redsprings gravelly fine sandy loam, 2 to 5 percent slopes (fig. 26), in an abandoned field; from the junction of U.S. Highway 84 and Farm Road 3055 west of Mount Enterprise, 2 miles south on Farm Road 3055, 300 feet north of road:

A—0 to 6 inches; dark reddish brown (2.5YR 3/4) gravelly fine sandy loam; moderate medium subangular blocky structure parting to weak very fine granular; hard, friable; many roots of all sizes; few pores of all sizes; 20 percent, by volume, ironstone pebbles; common worm casts; neutral; clear smooth boundary.

Bt1—6 to 14 inches; dark reddish brown (2.5YR 3/4) clay loam; weak medium prismatic structure parting to moderate very fine subangular blocky; very hard, very firm; many roots and pores of all sizes; many thick clay films on faces of peds; 10 percent, by volume, ironstone pebbles; few fine worm casts; slightly acid; gradual smooth boundary.

Bt2—14 to 24 inches; dark red (2.5YR 3/6) clay loam; weak

medium prismatic structure parting to moderate very fine subangular blocky; very hard, very firm; common fine and medium and few coarse roots; many fine and medium pores; many thick clay films on faces of peds; 3 percent, by volume, ironstone pebbles; 10 percent, by volume, brownish yellow (10YR 6/8) weathered glauconitic material; slightly acid; gradual smooth boundary.

Bt3—24 to 35 inches; dark red (2.5YR 3/6) clay; weak medium prismatic structure parting to moderate very fine subangular blocky; very hard, very firm; common fine and medium and few coarse roots; many fine and medium pores; many thick clay films on faces of peds; 2 percent, by volume, ironstone pebbles; 5 percent, by volume, reddish yellow (7.5YR 6/8) weathered glauconitic material; few black stains; slightly acid; gradual smooth boundary.

Bt4—35 to 44 inches; red (2.5YR 4/6) clay; weak medium prismatic structure parting to moderate very fine subangular blocky; very hard, very firm; few fine and coarse and common medium roots; common fine and medium pores; many thick clay films on faces of peds; 2 percent, by volume, ironstone pebbles; 15 percent, by volume, reddish yellow (7.5YR 6/8) weathered glauconitic material; few black stains; slightly acid; clear wavy boundary.

C/Bt1—44 to 55 inches; reddish yellow (7.5YR 6/8) weathered glauconitic material (C) and dark red (2.5YR 3/6) clay (Bt); common medium prominent brownish yellow (10YR 6/8), common medium distinct red (2.5YR 4/8), and many medium prominent brownish yellow (10YR 6/6) lithochromic mottles; massive; very hard, very firm; few fine and medium roots; common fine and medium pores; many thick clay films on faces of peds; 2 percent, by volume, ironstone pebbles; few black stains; moderately acid; gradual wavy boundary.

C/Bt2—55 to 76 inches; reddish yellow (7.5YR 6/8) weathered glauconitic material (C) and red (2.5YR 4/6) clay (Bt); massive; very hard, very firm; few fine and medium roots; common fine and medium pores; many thick clay films on faces of peds; 2 percent, by volume, ironstone pebbles; few black stains; moderately acid; gradual wavy boundary.

C/Bt3—76 to 80 inches; reddish yellow (7.5YR 6/8) weathered glauconitic material (C), light yellowish brown (2.5Y 6/4) weathered shale (Bt), and red (2.5YR 4/6) clay; massive; very hard, firm; few fine and medium roots; few fine pores; few thin clay films on faces of peds; 2 percent, by volume, ironstone pebbles; moderately acid.

Range in Characteristics

Solum thickness: 40 to 60 inches
Clay content in the control section: 35 to 50 percent
Redoximorphic features: None
Other distinctive soil features: Up to 1 percent ironstone channers and flags 1/2 inch to 3 inches thick and 3 to 20 inches across on the surface of some pedons
Concentrated minerals: None

A horizon:
- Color—Dusky red, dark reddish brown, red, reddish brown, or dark red
- Texture—Gravelly fine sandy loam or clay loam
- Reaction—Moderately acid to neutral
- Other features—15 to 35 percent, by volume, ironstone pebbles

Bt horizon:
- Color—Dark reddish brown, reddish brown, dark red, or red
- Redoximorphic features—None
- Texture—Clay loam or clay
- Reaction—Very strongly acid to slightly acid
- Other features—2 to 10 percent, by volume, rounded and flat pebbles and ironstone fragments; weathered glauconitic material in shades of brown and yellow in some pedons

C/Bt horizon (and BC or Bt/C horizon, where present):
- Color—Reddish brown, dark red, red, light reddish brown, reddish yellow, yellowish red, or light red (B); brown and yellow (C)
- Texture—Clay, clay loam, or sandy clay loam
- Reaction—Very strongly acid to moderately acid
- Other features—Weathered glauconitic material (C) makes up 20 to 40 percent in the BC and B/C horizons and 55 to 85 percent in the C/B horizon; shale fragments range from 0 to 10 percent

C horizon (where present):
- Color—Brown and yellow
- Texture—Stratified sandy clay loam to clay with fractured discontinuous strata of ironstone, shale, or sandstone
- Reaction—Very strongly acid to moderately acid
- Other features—Loamy and clayey parts are weathered glauconitic material

Rentzel Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landscape: Coastal plains
Landform: Uplands
Parent material: Coastal plains sediments from sandy and loamy marine sediments

Slope range: 0 to 4 percent
Taxonomic class: Loamy, siliceous, thermic Arenic Plinthaquic Paleudults

Typical Pedon

Rentzel loamy fine sand, 0 to 4 percent slopes, in an open field; from the intersection of U.S. Highway 84 and U.S. Highway 259 in Mount Enterprise, 5 miles west on U.S. Highway 84, 0.2 mile north on County Road 3227, 350 feet east of road:

A—0 to 9 inches; brown (10YR 5/3) loamy fine sand; weak fine subangular blocky structure; soft, very friable; common fine and few medium roots; slightly acid; clear smooth boundary.
E—9 to 26 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine subangular blocky structure; soft, very friable; few fine and medium roots; moderately acid; clear wavy boundary.
Bt—26 to 30 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine prominent red (2.5YR 4/6) iron accumulations; moderate medium subangular blocky structure; slightly hard, friable; few fine and medium roots and pores; few thin clay films on faces of peds; few light yellowish brown (10YR 6/4) skeletans along root channels; few fine pebbles; few dark root stains; strongly acid; clear wavy boundary.
Btv1—30 to 37 inches; variegated yellowish brown (10YR 5/8), red (2.5YR 4/6), and light brownish gray (10YR 6/2) sandy clay loam; moderate medium subangular blocky structure; hard, firm; few fine roots; few fine and medium pores; 8 percent, by volume, of plinthite; common thin clay films on faces of peds; very strongly acid; clear wavy boundary.
Btv2—37 to 80 inches; variegated yellowish brown (10YR 5/8), red (2.5YR 4/6), and light brownish gray (10YR 6/2) sandy clay loam; moderate medium subangular blocky structure; hard, firm; few fine roots; 10 percent, by volume, of plinthite; few thin clay films on faces of peds; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 15 to 35 percent
Other distinctive soil features: More than 5 percent, by volume, of plinthite at 30 to 60 inches deep
Concentrated minerals: None

A horizon:
Color—Brown, dark grayish brown, or grayish brown
Redoximorphic features—None
Texture—Loamy fine sand
Reaction—Strongly acid to slightly acid
Other features—None

E horizon:
Color—Light brownish gray, very pale brown, brown, light yellowish brown, grayish brown, pale brown, or light brown
Redoximorphic features—None
Texture—Loamy fine sand
Other features—None
Reaction—Strongly acid to slightly acid
Thickness—Combined thickness of the A and E horizons ranges from 20 to 40 inches

Bt horizon:
Color—Yellowish red, strong brown, reddish yellow, yellowish brown, or brownish yellow
Redoximorphic features—None to common iron accumulations in shades of red or yellow; iron depletions in shades of gray in the upper 5 inches
Texture—Fine sandy loam or sandy clay loam
Reaction—Very strongly acid or strongly acid
Other features—None

Btv horizon:
Color—Yellowish red, strong brown, reddish yellow, yellowish brown, or brownish yellow
Redoximorphic features—Few to many iron depletions in shades of gray and iron accumulations in shades of red; or the horizon is variegated in these colors
Texture—Fine sandy loam or sandy clay loam
Reaction—Very strongly acid or strongly acid
Other features—5 to 15 percent, by volume, of plinthite segregations

Sacul Series

Depth class: Deep to very deep
Drainage class: Moderately well drained
Permeability: Slow
Landscape: Coastal plains
Landform: Uplands
Parent material: Loamy and clayey residuum from soft, stratified sandstone and shale
Slope range: 1 to 3 percent
Taxonomic class: Clayey, mixed, thermic Aquic Hapludults

Typical Pedon

Sacul fine sandy loam, 1 to 3 percent slopes, in an area of woodland; from the junction of Farm Road 839 and Farm Road 1662 in New Salem near Lake Striker, 3.2 miles north on Farm Road 839 to County Road 4221A, 150 feet southeast on County Road 4221A to a pipeline, 200 feet south of pipeline, 50 feet east of pipeline:

A—0 to 3 inches; dark brown (10YR 4/3) fine sandy loam; weak fine subangular blocky structure; soft, very friable; common fine and medium roots; few fine and

medium pores; few fine pebbles; strongly acid; clear smooth boundary.

E—3 to 8 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine subangular blocky structure; soft, very friable; common fine and medium roots; few fine and medium pores; few dark brown spots; few fine pebbles; strongly acid; clear smooth boundary.

Bt1—8 to 24 inches; red (10R 4/6) clay; few fine prominent light yellowish brown (10YR 6/4) iron depletions; moderate medium subangular blocky structure; very hard, very firm; few fine roots and pores; many small shiny pressure faces; many thin clay films on faces of peds; few fine pebbles; very strongly acid; clear smooth boundary.

Bt2—24 to 31 inches; red (10R 4/6) clay; yellowish brown (10YR 5/6) iron accumulations and common medium prominent light brownish gray (10YR 6/2) and few fine distinct pale brown (10YR 6/3) iron depletions; moderate medium subangular blocky structure; very hard, very firm; few fine roots and pores; few small shiny pressure faces; common thin clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt3—31 to 37 inches; variegated red (10R 4/6), light brownish gray (10YR 6/2,) and yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; very hard, very firm; few fine roots and pores; few small shiny pressure faces; few thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

Btg—37 to 53 inches; light brownish gray (10YR 6/2) clay loam; many medium prominent red (10R 4/6) and few fine distinct yellowish brown (10YR 5/6) iron accumulations; moderate medium subangular blocky structure; very hard, very firm; few fine and coarse roots; few fine pores; few small shiny pressure faces; few thin clay films on faces of peds; very strongly acid; clear wavy boundary.

C—53 to 80 inches; grayish brown (10YR 5/2) and brown (10YR 5/3) soft shale and clay loam; common coarse prominent strong brown (7.5YR 5/8) and few medium distinct yellowish brown (10YR 5/8) and light olive brown (2.5Y 5/4) iron accumulations; massive; very hard, very firm; very strongly acid.

Range in Characteristics

Solum thickness: 40 to 70 inches
Clay content in the control section: 45 to 55 percent
Other distinctive soil features: None
Concentrated minerals: 0 to 10 percent, by volume, ironstone pebbles throughout the profile

A horizon:
Color—Dark grayish brown, very dark grayish brown, brown, dark brown, or dark yellowish brown
Redoxymorphic features—None
Texture—Fine sandy loam
Reaction—Very strongly acid to moderately acid
Other features—None

E horizon:
Color—Pale brown, brown, yellowish brown, or light yellowish brown
Redoximorphic features—None
Texture—Fine sandy loam
Reaction—Very strongly acid to moderately acid
Other features—None

Upper Bt horizon:
Color—Red, yellowish red, or dark red
Redoximorphic features—None to common iron depletions in shades of gray and iron accumulations in shades of brown at 12 to 30 inches deep
Texture—Clay or silty clay
Reaction—Very strongly acid or strongly acid
Other features—None

Lower Bt horizon:
Color—Variegated in shades of red, brown, and gray
Redoximorphic features—None to common iron depletions in shades of gray and iron accumulations in shades of brown at 12 to 30 inches deep
Texture—Clay, clay loam, or silty clay
Reaction—Very strongly acid or strongly acid
Other features—None

Btg horizon:
Color—Gray, grayish brown, or light brownish gray
Redoximorphic features—Depleted matrix with iron accumulations in shades of red or brown
Texture—Silty clay, clay, or clay loam
Reaction—Strongly acid to extremely acid
Other features—None

C horizon:
Color—Variegated in shades of red, brown, and gray
Redoximorphic features—None
Texture—Stratified weathered sandstone and shale with textures of silty clay loam, clay loam, and loam
Reaction—Strongly acid to extremely acid
Other features—None

Sawlit Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Landscape: Coastal plains
Landform: Terraces
Parent material: Loamy, wind modified alluvial sediments over clayey alluvium from rivers and streams

Slope range: 0 to 2 percent
Taxonomic class: Fine-loamy, siliceous, thermic Aquic Glossudalfs

Typical Pedon

Sawlit loam, in an area of Sawlit-Sawtown complex, 0 to 2 percent slopes, in an area of native pasture; from Brachfield at the intersection of Farm Road 840 and Farm Road 1798, 2.8 miles northeast on Farm Road 1798, 0.1 mile west on intermound:

Ap—0 to 4 inches; dark brown (10YR 4/3) loam; weak fine subangular blocky structure; slightly hard, very friable; common fine and medium roots; few fine, medium, and coarse pores; common dark brown (7.5YR 4/4) root stains; very strongly acid; clear smooth boundary.

E—4 to 9 inches; brown (10YR 5/3) loam; weak fine subangular blocky structure; slightly hard, very friable; few fine and medium roots and pores; common dark yellowish brown (10YR 4/4) and strong brown (7.5YR 5/8) stains along root channels; light brownish gray (10YR 6/2) thin coatings along some pores and root channels; few dark grayish brown worm casts; very strongly acid; clear smooth boundary.

Bt1—9 to 15 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; hard, friable; few fine and medium roots; common fine and few medium pores; grayish brown (10YR 5/2) coatings along some pores and root channels; few thin clay films on faces of peds; common dark grayish brown worm casts; few medium rounded ironstone pebbles; very strongly acid; clear smooth boundary.

Bt2—15 to 21 inches; yellowish brown (10YR 5/6) loam; common fine and medium distinct strong brown (7.5YR 5/6) iron accumulations and few fine distinct light brownish gray (10YR 6/2) iron depletions; moderate medium subangular blocky structure; very hard, firm; few fine and medium roots and pores; few thin clay films on faces of peds; few dark grayish brown worm casts; few medium rounded ironstone pebbles; very strongly acid; clear smooth boundary.

Bt/E1—21 to 29 inches; yellowish brown (10YR 5/6) clay loam; common fine and medium distinct light brownish gray (10YR 6/2) iron depletions and many fine and medium prominent yellowish red (5YR 4/6) and few fine prominent red (2.5YR 4/6) iron accumulations; moderate coarse prismatic structure parting to moderate medium subangular blocky; very hard, firm; few fine and medium roots; common fine and medium and few coarse pores; common thin clay films on faces of prisms; common medium rounded ironstone pebbles; 15 percent, by volume, streaks, pockets, and coatings of albic material on surfaces of prisms (E); very strongly acid; clear smooth boundary.

Bt/E2—29 to 36 inches; yellowish brown (10YR 5/6) clay loam; many coarse prominent red (2.5YR 4/6) iron accumulations and grayish brown (10YR 5/2) iron depletions; moderate coarse prismatic structure parting to moderate medium subangular blocky; very hard, very firm; few fine roots and pores; thin common clay films on faces of prisms; 20 percent, by volume, streaks, pockets, and coatings of albic material along surfaces of prisms (E); very strongly acid; clear smooth boundary.

2Bt—36 to 80 inches; yellowish brown (10YR 5/6) clay; many medium and coarse prominent red (2.5YR 4/6) iron accumulations and grayish brown (10YR 5/2) iron depletions; moderate medium angular blocky structure; very hard, very firm; few fine roots; few pressure faces; common thin clay films on faces of some peds; about 3 percent, by volume, streaks, coatings, and pockets of albic material; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 25 to 35 percent
Other distinctive soil features: Clayey discontinuity at 26 to 40 inches deep
Concentrated minerals: None

A or Ap horizon:
- Color—Very dark grayish brown, dark brown, dark grayish brown, or brown
- Redoximorphic features—None to few iron stains along root channels in shades of brown or red
- Texture—Loam
- Reaction—Very strongly acid to moderately acid, unless limed
- Other features—None to few rounded ironstone and/or siliceous pebbles

E horizon:
- Color—Brown, yellowish brown, pale brown, light yellowish brown, or very pale brown
- Redoximorphic features—None to common iron stains in shades of brown or red
- Texture—Fine sandy loam, very fine sandy loam, or loam
- Reaction—Very strongly acid to moderately acid, unless limed
- Other features—None to few rounded ironstone and/or siliceous pebbles
- Thickness—Combined thickness of the A and E horizons ranges from 7 to 20 inches

Bt horizon:
- Color—Strong brown, reddish yellow, yellowish brown, or brownish yellow
- Redoximorphic features—Few or common iron depletions in shades of gray and iron accumulations

in shades of red, yellow, and brown at 7 to 30 inches deep are mainly in the lower part
Texture—Loam, sandy clay loam, or clay loam
Reaction—Very strongly acid to moderately acid
Other features—0 to 4 percent, by volume, rounded ironstone pebbles

Bt/E horizon:
Color—Strong brown, reddish yellow, yellowish brown, or brownish yellow
Redoximorphic features—Iron depletions in shades of gray and iron accumulations in shades of red and brown
Texture—Loam, sandy clay loam, or clay loam
Reaction—Very strongly acid to moderately acid
Other features—15 to 35 percent, by volume, streaks, pockets, and coatings of albic material (E); 0 to 15 percent brittle peds; 0 to 4 percent, by volume, rounded ironstone pebbles

2Bt horizon:
Color—Gray, grayish brown, light gray or light brownish gray, yellowish brown, brownish yellow, pale brown, light yellowish brown, or brown
Redoximorphic features—Few to many iron accumulations in shades of red, yellow, and brown and iron depletions in shades of gray at 7 to 30 inches deep; or the horizon is variegated in these colors
Texture—Clay loam or clay with 35 to 50 percent clay
Reaction—Extremely acid to strongly acid
Other features—0 to 4 percent, by volume, streaks, coatings, and pockets of albic material; crystals of gypsum and/or fine masses of barite range from none to common

2BC horizon (where present):
Color—Gray, grayish brown, light gray or light brownish gray, yellowish brown, brownish yellow, pale brown, light yellowish brown, or brown
Redoximorphic features—Few to many iron accumulations in shades of red, yellow, and brown and iron depletions in shades of gray at 7 to 30 inches deep; or the horizon is variegated in these colors
Texture—Clay loam with less than 35 percent clay
Reaction—Extremely acid to strongly acid
Other features—0 to 4 percent, by volume, streaks, coatings, and pockets of albic material; crystals of gypsum and/or fine masses of barite range from none to common

Sawtown Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plains
Landform: Terraces
Parent material: Loamy, wind modified alluvial sediments over clayey alluvium from rivers and streams
Slope range: 0 to 2 percent
Taxonomic class: Fine-loamy, siliceous, thermic Typic Glossudalfs

Typical Pedon

Sawtown very fine sandy loam, in an area of Sawlit-Sawtown complex, 0 to 2 percent slopes, in an area of native pasture; from Brachfield at the intersection of Farm Road 840 and Farm Road 1798, 2.8 miles northeast on Farm Road 1798, 0.1 mile west on mound:

Ap—0 to 9 inches; dark brown (10YR 4/3) very fine sandy loam; weak fine subangular blocky structure; hard, very friable; common fine and medium roots; few fine and medium pores; few fine and medium iron-manganese concretions; few rounded ironstone pebbles; very strongly acid; clear smooth boundary.

E—9 to 23 inches; yellowish brown (10YR 5/4) very fine sandy loam; weak fine subangular blocky structure; hard, very friable; common fine and medium roots; few fine and medium pores; few fine and medium iron-manganese concretions; few medium rounded ironstone pebbles; very strongly acid; clear smooth boundary.

Bt1—23 to 31 inches; strong brown (7.5YR 5/6) loam; few medium distinct yellowish red (5YR 5/6) iron accumulations; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, friable; common fine and few medium roots and pores; few thin clay films on surfaces of peds; few fine and medium iron-manganese concretions; few medium rounded ironstone pebbles; few dark brown worm casts; very strongly acid; clear smooth boundary.

Bt2—31 to 49 inches; brownish yellow (10YR 6/6) clay loam; common fine and medium prominent yellowish red (5YR 5/6) iron accumulations; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm; common fine and few medium roots; common medium pores; few thin clay films on faces of peds; about 4 percent, by volume, streaks, pockets, and coatings of albic material; few fine and medium iron-manganese concretions; few rounded ironstone pebbles; about 10 percent of the matrix is slightly brittle; very strongly acid; clear smooth boundary.

2Btg/E—49 to 80 inches; light brownish gray (10YR 6/2) clay; many medium and coarse prominent dark red (2.5YR 3/6) and yellowish brown (10YR 5/8) iron accumulations; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard,

Figure 26.—Profile of Redsprings gravelly fine sandy loam.

Figure 27.—Profile of Tenaha loamy fine sand.

firm; few fine roots and pores; few thin clay films on faces of prisms; about 20 percent, by volume, streaks, pockets, and coatings of albic material (E); few medium masses of iron-manganese; very strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 18 to 27 percent
Other distinctive soil features: Clayey discontinuity at 40 to 60 inches deep
Concentrated minerals: None

A or Ap horizon:
Color—Brown, dark grayish brown, very dark grayish brown, grayish brown, or dark brown
Redoximorphic features—None
Texture—Very fine sandy loam
Reaction—Very strongly acid to slightly acid
Other features—Very dark grayish brown surface layers are less than 7 inches thick; none to few rounded ironstone or siliceous pebbles

E horizon:
Color—Brown, grayish brown, pale brown, light brownish gray, very pale brown, pinkish gray, light brown, pink, light gray, light yellowish brown, or yellowish brown
Redoximorphic features—None
Texture—Fine sandy loam, very fine sandy loam, or loam
Reaction—Very strongly acid to moderately acid
Other features—None to few rounded ironstone or siliceous pebbles
Thickness—Combined thickness of the A and E horizons ranges from 15 to 35 inches

Bt horizon:
Color—Brown, light yellowish brown, brownish yellow, strong brown, reddish yellow, yellow, or yellowish brown
Redoximorphic features—None to common iron accumulations in shades of red, brown, or yellow
Texture—Loam, clay loam, or sandy clay loam
Reaction—Extremely acid to moderately acid
Other features—None to 15 percent brittle peds; 0 to 4 percent, by volume, rounded ironstone or siliceous pebbles; 0 to 4 percent, by volume, streaks, pockets, and coatings of albic material

Bt/E horizon (where present):
Color—Brown, light yellowish brown, brownish yellow, strong brown, reddish yellow, yellow, or yellowish brown
Redoximorphic features—None to common iron accumulations in shades of red, brown, or yellow
Texture—Loam, clay loam, or sandy clay loam
Reaction—Extremely acid to moderately acid
Other features—None to 15 percent brittle peds; 0 to 4 percent, by volume, rounded ironstone or siliceous pebbles; 5 to 15 percent, by volume, streaks, pockets, and coatings of albic material (E)

2Btg/E horizon (and 2Bt/E horizon, where present):
Color—Gray, grayish brown, brown, light gray, or light brownish gray
Redoximorphic features—Few to many iron depletions in shades of gray and iron accumulations in shades of red, brown, or yellow at 40 to 60 inches deep; or the horizon is variegated in these colors
Texture—Clay loam or clay with 35 to 50 percent clay
Reaction—Extremely acid to slightly acid
Other features—15 to 25 percent, by volume, streaks, pockets, and coatings of albic material (E); gypsum crystals range from none to common

2BC or 2BCg horizon (where present):
Color—Gray, grayish brown, brown, light gray, or light brownish gray
Redoximorphic features—Few to many iron depletions in shades of gray and iron accumulations in shades of red, brown, or yellow at 40 to 60 inches deep; or the horizon is variegated in these colors
Texture—Clay loam with less than 35 percent clay
Reaction—Extremely acid to slightly acid
Other features—15 to 25 percent, by volume, streaks, pockets, and coatings of albic material (E); gypsum crystals range from none to common

Tenaha Series

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plains
Landform: Uplands
Parent material: Coastal plains sediments from loamy marine deposits
Slope range: 5 to 15 percent
Taxonomic class: Loamy, siliceous, thermic Arenic Hapludults

Typical Pedon

Tenaha loamy fine sand, 5 to 15 percent slopes (fig. 27), in an area of woodland; from the intersection of Texas Highway 43 and Texas Highway 149 in Tatum, 0.2 mile north on Texas Highway 149, 1 mile north on County Road 2210, 1.3 miles east and north on County Road 2218; 300 feet west of road:

A—0 to 4 inches; dark grayish brown (10YR 4/2) loamy fine

sand; weak medium granular structure; soft, very friable; few medium and coarse roots; strongly acid; clear smooth boundary.
E—4 to 35 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak medium granular structure; soft, very friable; few fine and medium roots; few very dark grayish brown root stains; moderately acid; clear smooth boundary.
Bt—35 to 44 inches; yellowish brown (10YR 5/8) sandy clay loam; few coarse pale brown (10YR 6/3) spots; weak medium subangular blocky structure; very hard, friable; few medium roots; few fine and medium pores; few thin clay films on faces of peds; strongly acid; clear smooth boundary.
C—44 to 65 inches; weathered pale brown (10YR 6/3) sandstone and fine sandy loam; few yellowish brown (10YR 5/6) loamy fine sand strata and spots; soft, very friable; strongly acid.

Range in Characteristics

Solum thickness: 40 to 60 inches
Clay content in the control section: 20 to 35 percent
Redoximorphic features: None
Other distinctive soil features: None
Concentrated minerals: None to few ironstone pebbles

A horizon:
Color—Very dark grayish brown, dark grayish brown, grayish brown, brown, yellowish brown, dark brown, or dark yellowish brown
Texture—Loamy fine sand
Reaction—Strongly acid or moderately acid, unless limed
Other features—None

E horizon:
Color—Pale brown, brown, light yellowish brown, or light brown
Texture—Loamy fine sand
Other features—None
Reaction—Strongly acid or moderately acid, unless limed
Thickness—Combined thickness of the A and E horizons ranges from 20 to 40 inches

Bt horizon:
Color—Yellowish red, strong brown, or yellowish brown; or the horizon is variegated in these colors
Texture—Sandy clay loam or loam
Reaction—Very strongly acid or strongly acid
Other features—Common pockets of gray or brown weathered shale in the lower part

BC horizon (where present):
Color—Shades of red, brown, and yellow; or the horizon is variegated in these colors
Texture—Sandy clay loam or fine sandy loam
Reaction—Very strongly acid or strongly acid
Other features—Discontinuous strata or pockets of grayish weathered shale range from 0 to 10 percent; few mica flakes in some pedons

C horizon:
Color—Shades of red, yellow, or brown
Texture—Soft, stratified sandstone with texture of sandy clay loam to fine sandy loam
Reaction—Very strongly acid or strongly acid
Other features—Thin layers of gray shale and more loamy material in some pedons

Tonkawa Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Landscape: Coastal plains
Landform: Uplands
Parent material: Coastal plains sediments from sandy marine deposits
Slope range: 0 to 35 percent
Taxonomic class: Thermic, coated Typic Quartzipsamments

Typical Pedon

Tonkawa fine sand, 0 to 8 percent slopes (fig. 28), in a forest clearcut area; from the intersection of U.S. Highway 259 and U.S. Highway 84 about 7 miles southeast of Mount Enterprise, 7.2 miles south on U.S. Highway 259 to Farm Road 1087, 4.6 miles east on Farm Road 1087 to Camp Tonkawa crossing, 1.2 miles north on a county road, 75 feet east of road:

A—0 to 12 inches; dark grayish brown (10YR 4/2) fine sand; weak fine granular structure; soft, very friable; common fine and medium roots; strongly acid; clear smooth boundary.
Bw1—12 to 32 inches; brownish yellow (10YR 6/6) fine sand; weak coarse and very coarse prismatic structure parting to single grained; soft, very friable; common fine and few medium and coarse roots; common krotovinas; very strongly acid; diffuse smooth boundary.
Bw2—32 to 68 inches; reddish yellow (7.5YR 6/8) fine sand; few very pale brown (10YR 7/3) spots; weak coarse and very coarse prismatic structure parting to single grained; soft, very friable; few fine and medium roots; very strongly acid; gradual smooth boundary.
Bw3—68 to 80 inches; very pale brown (10YR 7/4) and yellow (10YR 7/6) fine sand; few yellowish red (5YR 5/8) spots; weak coarse and very coarse prismatic structure parting to single grained; soft, very friable;

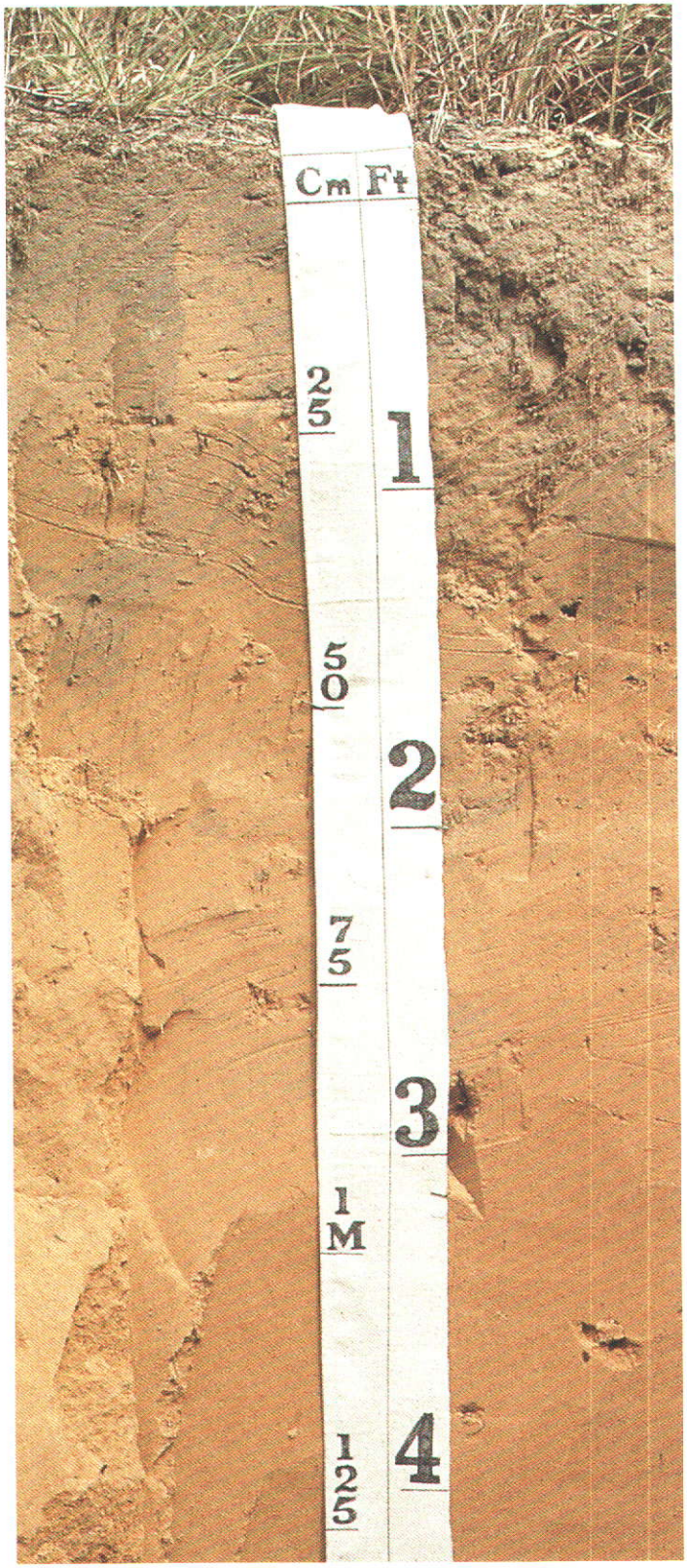

Figure 28.—Profile of Tonkawa fine sand.

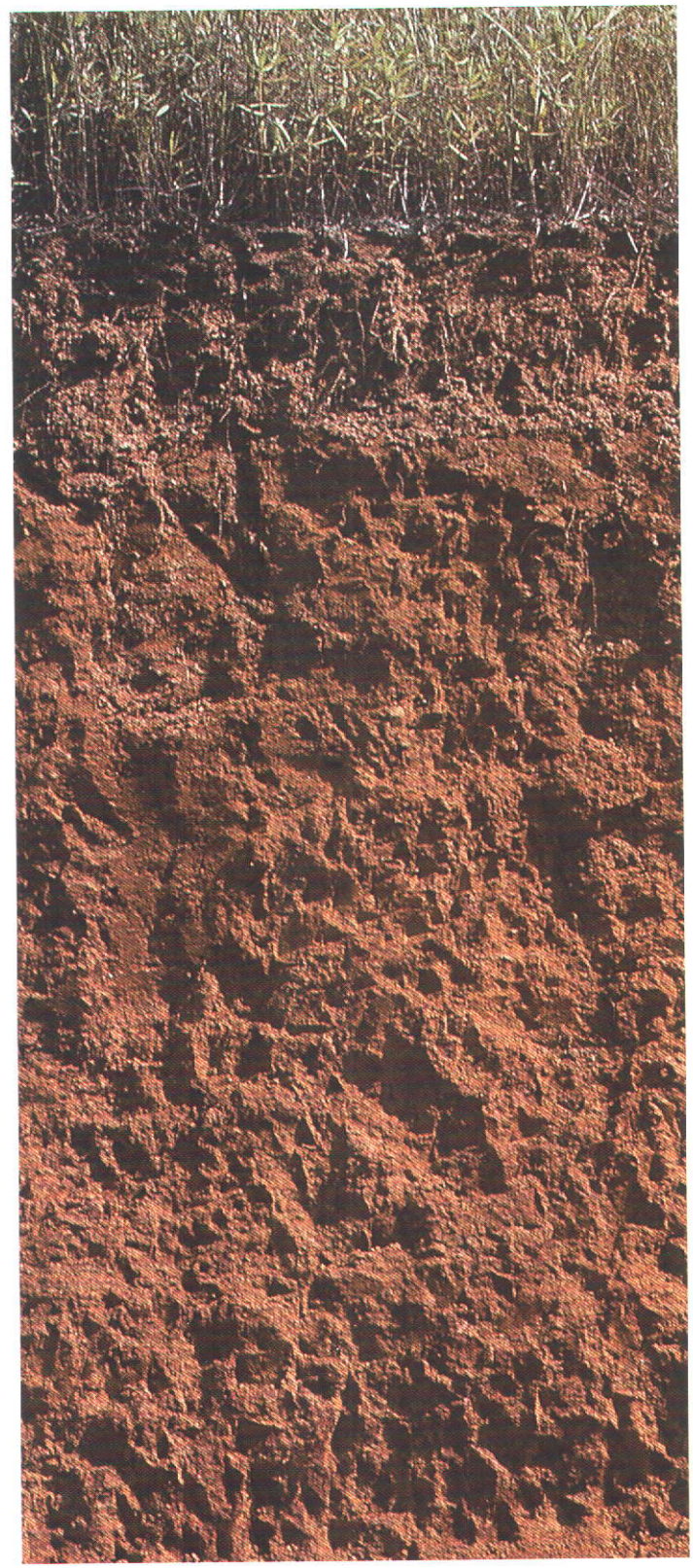

Figure 29.—Profile of Ulto fine sandy loam.

few fine and medium roots; few fine ironstone pebbles; very strongly acid.

Range in Characteristics

Solum thickness: More than 60 inches
Clay content in the control section: 2 to 8 percent
Redoximorphic features: None
Other distinctive soil features: Few very thin lamellae at more than 60 inches deep
Concentrated minerals: None

A horizon:
Color—Very dark grayish brown, brown, dark grayish brown, or grayish brown
Texture—Fine sand
Reaction—Extremely acid to moderately acid
Other features—None

Bw horizon:
Color—Yellowish brown, brownish yellow, yellow, reddish yellow, very pale brown, or strong brown
Texture—Fine sand
Reaction—Extremely acid to moderately acid in the upper part and extremely acid to strongly acid in the lower part
Other features—Few very thin lamellae in shades of brown and red in some pedons which appear to be mainly enrichment of iron rather than clay; none to few ironstone pebbles

C horizon (where present):
Color—Brown, yellowish brown, pale brown, light yellowish brown, or very pale brown
Texture—Fine sand
Reaction—Extremely acid to strongly acid
Other features—Few ironstone pebbles in some pedons

Ulto Series

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plains
Landform: Uplands
Parent material: Loamy residuum from stratified glauconitic material
Slope range: 1 to 3 percent
Taxonomic class: Fine-loamy, siliceous, thermic Ultic Hapludalfs

Typical Pedon

Ulto fine sandy loam, 1 to 3 percent slopes (fig. 29), in a pasture; from the intersection of U.S. Highway 84 and Farm Road 2753 west of Mount Enterprise, 1.95 miles west on U.S. Highway 84, 2.1 miles north and east on County Road 4245, 750 feet north of road:

A1—0 to 7 inches; dark brown (7.5YR 3/4) fine sandy loam; moderate medium subangular blocky structure; slightly hard, very friable; common fine and medium roots; few fine and medium pores; few fine ironstone pebbles; strongly acid; clear smooth boundary.
A2—7 to 12 inches; brown (7.5YR 4/4) fine sandy loam; moderate medium subangular blocky structure; slightly hard, very friable; common fine and medium roots; few fine and medium pores; few fine ironstone pebbles; strongly acid; clear wavy boundary.
Bt1—12 to 21 inches; yellowish red (5YR 4/6) fine sandy loam; moderate medium subangular blocky structure; hard, friable; few fine and medium pores; common brown (7.5YR 4/4) worm casts; few fine ironstone pebbles; few thin clay films on faces of peds; strongly acid; gradual smooth boundary.
Bt2—21 to 36 inches; yellowish red (5YR 4/6) clay loam; common fine and medium distinct strong brown (7.5YR 5/6) iron accumulations; moderate medium subangular blocky structure; very hard, firm; few fine and medium roots; few fine pores; common fine ironstone pebbles; few thin clay films on faces of peds; moderately acid; gradual smooth boundary.
Bt3—36 to 42 inches; strong brown (7.5YR 4/6) clay loam; common medium and coarse prominent red (2.5YR 4/6) iron accumulations; few fine strong brown (7.5YR 5/8) remnants of weathered glauconitic material; moderate medium subangular blocky structure; very hard, firm; few fine roots and pores; common fine ironstone pebbles; 2 percent, by volume, of plinthite; few thin clay films on faces of peds; intermittent layers of ironstone ½ inch to 2 inches thick; moderately acid; gradual smooth boundary.
BCt—42 to 56 inches; yellowish red (5YR 5/8) sandy clay loam; common medium distinct red (2.5YR 4/8) iron accumulations; common medium remnants of strong brown (7.5YR 5/8) weathered glauconitic material; weak medium subangular blocky structure; very hard, firm; few fine roots and pores; few fine ironstone pebbles; few thin clay films on faces of peds; few mica flakes; very strongly acid; gradual wavy boundary.
C—56 to 80 inches; red (2.5YR 4/8) weakly consolidated sandstone and sandy clay loam; common coarse remnants of strong brown (7.5YR 5/8) weathered glauconitic material; massive; hard, friable; few spots and pockets of pale brown (10YR 6/3) clean sand; few light brownish gray (10YR 6/2) discontinuous shale strata less than 1 inch thick; few mica flakes; very strongly acid.

Range in Characteristics

Solum thickness: 40 to 60 inches

Clay content in the control section: 20 to 35 percent
Other distinctive soil features: Clay content decreases by 20 percent of the maximum at less than 60 inches deep
Concentrated minerals: Up to 5 percent iron-manganese concretions

A horizon:
Color—Dark reddish brown, reddish brown, dark yellowish brown, yellowish brown, dark brown, and brown
Redoximorphic features—None
Texture—Fine sandy loam
Reaction—Strongly acid to slightly acid
Other features—0 to 10 percent, by volume, ironstone pebbles

Upper Bt horizon:
Color—Yellowish red, reddish yellow, dark yellowish brown, yellowish brown, brownish yellow, strong brown, and reddish yellowish
Redoximorphic features—Few or common iron accumulations in shades of red and brown
Texture—Fine sandy loam, loam, or sandy clay loam
Reaction—Very strongly acid to moderately acid
Other features—Yellowish and brownish weathered glauconitic material range from none to common

Lower Bt horizon:
Color—Yellowish red, reddish yellow, dark yellowish brown, yellowish brown, brownish yellow, strong brown, and reddish yellowish
Redoximorphic features—Few or common iron accumulations in shades of red and brown
Texture—Sandy clay loam or clay loam
Reaction—Very strongly acid to moderately acid
Other features—Yellowish and brownish weathered glauconitic material and discontinuous ironstone or glauconitic ironstone layers and fragments ½ inch to 2 inches thick range from few or common; ironstone channers range from few or common in some pedons

BCt horizon:
Color—Yellowish red, reddish yellow, red, and light red
Redoximorphic features—None
Texture—Sandy loam or sandy clay loam
Reaction—Very strongly acid to moderately acid
Other features—Weathered glauconitic material in shades of brown and yellow range from common or many; thin grayish discontinuous shale and brownish glauconitic ironstone strata range from 0 to 5 percent; ironstone channers range from none to common

C horizon:
Color—Variegated in shades of brown, yellow, red, and gray
Redoximorphic features—None
Texture—Stratified weakly consolidated sandstone and shale with texture of fine sandy loam or sandy clay loam; spots and strata of clay loam or clay in many pedons
Reaction—Very strongly acid to moderately acid
Other features—Fractured discontinuous strata of glauconitic ironstone and sandstone are common in most pedons; roots penetrate the material but are mainly concentrated along fractures

Woden Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landscape: Coastal plains
Landform: Uplands
Parent material: Coastal plains sediments from loamy marine deposits
Slope range: 1 to 3 percent
Taxonomic class: Coarse-loamy, siliceous, thermic Typic Paleudalfs

Typical Pedon

Woden fine sandy loam, 1 to 3 percent slopes, in a pasture; from the intersection of U.S. Highway 259 and Texas Highway 315 in Mount Enterprise, 1.25 miles northeast on Texas Highway 315, 1.4 miles north on County Road 3153, 100 feet east of road:

Ap—0 to 11 inches; brown (7.5YR 4/4) fine sandy loam; weak fine subangular blocky structure; soft, very friable; many fine and medium roots; few ironstone pebbles; strongly acid; clear smooth boundary.
Bt1—11 to 27 inches; red (2.5YR 4/6) fine sandy loam; few fine faint yellowish red (5YR 5/6) lithochromic mottles; weak medium subangular blocky structure; slightly hard, very friable; common fine and medium roots; few fine and medium pores; few clay coats and bridges on sand grains; few fine ironstone pebbles; strongly acid; gradual smooth boundary.
Bt2—27 to 55 inches; red (2.5YR 4/6) fine sandy loam; few fine distinct reddish yellow (5YR 6/6) lithochromic mottles; weak medium subangular blocky structure; hard, very friable; common fine and medium roots and pores; few clay coats and bridges on sand grains; few fine ironstone pebbles; moderately acid; clear smooth boundary.
Bt3—55 to 80 inches; yellowish red (5YR 5/6) fine sandy loam; weak medium subangular blocky structure;

slightly hard, very friable; few fine and medium roots and pores; few clay coats and bridges on sand grains; few spots of clean sand grains; few fine angular ironstone pebbles; strongly acid.

Range in Characteristics

Solum thickness: More than 80 inches
Clay content in the control section: 8 to 18 percent
Other distinctive soil features: None
Concentrated minerals: None to few ironstone pebbles throughout the profile

A or Ap horizon:
Color—Brown, reddish brown, dark reddish brown, dark grayish brown, or dark brown
Redoximorphic features—None
Texture—Fine sandy loam
Reaction—Strongly acid to slightly acid, unless limed
Other features—None

E horizon (where present):
Color—Light brown, brown, pale brown, or light yellowish brown
Redoximorphic features—None
Texture—Fine sandy loam or loam
Reaction—Strongly acid to slightly acid, unless limed
Other features—None

Bt horizon:
Color—Red or yellowish red
Redoximorphic features—None to few lithochromic mottles in shades of red, yellow, and brown
Texture—Fine sandy loam or loam
Reaction—Strongly acid to slightly acid
Other features—Spots of clean sand grains range from none to common

Woodtell Series

Depth class: Deep
Drainage class: Well drained
Permeability: Very slow
Landscape: Coastal plains
Landform: Uplands
Parent material: Coastal plains sediments from acid marine deposits
Slope range: 1 to 15 percent
Taxonomic class: Fine, smectitic, thermic Vertic Hapludalfs

Typical Pedon

Woodtell loam, 1 to 3 percent slopes, in an area of woodland; from the junction of U.S. Highway 79 and County Road 3107 about 10 miles east of Henderson, 0.9 mile south and east on County Road 3107, 150 feet west of road:

A—0 to 6 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; soft, very friable; few roots of all sizes; few fine and medium pores; few fine ironstone pebbles; very strongly acid; clear smooth boundary.
Bt1—6 to 18 inches; red (2.5YR 4/6) clay; common fine and medium prominent light yellowish brown (10YR 6/4) iron depletions; moderate medium subangular blocky structure; very hard, firm; few roots and pores of all sizes; common small pressure faces; many thin clay films on faces of peds; very strongly acid; clear smooth boundary.
Bt2—18 to 28 inches; red (2.5YR 4/6) clay; yellowish brown (10YR 5/6) iron accumulations and common fine and medium prominent light yellowish brown (10YR 6/4) iron depletions; moderate medium subangular blocky structure; very hard, firm; few fine and coarse roots; few fine pores; common small pressure faces; many thin clay films on faces of peds; very strongly acid; clear wavy boundary.
Btss1—28 to 46 inches; red (2.5YR 4/6) clay; many medium prominent light brownish gray (10YR 6/2) iron depletions and common fine and medium prominent yellowish brown (10YR 5/6) iron accumulations; moderate medium subangular blocky structure; very hard, firm; few fine roots and pores; common small slickensides and pressure faces; few thin clay films on faces of peds; very strongly acid; clear wavy boundary.
Btss2—46 to 52 inches; variegated light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) clay; few fine and medium distinct yellowish red (5YR 5/8) and red (2.5YR 4/8) iron accumulations; weak medium subangular blocky structure; very hard, firm; few fine roots; common small slickensides and pressure faces; few thin clay films on faces of peds; few mica flakes; few small spots of white materials; very strongly acid; clear wavy boundary.
C—52 to 64 inches; light brownish gray (2.5Y 6/2) unconsolidated shale and clay loam; few yellowish brown (10YR 5/6) and light brownish yellow (2.5Y 6/4) strata; massive, parting along bedding planes; hard, firm; moderately acid.

Range in Characteristics

Solum thickness: 40 to 60 inches
Clay content in the control section: 40 to 60 percent
Other distinctive soil features: The COLE ranges from .09 to 0.14 in the upper 20 inches in the Bt horizon
Concentrated minerals: Few or common white masses and mica in the lower part of the solum in some pedons

A horizon:
Color—Very dark grayish brown, dark grayish brown, grayish brown, dark brown, brown, yellowish brown, or dark yellowish brown

Redoximorphic features—None
Texture—Loam
Reaction—Very strongly acid to moderately acid
Other features—None

E horizon (where present):
Color—Brown, light brown, yellowish brown, pale brown, or light yellowish brown
Redoximorphic features—None
Texture—Loam or fine sandy loam
Reaction—Very strongly acid to slightly acid
Other features—None

Upper Bt horizon:
Color—Red or yellowish red
Redoximorphic features—None to many iron depletions in shades of gray and iron accumulations in shades of red and brown at 12 to 30 inches deep
Texture—Clay
Reaction—Very strongly acid or strongly acid
Other features—Few or common pressure faces and small non-intersecting slickensides

Lower Bt horizon:
Color—Variegated in shades of red, brown, yellow, or gray
Redoximorphic features—None to many iron depletions in shades of gray and iron accumulations in shades of red and brown at 12 to 30 inches deep
Texture—Clay or clay loam
Reaction—Very strongly acid to moderately acid
Other features—Few or common pressure faces and small non-intersecting slickensides

Btss horizon:
Color—Red, reddish brown, or yellowish red
Redoximorphic features—Few to many iron depletions in shades of gray and iron accumulations in shades of red and brown at 12 to 30 inches deep; or the horizon is variegated in these colors
Texture—Clay or clay loam
Reaction—Very strongly acid to moderately acid
Other features—Intersecting slickensides

BC horizon (where present):
Color—Variegated in shades of red, brown, yellow, and gray
Redoximorphic features—Common or many iron depletions in shades of gray and iron accumulations in shades of red and brown at 12 to 30 inches deep
Texture—Clay or clay loam
Reaction—Very strongly acid to slightly acid
Other features—None

C horizon:
Color—Gray or variegated in shades of gray, brown, yellow, red, and olive
Texture—Stratified sandstone and shale or siltstone with textures of clay loam or clay
Reaction—Very strongly acid to neutral; however, some pedons range to slightly alkaline

Formation of the Soils

In this section, the factors of soil formation are described and related to the formation of the soils in Rusk County. In addition, the processes of soil formation and the surface geology of the county are described.

Factors of Soil Formation

Soil is formed by the action of soil-forming processes on material deposited or accumulated by geologic forces. The characteristics of a soil depend on the physical and mineralogical composition of the parent material, the climate under which the parent material has accumulated and has existed since accumulation, the plant and animal life on and in the soil, the relief or lay of the land, and the length of time the forces of soil formation have acted on the soil material. All of the factors are important in the formation of any soil, but the influence of each varies from place to place.

Parent Material

Parent material is the unconsolidated mass in which soil forms. The characteristics of the material determine the chemical and mineralogical composition of the soil. The geology of the parent material in Rusk County is described in the section "Surface Geology."

Climate

Rusk County has a warm, 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 influences the development of the soils in the county. The high humidity and the rainfall causes 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 between the soils, however, cannot be attributed to the climate because it is relatively uniform throughout the county.

Plant and Animal Life

The vegetation under which a soil forms influences soil properties, such as color, structure, reaction, and content and distribution of organic matter. Vegetation extracts water from the soil, recycles nutrients, and adds organic matter to the soil. Gases derived from root respiration combine with water to form acids that influence the weathering of minerals. Because of a lower content of organic matter, soils that formed under forest vegetation are generally lighter colored than those that formed under grasses.

Bacteria, fungi, and many other micro-organisms decompose organic matter and release nutrients to growing plants. They influence the formation of soil structure. Soil properties, such as drainage, temperature, and reaction, influence the type of micro-organisms that live in the soil. Fungi are generally more active in the more acid soils, while bacteria are more active in the less acid and more alkaline soils.

Earthworms, insects, and small burrowing animals mix the soil and create small channels that aid in the soil aeration and water movement. Earthworms help to incorporate crop residue or other organic matter into the soil. The organic matter improves tilth. In areas that are well populated with earthworms, the leaf litter that accumulates on the soil in the fall is generally incorporated into the soil by the following spring. If the earthworm population is low, part of the leaf fall can remain on the surface for several years.

Human activity can significantly influence soil formation. The clearing of the native forests followed by continuous farming may drastically change activities within the soil. Cultivation generally accelerates erosion on sloping soils, affects soil structure and compacting, and lowers the content of organic matter. Drainage of wet soils changes soil formation. Fertilizers, lime, and pesticides also affect soil formation. Developing land for urban uses or for mining significantly influences soil development.

Relief

Relief affects soil formation through its influence on drainage, infiltration, and plant cover. It also strongly

influences how much water percolates through the soil. Soils on nearly level terraces, such as Derly soils, have poor drainage. The strongly sloping to steep Cuthbert soils have a thinner solum than the nearby Bowie soils which are very deep and gently sloping. On steeper slopes, water runs off faster, less moisture infiltrates into the soils, and plant cover is thinner.

Although most of the soils in the county are gently sloping to steep, the development of shallow soils as a result of relief is 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 deeply developed.

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, however, soils that do not have definite horizons are young or immature. Soils that have well-defined horizons are old or mature.

The soils in the county range from young to old. Laneville, Mattex, Iulus, and Dreka soils are on flood plains and have little soil horizon development. Bowie, Cuthbert, and Kirvin soils in the uplands are older soils that have distinct horizon development and have little resemblance to the original parent material.

Processes of Soil Formation

Soil forms through complex processes that are grouped into four general categories. These are additions, removals, transfers, and transformations. These processes affect soil formation in differing degrees and account for the presence of soil layers or horizons.

The accumulation of organic matter in the A horizon of the soils in Rusk County is an example of an addition. This accumulation is the main reason for the dark color of the A horizon. The color of the raw parent material is uniform with increasing depth.

The leaching of lime or bases from the upper few feet in many of the soils is an example of removal. The parent materials of these soils contain more lime or bases than the soil itself. This indicates leaching of the soil profile by percolating water.

The movement of clay and other materials from the A horizon to the B horizon is an example of transfer. The E horizon is a zone of maximum eluviation, or loss. The B horizon is a zone of illuviation, or gain. Cuthbert, Lilbert, and many other soils have maximum clay content in the B horizon. An indication of a transfer of clay is thin clay films in pores and on faces of peds.

An example of a transformation is the reduction of ferrous iron. This process takes place under wet, saturated conditions in which there is no molecular oxygen. Gleying, or the reduction of iron, is evident in Derly and Mollville soils which have a dominantly gray subsoil. The gray color indicates the presence of reduced iron, which in turn implies wetness. Reduced iron is soluble, but it commonly has been moved only short distances in the soils in the survey area, stopping in a lower part of the horizon where it originated or in an underlying horizon. Part of this iron can be reoxidized and segregated in the form of stains, concretions, or bright yellow and red accumulations.

Surface Geology

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Rusk County lies in the western Gulf geomorphic province *(19, 34)* in which the surface formations dip regionally at very low angles to the Gulf of Mexico. The geology of the area is depicted on the adjacent Tyler and Palestine sheets of the geologic atlas of Texas *(5, 6)* and on the geologic map of Texas *(7)*.

Tertiary outcrops, "bedrock" formations, are Paleocene to Eocene in age. Their ages range from about 65 million to about 37 million years before the present, respectively. Quaternary surficial deposits, Pleistocene to Holocene in age, parallel the major streams as terraces and flood plains, respectively. The maximum age of Quaternary deposits is about 2.6 million years old.

The oldest rock in the county is in the Paleocene-Eocene age Wilcox Group. The lower part of the Eocene age Claiborne Group overlies the Wilcox Group. Claiborne Group formations cropping out in Rusk County, from oldest to youngest, are the Carrizo Sand, Reklaw Formation, Queen City Sand, Weches Formation, and Sparta Sand.

The Tertiary formations record a sequence of marine transgressions and regressions in Rusk County. A transgression results in a decrease in land area and an increase in marine sediment deposition. A regression is a retreat of the sea. A regression results in greater land area and an increase in deltaic and fluvial deposition. Most of the Wilcox Group was deposited under regressive conditions; the exception is a partially preserved transgressive stratum at the top of the group. The lower part of the Reklaw Formation, the Newby Member, is transgressive; the upper part, the Marquez Member, is regressive. The near shore, shallow-water Sparta Sand and Weches Formation represent the last transgressions followed by the regressive Sparta Sand *(1, 9)*.

Most of the county is on the eastern flank of the Sabine Uplift *(11, 14, 22)*. The Sabine Uplift is a regional structure dome. The highest part of the uplift, in Rusk County, is near the center of the eastern county line. The uplift has

elevated and exposed large areas of the older Wilcox Group and Carrizo Sand as inliers. The younger formations are exposed to the northwest, southwest, and south and dip away from the Sabine Uplift towards the East Texas Basin.

The Mount Enterprise Fault Zone, an east-west trending system of normal faults, crosses the southern part of the county. The general trend of the fault system parallels the vicinity of U.S. Highway 84. Most of the faults are usually mapped in the East Texas Basin area *(6, 11, 12, 26)*. Many faults are downthrown to the south. Other faults are downthrown to the north. One effect of the faulting is an anomalous juxtaposition of formations. The older Wilcox Group may be placed at the surface opposite the younger Sparta Sand or Weches Formation with no intervening formations. Most of the faults lie within the Redsprings-Ulto general soil map unit in the southern part of the county.

The northern part of the county drains directly into the Sabine River; the southern part drains into the Neches River via the Angelina River. The drainage divide is roughly in the vicinity of the northwest trending Farm Road 95 and U.S. Highway 259 in the southern part of the county and in the vicinity of State Highway 323 northwest of the city of Henderson.

The relationship between Tertiary "bedrock" formations and Quaternary deposits and their superincumbent soils is complex. Some formations lack definitive or unique lithologies. Some soil sola, even C horizon material, may be genetically unrelated to the underlying formations. The uppermost strata in which the soils have developed may be late Tertiary or Quaternary age, and may be of eolian, colluvial, or fluvial origin.

The general soil map at the back of this publication should be used to correlate the occurrence of the soils in the county with the surface outcrops of the geologic formations.

Wilcox Group

The Wilcox Group is not divided into several formations on the geologic maps *(5, 6)* as it is elsewhere in east-central Texas *(22)*.

The Wilcox Group outcrops north of the Trinity River, which includes Rusk County, are mostly of fluvial origin. An exception is a thin shaly marine stratum formerly referred to as the "Sabinetown Formation" *(24)*. The name and formational status has subsequently been abandoned *(20, 22)*. This marine stratum is not everywhere present at the top of the Wilcox Group; however, where present, the "Sabinetown Formation" is considered to be part of the Wilcox Group.

The Wilcox Group is described as consisting of quartz sands, silts, clays, lignite, and subordinate quantities of glauconite where present *(5, 6)*. Glauconite is a fine-grained greenish hydroxalated iron and potassium mineral-bearing aluminum silicate . Glauconite is an indicator of a marine depositional environment. Consequently, the presence of glauconite at the top of the Wilcox Group is an indication of the "Sabinetown Formation" stratum. The sands are of fluvial channel and point bar origin; the silts and clays are of fluvial overbank origin. A map *(13)* suggests that most of the Wilcox Group outcrop in Rusk County belongs to a fluvial overbank facies which encloses a few narrow elongated southwest-trending channel sand deposits. These sediments were laid down by the early Tertiary age Mount Pleasant Fluvial System flowing from the north and east *(4)*. The lignite mined in Rusk County is in the Wilcox Group and is associated with accumulations of organic matter in low, poorly drained areas between higher sand-rich channel areas (21). The Pirkey soils are developing from mine spoil.

A major part of the Wilcox Group outcrop area, as indicated on the general soil map, is overlain by the soils in the Sawlit-Sawtown-Latex general soil map unit, especially in the east-central part of the county centering around U.S. Highway 79 east of Henderson. This area of outcrop and the overlying Sawlit-Sawtown-Latex general soil map unit extend to the northwest corner of the county. Most of this map unit is also coincident with the distribution of the Wilcox Group outcrop area in the southern part of the county, south of U.S. Highway 84 where the Wilcox Group outcrop is on the upthrown sides of faults. The Tenaha-Lilbert-Darco, Maben-Woodtell, and Tonkawa general soil map units cover most of the remainder of the Wilcox outcrop area.

The clayey and shaly parent materials of most soils in the Sawlit-Sawtown-Latex and the Maben-Woodtell general soil map units are consistent with a flood basin or overbank fluvial origin. The minor parts of the Wilcox outcrop area covered by the Tenaha-Lilbert-Darco and Tonkawa general soil map units, with their sandy parent materials, indicate a fluvial channel facies origin.

The Sawlit-Sawtown-Latex general soil map unit in the discussion of the map units in the General Soil Map Units section is placed under "Soils on Terraces." As may be seen on topographic maps, the relationship of these soils to well-defined terraces adjacent to a major stream is problematical. Perhaps these surface sands were inherited from larger late Tertiary age, pre-Pleistocene stream channels flowing at now obliterated higher surface elevations. These sands were possibly distributed downslope by colluvial processes as the topography was lowered by erosion and reworked in part by the wind. The mound-intermound microrelief is indicative of this scenario. Alternatively, soil parent material could have been derived from adjacent sandy sola, especially from the soils of the Tenaha-Lilbert-Darco and Tonkawa general soil map units.

None of these general soil map units—Sawlit-Sawtown-Latex, Tenaha-Lilbert-Darco, Maben-Woodtell, and

Tonkawa—are restricted to the outcrop of the Wilcox Group.

Carrizo Sand

In some places, the Eocene Carrizo Sand unconformably overlies the Wilcox Group. However, in other places, where the "Sabinetown Formation" is present, the contact is conformable. The Carrizo Sand is described as a fine to medium grained, thin-bedded to thick-bedded, massive sand *(5, 6)*. The Carrizo Sand is fluvial in origin.

The Tenaha-Lilbert-Darco general soil map unit covers most of the Carrizo Sand outcrop. The Tonkawa general soil map unit overlies both the Carrizo Sand and Wilcox Group outcrops along the southeast margin of the county. The range of topographic positions for the Tonkawa series and its classification as an Entisol suggests its parent material was derived by eolian reworking of sandy sediments from the Carrizo Sand and the Wilcox Group.

Reklaw Formation

The lower part of the Reklaw Formation, the Newby Member, is shallow-water marine or marine shelf in origin and consists of carbonaceous clays and glauconitic sands with marine macrofossils *(10, 15)*. The upper part of the Reklaw Formation, the Marquez Member, is of deltaic and near-shore origin. The Marquez Member is composed mainly of clay and silty clay with thin, locally glauconitic, cross-bedded sand. The scattered areas of Reklaw Formation outcrops are on the south, north, and west flanks of the domal Sabine Uplift.

Most of the Reklaw Formation outcrops underlie the Redsprings-Ulto general soil map unit. The soils in this map unit have glauconitic, shaly, and sandy substrates. The Reklaw Formation outcrops also underlie small areas of the Cuthbert-Kirvin-Bowie general soil map unit.

Queen City Sand

The Queen City Sand is exposed on the flanks of the Sabine Uplift in the northwestern, southeastern, and southern parts of the county. The formation is of tidal embayment, tidal delta, and barrier island origins *(16, 17)*. It is mostly sand with some minor beds of clay; in some places, it is glauconitic.

In the northwest part of the county, west of State Highway 26 and along the western margin of the county between U.S. Highways 79 and 84, the Cuthbert-Kirvin-Bowie association overlies this formation. Soils of the Redsprings-Ulto and Tenaha-Lilbert-Darco general soil map units developed within the Mount Enterprise Fault Zone north and south of U.S. Highway 84.

Weches Formation

The Weches Formation consists of marine glauconitic marl, sand, and clay. Most of the outcrop area is in the southern part of the county within the Mount Enterprise Fault Zone and U.S. Highway 84 vicinities. The Redsprings soil delineations outline the outcrop area of the Weches Formation. The reddish colors and the ironstone concretions of this soil are derived from the iron-rich glauconitic component of the Weches Formation.

Between Mount Enterprise and Concord communities, a small portion of the Weches outcrop falls in the Cuthbert-Kirvin-Bowie and Tenaha-Lilbert-Darco general soil map units. The Redsprings soil is not mapped in either of these general soil map units. Other reddish ironstone-bearing or plinthitic soils, such as the Lilbert soils, developed on the Weches Formation.

Sparta Sand

The Sparta Sand in east Texas is mainly a deltaic deposit with local thin beds of lignitic clay and silt *(6)*. It is the youngest Tertiary formation in the county. Its outcrop area is confined to the Mount Enterprise Fault Zone in close proximity to the outcrop area of the Weches Formation *(6)*. The Sparta Sand belongs to the delta plain facies of gulf-ward flowing paleo-streams entering the county from the northeast *(27)*. This subaerial part of a delta contains distributary channel cross-bedded sandstones and adjacent interdistributary mudstones *(27)*.

Soils of the Cuthbert-Kirvin-Bowie general soil map unit developed over numerous Sparta Sand outcrops. The substrates of these soils are varied enough to be compatible with the Sparta Sand's delta plain origin.

Late Tertiary to Pleistocene Terraces and Eolian Deposits

The beginning of Pleistocene time has been estimated to be about 1.6 to about 2.6 million years before the present *(8, 25)*. Terraces, in the strict sense of being intermediate in elevation between a flood plain and an upland, are assumed to be Pleistocene age. Possible terrace sediments in the absence of adjacent flood plains and uplands, implying a lowering and inversion of the original fluvial topography, are probably late Tertiary age.

Almost all of the soils in the terrace soil grouping depicted on the Rusk County general soil map occur on well-defined terraces or in upland positions with anomalous relationships to adjacent drainage. This coincidence may be the result of eolian processes on deep sands accompanied by a decrease or loss of vegetative cover in dry periods during Pleistocene and Holocene times.

Droughts in Holocene time are well documented for the eastern United States and for the High Plains of Texas *(29, 36)*.

The Sawlit-Sawtown-Latex general soil map unit, discussed in relation to the Wilcox Group outcrop, displays very few extant terraces in the sense of well-defined stream paralleling landforms. Much of this general soil map unit may be an inheritance from a higher, now obliterated, late Tertiary topography. Pleistocene and Holocene eolian activity is also suggested by the presence of the mounded Sawlit soil. Classic terraces, having an intermediate elevation between a flood plain and an upland, are along the Sabine River in the northeastern part of the county and along the Angelina River in the south-central part of the county.

Several Bernaldo-Attoyac general soil map unit delineations are located in the southern and west-central parts of the county. As seen on the relevant 5-foot contour-interval quadrangle maps, Bernaldo-Attoyac general soil map unit delineations do not have flat or gently sloping terrace-like morphology in relation to adjacent streams. The soils in this map unit ascend the slopes adjacent to nearby streams as if the sandy material in the soil sola were wind-deposited by deflation of the streams' flood plains. The soils in the Sawlit-Sawtown-Latex and Bernaldo-Attoyac general soil map units might be remnants of fluvial deposits laid down by streams flowing at higher elevations during late Tertiary or early Pleistocene times.

The Bienville general soil map unit is delineated in the west-central part of the county. A portion of the Bienville general soil map unit is shown on a Pleistocene terrace *(5)*, though only a small part of the delineation is depicted. Most of the map unit, however, is mapped over the Carrizo Sand. Five-foot contour-interval quadrangle maps indicate most soil surfaces have a stream-paralleling relationship to subjacent flood plains. The major portion of the map unit is on the interfluve between Johnson and Bowles Creeks. The extent and location of the map unit suggests these creeks had a single course in the past. The deposition of these presumed terrace materials is likely to have occurred during Pleistocene time.

Pimple Mounds

Pimple mounds are circular to elliptical knolls, 10 to 75 feet in diameter, and generally are less than 3 feet in height. They are known as mima or prairie mounds in areas other than Texas, Louisiana, and contiguous states. In Rusk County, pimple mounds are mapped in the Gallime-Alazan, Mollville-Besner, and Sawlit-Sawtown complexes. The Besner, Gallime, and Sawtown soils are the mounded soils. The A and E horizons in the mounds generally are thicker than the corresponding horizons of the intermound soils.

Similar mounds are found in widely scattered localities west of the Mississippi River. They are located mainly on known Pleistocene age sediments or on thin surficial materials of probable Pleistocene age. They extend southward along the Gulf Coast into northeastern Texas and adjacent Louisiana and northward into southeastern Oklahoma, Arkansas, and southern Missouri. They are also found in isolated areas in northwestern Iowa, northwestern Minnesota, and in parts of New Mexico, Colorado, and Wyoming. In the western states, they occur in parts of Washington, Idaho, and California.

Theories of the origin of pimple mounds have generated an immense and diverse literature *(35)*. Hypotheses for the genesis of pimple mounds along the Gulf Coast and in northeast Texas are:

(1) Residual hillocks left after wind erosion, sheet flood erosion (possibly with a core of tree-root bonded surficial material), or fluvial erosion.
(2) Accumulations of wind-transported sand, silt, or clay pellets or chips around clumps of vegetation.
(3) Accumulations around or modifications of tree-tip mounds or cradle knolls.
(4) Eolian accumulations whose sites were started by, or topographically enhanced by, erosional processes.
(5) The result of the "fluffing up", or the decreasing of the bulk densities, of solum materials and the lateral or centripetal transport of surface materials by burrowing animals, such as pocket gophers, with possible eolian increments.

Hypotheses (4) and (5) involving eolian effects seem the most plausible for Gulf Coast and northeast Texas mounds. Eolian accumulation suggests a partly non-pedogenic origin for the thickened A and E horizons and perhaps drier climates than at present.

Holocene Alluvium

The term "Holocene" has been defined as covering the past 10,000 years *(18, 28)*. Locally, this is the time of flood plain sediment deposition along streams. These streams include the Angelina River and its tributaries in the southern part of the county and the Sabine River and its tributaries in the northern and northeastern parts of the county.

Most flood plain sediments are parent materials for soils of the Laneville-Mattex general soil map unit. Covering less area are soils of the Dreka, Estes, and Keechi general soil map units. All flood plain soils having minor profile development are Entisols or Inceptisols. Most Entisol soils on flood plains are considered to be "frequently flooded." Inceptisol soils on Rusk County flood plains are "occasionally flooded."

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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.

Absorbents. Substances used in seedling root treatments for the purpose of holding and drawing moisture.

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.

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

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, are linear, and may or may not include cliff segments.

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. A site preparation method in which soil is formed into ridges or beds elevated 6 to 10 inches above the normal ground level on which seedlings are to be planted.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

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.

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

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.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The

common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay 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.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse 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.

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."

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.

Crowning. A road construction method in which the road surface is built higher in the center than on either side for the purpose of shedding surface water runoff.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deadening. A method of timber stand improvement in which the trees to be killed are injected with chemicals.

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.

Doyle Rule. A widely used mathematical formula that gives board foot yields from logs based on diameter and length. For 16-foot logs, volume, in board feet, equals the diameter of the log minus 4 squared.

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.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

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.

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.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Footslope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Glauconite. A greenish micaceous mineral consisting essentially of potassium, aluminum, and iron that weathers to an olive yellow, yellow, or reddish weakly consolidated material high in iron.

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.

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.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

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.

Intermound. An area between mounds.

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.

Ironstone. An extremely hard reddish or dark brown material formed by the secondary precipitation of iron.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Krotovina. A former animal burrow in one soil horizon that has been filled with organic matter or material from another horizon.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Levee (natural). A long, broad low ridge or embankment of sand and coarse silt built up by a stream on its flood plain and along one or both sides of its channel.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

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.

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).

Mound. A low rounded hill of earth.

Mounding. A site preparation method in which soil is formed into a series of interrupted mounds elevated 6 to 10 inches above the normal ground level on which seedlings are to be planted.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

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.

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

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely 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.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

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.

Release. The removal of all plants competing with or overtopping desirable seedlings.

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.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Roller chopping. A site preparation method in which competing vegetation is chopped by pulling a rolling drum with attached cutting blades over it.

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.

Saddle. A broad flat area, sloping gently on both sides, and resembling a saddle in shape.

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.

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.

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.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. 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.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

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.

Site preparation. Preparing an area of land for planting, direct seeding, or natural regeneration of trees by clearing, chemical vegetation control, burning, disking, chopping, bedding, windrowing, raking, or a combination thereof.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 1 percent
Very gently sloping	1 to 3 percent
Gently sloping	3 to 5 percent
Moderately sloping	5 to 8 percent
Strongly sloping	8 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 45 percent
Very steep	45 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slough. A section of abandoned stream channel often containing stagnant water and occurring in a flood plain.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 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.

Stand improvement. The control of plants that are undesirable, either because of species, form, or competition to desirable plants, for the purpose of improving a stand's composition, growth, or condition.

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.

Streamside management zone. An area of 50 or more feet on both sides of a stream where extra precaution is needed in carrying out forest practices in order to protect streambank edges and water quality.

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.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the 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. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

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

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

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.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Underplanting. A regeneration method in which seedlings are planted beneath existing trees and brush. A follow-up operation to release the seedlings will be needed.

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.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

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.

Wing ditch. A drainage ditch which drains water away from roads.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Henderson, Texas)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	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	54.7	32.7	43.7	79	10	68	3.44	1.24	5.26	6	.7
February	59.4	36.0	47.7	82	16	92	3.58	2.14	4.86	5	.3
March	68.0	43.7	55.8	85	23	233	3.86	1.81	5.62	5	.1
April	76.4	52.7	64.5	89	32	438	4.00	1.80	5.89	4	0.0
May	82.4	60.3	71.3	92	44	660	4.94	2.08	7.37	6	0.0
June	88.8	67.4	78.1	98	53	846	4.36	1.34	6.82	5	0.0
July	92.9	71.1	82.0	102	60	991	2.82	1.63	4.06	4	0.0
August	93.1	70.2	81.7	103	57	981	2.45	0.93	3.73	4	0.0
September	86.5	64.4	75.5	98	45	763	3.51	1.70	5.07	4	0.0
October	78.2	53.1	65.6	92	34	483	3.95	1.46	6.27	4	0.0
November	67.5	43.9	55.7	85	24	223	4.25	2.15	6.07	5	0.0
December	58.5	35.8	47.2	78	14	85	3.92	2.02	5.57	5	.3
Yearly:											
Average	75.5	52.6	64.1	---	---	---	---	---	---	---	---
Extreme	108	-1	---	104	8	---	---	---	---	---	---
Total	---	---	---	---	---	5,863	45.08	35.30	53.81	57	1.4

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Henderson, 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--	Mar. 11	Mar. 23	Apr. 7
2 years in 10 later than--	Mar. 3	Mar. 16	Apr. 1
5 years in 10 later than--	Feb. 17	Mar. 3	Mar. 20
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 20	Nov. 3	Oct. 28
2 years in 10 earlier than--	Nov. 29	Nov. 11	Nov. 2
5 years in 10 earlier than--	Dec. 14	Nov. 26	Nov. 11

Table 3.--Growing Season

(Recorded in the period 1961-90 at Henderson, 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	259	238	213
8 years in 10	267	246	221
5 years in 10	282	262	236
2 years in 10	296	279	252
1 year in 10	304	287	259

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AyB	Attoyac fine sandy loam, 1 to 3 percent slopes	2,332	0.4
AyE	Attoyac fine sandy loam, 8 to 15 percent slopes	517	0.1
BeB	Bernaldo very fine sandy loam, 1 to 3 percent slopes	4,605	0.8
BeD	Bernaldo very fine sandy loam, 5 to 8 percent slopes	1,360	0.2
BtB	Betis loamy fine sand, 1 to 5 percent slopes	13,201	2.2
BvB	Bienville loamy fine sand, 0 to 2 percent slopes	2,332	0.4
BwB	Bowie very fine sandy loam, 1 to 4 percent slopes	25,129	4.2
CbE	Cuthbert fine sandy loam, 5 to 15 percent slopes	68,685	11.4
CbG	Cuthbert fine sandy loam, 15 to 35 percent slopes	2,901	0.5
CsG	Cuthbert fine sandy loam, 15 to 40 percent slopes, stony	356	0.1
CtE	Cuthbert gravelly fine sandy loam, 5 to 15 percent slopes	8,888	1.5
DaC	Darco loamy fine sand, 1 to 8 percent slopes	16,009	2.7
DaE	Darco loamy fine sand, 8 to 15 percent slope	10,478	1.7
DeA	Derly silt loam, 0 to 1 percent slopes	711	0.1
Dr	Dreka loam, frequently flooded	5,674	0.9
Es	Estes clay, frequently flooded	1,832	0.3
GaA	Gallime-Alazan complex, 0 to 2 percent slopes	2,980	0.5
Ha	Hannahatchee fine sandy loam, occasionally flooded	2,640	0.4
Iu	Iulus fine sandy loam, occasionally flooded	9,082	1.5
KaA	Kawah fine sand, 0 to 2 percent slopes	145	*
Kc	Keechi fine sandy loam, frequently flooded	1,781	0.3
KfC	Kirvin fine sandy loam, 2 to 5 percent slopes	27,268	4.5
KfE	Kirvin fine sandy loam, 5 to 15 percent slopes	10,069	1.7
KgC	Kirvin gravelly fine sandy loam, 2 to 5 percent slopes	20,165	3.4
KsC	Kirvin soils graded, 2 to 8 percent slopes	1,783	0.3
La	Laneville loam, occasionally flooded	3,972	0.7
Lf	Laneville loam, frequently flooded	39,485	6.6
LtB	Latex very fine sandy loam, 1 to 3 percent slopes	12,523	2.1
LyC	Lilbert loamy fine sand, 2 to 5 percent slopes	47,062	7.8
MaE	Maben fine sandy loam, 5 to 15 percent slopes	23,928	4.0
Me	Mattex clay loam, frequently flooded	10,541	1.8
Mo	Mattex-Owentown complex, frequently flooded	372	0.1
MtC	Meth fine sandy loam, 2 to 5 percent slopes	5,627	0.9
MvA	Mollville-Besner complex, 0 to 1 percent slopes	776	0.1
Na	Naconiche mucky sandy loam, frequently flooded	2,449	0.4
Ow	Owentown fine sandy loam, occasionally flooded	646	0.1
PrC	Pirkey very fine sandy loam, 1 to 5 percent slopes	1,151	0.2
PrD	Pirkey very fine sandy loam, 5 to 12 percent slopes	308	0.1
Pt	Pits	356	0.1
ReC	Redsprings gravelly fine sandy loam, 2 to 5 percent slopes	24,138	4.0
ReE	Redsprings gravelly fine sandy loam, 5 to 15 percent slopes	23,392	3.9
ReG	Redsprings gravelly fine sandy loam, 15 to 40 percent slopes	3,016	0.5
RgC	Redsprings soils, graded, 2 to 5 percent slopes	1,216	0.2
RzB	Rentzel loamy fine sand, 0 to 4 percent slopes	3,210	0.5
SaB	Sacul fine sandy loam, 1 to 3 percent slopes	13,496	2.2
StB	Sawlit loam, 0 to 2 percent slopes	14,955	2.5
SwA	Sawlit-Sawtown complex, 0 to 2 percent slopes	32,313	5.4
TeE	Tenaha loamy fine sand, 5 to 15 percent slopes	45,354	7.6
ToC	Tonkawa fine sand, 0 to 8 percent slopes	4,120	0.7
ToE	Tonkawa fine sand, 8 to 15 percent slopes	875	0.1
ToG	Tonkawa fine sand, 15 to 35 percent slopes	810	0.1
UtB	Ulto fine sandy loam, 1 to 3 percent slopes	10,414	1.7
WoB	Woden fine sandy loam, 1 to 3 percent slopes	1,018	0.2
WtB	Woodtell loam, 1 to 3 percent slopes	7,346	1.2
WtE	Woodtell loam, 5 to 15 percent slopes	14,386	2.4
	Water areas less than 40 acres in size	1,114	0.2
	Water areas more than 40 acres in size	8,792	1.5
	Total	600,084	100.0

* Less than 0.1 percent.

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	Green peas	Watermelons	Improved bermuda-grass	Common bermudagrass	Bahiagrass	Small grain graze-out
		Bu	Bu	Tons	AUM*	AUM*	AUM*	AUM*
AyB---------- Attoyac	IIe	95	70	12	9	5	6	5
AyE---------- Attoyac	IVe	---	---	---	8	3	4	---
BeB---------- Bernaldo	IIe	90	70	11	9	6	7	6
BeD---------- Bernaldo	IVe	---	---	---	8	3	4	---
BtB---------- Betis	IIIs	60	50	10	5	---	---	4
BvB---------- Bienville	IIs	80	65	12	7	5	4	5
BwB---------- Bowie	IIe	85	60	11	7	5	6	6
CbE---------- Cuthbert	VIe	---	---	---	3	2	2	---
CbG---------- Cuthbert	VIIe	---	---	---	---	---	---	---
CsG---------- Cuthbert	VIIs	---	---	---	---	---	---	---
CtE---------- Cuthbert	VIe	---	---	---	3	1	1	---
DaC---------- Darco	IIIs	55	50	11	5	---	---	3
DaE---------- Darco	VIe	---	---	---	4	---	---	---
DeA---------- Derly	IIIw	---	---	---	2	---	2	---
Dr---------- Dreka	Vw	---	---	---	---	2	2	---
Es---------- Estes	Vw	---	---	---	---	1	1	---
GaA:								
Gallime--------	I	87	60	---	9	6	7	5
Alazan---------	IIw	87	60	---	9	6	7	5
Ha---------- Hannahatchee	IIw	90	---	---	9	7	8	7
Iu---------- Iulus	IIw	90	---	---	9	7	8	6

See footnotes 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	Green peas	Watermelons	Improved bermuda-grass	Common bermudagrass	Bahiagrass	Small grain graze-out
		Bu	Bu	Tons	AUM*	AUM*	AUM*	AUM*
KaA---------- Kawah	IIIw	---	---	9	7	---	---	---
Kc---------- Keechi	VIIw	---	---	---	---	---	---	---
KfC---------- Kirvin	IIIe	75	55	---	5	3	4	4
KfE---------- Kirvin	VIe	---	---	---	3	2	2	---
KgC---------- Kirvin	IVe	40	---	---	4	2	3	3
KsC---------- Kirvin	VIe	---	---	---	1	1	2	---
La---------- Laneville	IIw	90	---	---	9	7	8	6
Lf---------- Laneville	Vw	---	---	---	8	6	7	---
LtB---------- Latex	IIe	90	65	11	9	6	7	6
LyC---------- Lilbert	IIIe	80	60	10	6	---	5	5
MaE---------- Maben	IVe	---	---	---	4	3	3	---
Me---------- Mattex	Vw	---	---	---	---	1	2	---
Mo:								
Mattex---------	Vw	---	---	---	9	1	2	---
Owentown-------	IIw	---	---	---	9	5	6	---
MtC---------- Meth	IIIe	75	55	---	5	3	4	4
MvA:								
Mollville------	IVw	---	---	---	2	1	2	---
Besner---------	IIe	---	---	---	9	7	2	---
Na---------- Naconicha	VIIw	---	---	---	---	---	---	---
Ow---------- Owentown	IIw	90	---	---	9	5	6	5
PrC---------- Pirkey	IVe	70	50	---	5	4	4	3
PrD---------- Pirkey	VIe	---	---	---	3	2	2	2

See footnotes 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	Green peas	Watermelons	Improved bermuda-grass	Common bermudagrass	Bahiagrass	Small grain graze-out
		Bu	Bu	Tons	AUM*	AUM*	AUM*	AUM*
Pt**. Pits								
ReC---------- Redsprings	IIIe	75	55	---	5	3	4	3
ReE---------- Redsprings	VIe	---	---	---	3	2	2	2
ReG---------- Redsprings	VIIe	---	---	---	---	---	---	---
RgC---------- Redsprings	VIe	---	---	---	1	1	2	---
RzB---------- Rentzel	IIIw	---	---	---	7	5	6	5
SaB---------- Sacul	IIIe	70	---	---	5	3	4	3
StB---------- Sawlit	IIe	85	60	---	8	6	7	6
SwA:								
Sawlit---------	IIw	87	60	---	9	6	7	6
Sawtown--------	IIe	87	60	---	9	6	7	6
TeE---------- Tenaha	VIe	---	---	10	4	---	3	2
ToC---------- Tonkawa	IVs	---	40	8	3	---	---	1
ToE---------- Tonkawa	VIe	---	---	---	3	---	---	1
ToG---------- Tonkawa	VIIe	---	---	---	---	---	---	---
UtB---------- Ulto	IIe	80	---	---	5	3	4	4
WoB---------- Woden	IIe	90	70	12	9	5	7	5
WtB---------- Woodtell	IIIe	70	---	---	5	3	4	3
WtE---------- Woodtell	VIe	---	---	---	4	3	3	---

* 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	Woodland management group***	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
AyB---------- Attoyac	4	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	95	380	Loblolly pine,
							Shortleaf pine------	87	340	southern red
							Southern red oak----	---	---	oak, sweetgum,
							Sweetgum-----------	95	260	black walnut,
										white ash.
AyE---------- Attoyac	4	Moderate	Slight	Slight	Slight	Slight	Loblolly pine-------	93	380	Loblolly pine,
							Shortleaf pine------	87	360	southern red
							Southern red oak----	---	---	oak, sweetgum,
							Sweetgum-----------	---	---	white ash.
BeB, BeD------- Bernaldo	4	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	94	380	Loblolly pine,
							Shortleaf pine------	84	340	sweetgum,
							Sweetgum-----------	---	--	southern red
							Southern red oak----	---	--	oak, white ash.
BtB---------- Betis	14	Slight	Severe	Moderate	Slight	Moderate	Loblolly pine-------	85	280	Loblolly pine.
							Shortleaf pine------	76	220	
BvB---------- Bienville	5	Slight	Severe	Moderate	Slight	Slight	Loblolly pine-------	96	380	Loblolly pine,
							Longleaf pine-------	88	340	shortleaf pine.
							Shortleaf pine------	75	---	
BwB---------- Bowie	8	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	90	330	Loblolly pine,
							Shortleaf pine------	82	270	southern red
							Sweetgum-----------	90	210	oak, sweetgum,
							Southern red oak----	---	---	white ash.
CbG---------- Cuthbert	17	Severe	Severe	Slight	Slight	Slight	Loblolly pine-------	80	230	Loblolly pine.
							Shortleaf pine------	75	210	
CsG---------- Cuthbert	19	Severe	Severe	Slight	Slight	Slight	Loblolly pine-------	76	180	Loblolly pine.
							Shortleaf pine------	68	150	
ChE---------- Cuthbert	15	Moderate	Moderate	Slight	Slight	Slight	Loblolly pine-------	82	230	Loblolly pine.
							Shortleaf pine------	75	210	
CtE---------- Cuthbert	16	Moderate	Moderate	Slight	Slight	Slight	Loblolly pine-------	82	230	Loblolly pine.
							Shortleaf pine------	75	210	
DaC, DaE------- Darco	14	Slight	Severe	Moderate	Slight	Moderate	Loblolly pine-------	83	230	Loblolly pine.
							Shortleaf pine------	75	210	
DeA---------- Derly	18	Slight	Severe	Moderate	Slight	Severe	Loblolly pine-------	80	230	Loblolly pine,
							Water oak----------	78	---	water oak, willow
							Willow oak---------	---	---	oak, sweetgum,
							Sweetgum-----------	80	120	green ash.
Dr---------- Dreka	7	Slight	Moderate	Moderate	Slight	Moderate	Sweetgum-----------	93	240	Water oak,
							Willow oak---------	90	---	sweetgum,
							Water oak----------	90	---	cherrybark oak,
										green ash.

See footnotes at end of table.

Table 6.--Woodland Management and Productivity--Continued

Soil name and map symbol	Woodland management group***	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
Es---------- Estes	7	Slight	Severe	Moderate	Slight	Moderate	Sweetgum----------	93	240	Sweetgum, water oak, cherrybark oak, green ash.
							Willow oak----------	86	---	
							Water oak----------	93	---	
							Green ash----------	---	---	
GaA**:										
Gallime-------	8	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	92	350	Loblolly pine, southern red oak, sweetgum, white ash.
							Shortleaf pine------	85	340	
							Sweetgum----------	---	---	
							Southern red oak----	---	---	
Alazan--------	6	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine-------	95	380	Loblolly pine, sweetgum, southern red oak, green ash.
							Shortleaf pine------	87	340	
							Sweetgum----------	---	---	
							Southern red oak----	---	---	
Ha---------- Hannahatchee	1	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	102	430	Loblolly pine, sweetgum, cherrybark oak, green ash.
							Sweetgum----------	100	310	
							Cherrybark oak------	97	---	
Iu---------- Iulus	2	Slight	Moderate	Slight	Slight	Slight	Loblolly pine-------	100	430	Loblolly pine, cherrybark oak, water oak, sweetgum.
							Sweetgum----------	100	310	
							Water oak----------	---	---	
KaA---------- Kawah	10	Slight	Severe	Moderate	Slight	Severe	Loblolly pine-------	90	330	Loblolly pine.
							Willow oak----------	---	---	
KfC---------- Kirvin	11	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	85	200	Loblolly pine.
							Shortleaf pine------	75	210	
KfE---------- Kirvin	12	Moderate	Slight	Slight	Slight	Slight	Loblolly pine-------	85	280	Loblolly pine.
							Shortleaf pine------	75	210	
KgC---------- Kirvin	16	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	81	230	Loblolly pine.
							Shortleaf pine------	71	170	
KsC---------- Kirvin	20	Moderate	Moderate	Moderate	Slight	Slight	Loblolly pine-------	64	95	Loblolly pine.
							Shortleaf pine------	54	60	
La, Lf--------- Laneville	2	Slight	Moderate	Slight	Slight	Slight	Loblolly pine-------	100	430	Loblolly pine, water oak, cherrybark oak, sweetgum, green ash.
							Water oak----------	97	7	
							Sweetgum----------	100	310	
LtB---------- Latex	8	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	91	9	Loblolly pine.
							Shortleaf pine------	81	270	
							Sweetgum----------	90	210	
							Southern red oak----	---	---	
LyC---------- Lilbert	9	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine-------	90	330	Loblolly pine, slash pine.
							Shortleaf pine------	81	270	
MaE---------- Maben	12	Moderate	Moderate	Slight	Slight	Slight	Loblolly pine-------	83	260	Loblolly pine.
							Shortleaf pine------	76	210	

See footnotes at end of table.

Table 6.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns						Potential productivity			Trees to plant
	Woodland management group***	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
Me---------- Mattex	7	Slight	Severe	Moderate	Severe	Moderate	Sweetgum----------	93	260	Sweetgum, green ash, water oak, cherrybark oak.
							Green ash----------	90	---	
							Water oak----------	---	---	
Mo**:										
Mattex--------	7	Slight	Severe	Moderate	Severe	Moderate	Sweetgum----------	93	260	Sweetgum, green ash, water oak, cherrybark oak.
							Green ash----------	90	---	
							Water oak----------	---	---	
Owentown------	1	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	104	450	Loblolly pine, cherrybark oak, pecan, black walnut, sweetgum, green ash.
							Sweetgum----------	100	310	
							Shortleaf pine------	95	410	
							White oak----------	---	---	
							Cherrybark oak------	---	---	
MtC---------- Meth	11	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	83	260	Loblolly pine.
							Shortleaf pine------	74	210	
							Sweetgum----------	---	---	
							Southern red oak----	---	---	
							White oak----------	---	---	
MvA**:										
Mollville-----	18	Slight	Severe	Moderate	Slight	Severe	Loblolly pine-------	78	230	Water oak, sweetgum, loblolly pine, green ash.
							Water oak----------	80	---	
							Willow oak---------	80	---	
							Sweetgum----------	80	---	
Besner--------	8	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	93	350	Loblolly pine, sweetgum, southern red oak, white ash.
							Shortleaf pine------	85	340	
							Sweetgum----------	---	---	
							Southern red oak----	---	---	
Na---------- Naconiche	3	Slight	Severe	Severe	Severe	Severe	Willow oak---------	100	---	Water oak, sweetgum, green ash.
							Water oak----------	100	---	
							Sweetgum----------	101	310	
Ow---------- Owentown	1	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	104	450	Loblolly pine, cherrybark oak, pecan, black walnut, sweetgum, green ash.
							Sweetgum----------	100	310	
							Shortleaf pine------	95	410	
							Cherrybark oak------	---	---	
							White oak----------	---	---	
ReC---------- Redsprings	16	Slight	Moderate	Slight	Slight	Slight	Loblolly pine-------	79	230	Loblolly pine.
							Shortleaf pine------	69	170	
ReE---------- Redsprings	16	Moderate	Moderate	Moderate	Slight	Slight	Loblolly pine-------	81	230	Loblolly pine.
							Shortleaf pine------	72	170	
ReG---------- Redsprings	17	Severe	Moderate	Moderate	Slight	Slight	Loblolly pine-------	79	230	Loblolly pine.
							Shortleaf pine------	69	170	
RgC---------- Redsprings	20	Moderate	Moderate	Severe	Slight	Slight	Loblolly pine-------	65	95	Loblolly pine.
							Shortleaf pine------	56	60	
RzB---------- Rentzel	10	Slight	Moderate	Moderate	Slight	Moderate	Loblolly pine-------	92	350	Loblolly pine, sweetgum, green ash, water oak.
							Shortleaf pine------	85	340	
							Sweetgum----------	90	210	

See footnotes at end of table.

Table 6.--Woodland Management And Productivity--Continued

Soil name and map symbol	Woodland management group***	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Productivity class*	
SaB---------- Sacul	12	Slight	Moderate	Slight	Moderate	Slight	Loblolly pine-------	87	300	Loblolly pine.
							Shortleaf pine------	79	270	
StB---------- Sawlit	10	Slight	Moderate	Slight	Slight	Slight	Loblolly pine-------	92	350	Loblolly pine,
							Shortleaf pine------	83	270	sweetgum, green
							Sweetgum----------	90	210	ash, water oak.
SwA**:										
Sawlit--------	10	Slight	Moderate	Slight	Slight	Slight	Loblolly pine-------	92	350	Loblolly pine,
							Shortleaf pine------	83	270	sweetgum, green
							Sweetgum----------	90	210	ash, water oak.
Sawtown-------	8	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	90	330	Loblolly pine,
							Shortleaf pine------	82	270	sweetgum,
							Sweetgum----------	90	210	southern red
							Southern red oak----	---	---	oak, white ash.
TeE---------- Tenaha	13	Moderate	Moderate	Moderate	Slight	Slight	Loblolly pine-------	87	320	Loblolly pine.
							Shortleaf pine------	80	270	
ToC---------- Tonkawa	21	Slight	Severe	Severe	Slight	Severe	Loblolly pine-------	64	95	Loblolly pine,
							Shortleaf pine------	56	66	shortleaf pine,
										longleaf pine.
ToE---------- Tonkawa	21	Moderate	Severe	Severe	Slight	Severe	Loblolly pine-------	67	100	Loblolly pine,
							Shortleaf pine------	60	90	shortleaf pine,
										longleaf pine.
ToG---------- Tonkawa	22	Severe	Severe	Severe	Slight	Severe	Loblolly pine-------	67	100	Loblolly pine,
							Shortleaf pine------	60	90	shortleaf pine,
										longleaf pine.
UtB---------- Ulto	8	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	90	330	Loblolly pine,
							Shortleaf pine------	82	270	southern red
							Southern red oak----	---	---	oak, white ash.
WoB---------- Woden	4	Slight	Slight	Slight	Slight	Slight	Loblolly pine-------	95	380	Loblolly pine,
							Shortleaf pine------	87	340	southern red
							Sweetgum----------	95	260	oak, white ash,
							Southern red oak----	---	---	sweetgum.
WtB---------- Woodtell	15	Slight	Moderate	Slight	Slight	Slight	Loblolly pine-------	80	230	Loblolly pine.
							Shortleaf pine------	70	170	
WtE---------- Woodtell	15	Moderate	Moderate	Slight	Slight	Slight	Loblolly pine-------	78	210	Loblolly pine.
							Shortleaf pine------	70	170	

* Productivity class is the yield in board feet (Doyle Rule) per acre per year calculated at age of 50 for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

*** See Woodland Management and Productivity Section for woodland management groups.

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
AyB, AyE----------	Favorable	1,300	Pinehill bluestem----------	55
Attoyac	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----------	Favorable	1,300	Pinehill bluestem----------	55
Bernaldo	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
BtB----------	Favorable	3,000	Mountain muhly----------	15
Betis	Normal	2,000	Arrowfeather threeawn----------	15
	Unfavorable	1,200	Longleaf uniola----------	15
			Broomsedge bluestem----------	10
			Beaked panicum----------	5
			Purpletop----------	5
			Indiangrass ----------	5
BvB----------	Favorable	1,300	Pinehill bluestem----------	20
Bienville	Normal	1,100	Little bluestem----------	20
	Unfavorable	800	Panicum----------	20
			Longleaf uniola----------	10
			Threeawn----------	10
			Other annual grasses----------	20
BwB ----------	Favorable	3,500	Pinehill bluestem----------	50
Bowie	Normal	3,000	Pineywoods dropseed----------	10
	Unfavorable	2,000	Longleaf uniola----------	10
			Big bluestem----------	10
			Indiangrass----------	5
Cbe----------	Favorable	2,300	Pinehill bluestem----------	50
Cuthbert	Normal	1,800	Big bluestem----------	10
	Unfavorable	1,300	Longleaf uniola----------	10
			Fineleaf bluestem----------	5
			Pineywoods dropseed----------	5
			Cutover muhly----------	5
CbG----------	Favorable	2,200	Pinehill bluestem----------	50
Cuthbert	Normal	1,700	Longleaf uniola----------	10
	Unfavorable	1,200	Fineleaf bluestem----------	10
			Big bluestem----------	5
			Pineywoods dropseed----------	5
CsG----------	Favorable	2,200	Pinehill bluestem----------	50
Cuthbert	Normal	1,700	Pineywoods dropseed----------	10
	Unfavorable	1,200	Longleaf uniola----------	10
			Big bluestem----------	5
			Fineleaf 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
CtE----------	Favorable	2,300	Pinehill bluestem----------	50
Cuthbert	Normal	1,800	Big bluestem----------	10
	Unfavorable	1,300	Longleaf uniola----------	10
			Fineleaf bluestem----------	5
			Pineywoods dropseed----------	5
			Cutover muhly----------	5
DaC, DaE----------	Favorable	1,650	Pinehill bluestem----------	50
Darco	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
DeA----------	Favorable	4,500	Florida paspalum----------	15
Derly	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
Dr----------	Favorable	2,000	Beaked panicum----------	25
Dreka	Normal	1,700	Longleaf uniola----------	20
	Unfavorable	1,000	Purpletop----------	15
			Switchcane----------	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
GaA*:				
Gallime----------	Favorable	3,000	Pinehill bluestem----------	20
	Normal	2,500	Beaked panicum----------	20
	Unfavorable	2,000	Longleaf uniola----------	20
			Purpletop----------	5
			Panicum----------	5
			American beautyberry----------	5
			Greenbrier----------	5
Alazan----------	Favorable	1,800	Pinehill bluestem----------	50
	Normal	1,600	Longleaf uniola----------	10
	Unfavorable	1,500	Beaked panicum----------	10
			Purpletop----------	5
			Panicum----------	5
			Dogwood----------	5
			Southern bayberry----------	5
			Carolina jessamine----------	5
			American holly----------	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
Ha	Favorable	1,800	Beaked panicum	15
Hannahatchee	Normal	1,600	Virginia wilddrye	15
	Unfavorable	1,200	Longleaf uniola	10
			Sedge	10
			Switchgrass	10
Iu	Favorable	1,800	Pinehill bluestem	50
Iulus	Normal	1,500	Beaked panicum	10
	Unfavorable	1.200	Spreading panicum	10
			Brownseed paspalum	10
			Longleaf uniola	10
			Big bluestem	1
			Virginia wildrye	1
			Switchgrass	1
			Purpletop	1
			Other prennial forbs	5
			Other shrubs	5
			Greenbrier	1
KaA	Favorable	2,000	Rush	20
Kawah	Normal	1,700	Sedge	20
	Unfavorable	1,200	Panicum	15
			Southern bayberyy	10
			Farkleberry	5
			Sassafras	5
			Sweetgum	5
			Bluejack oak	5
			Red maple	5
			White oak	5
			Southern red oak	5
KfC, KfE	Favorable	2,000	Pinehill bluestem	50
Kirvin	Normal	1,300	Longleaf uniola	10
	Unfavorable	1,000	Pineywoods dropseed	5
			American beautyberry	5
			Purpletop	5
			Indiangrass	5
			Brownseed paspalum	5
KgC	Favorable	2,400	Pinehill bluestem	50
Kirvin	Normal	1,900	Longleaf uniola	10
	Unfavorable	1,500	American beautyberry	5
			Indiangrass	5
			Brownseed paspalum	5
			Fineleaf bluestem	5
KsC	Favorable	2,300	Pinehill bluestem	50
Kirvin	Normal	1,800	Fineleaf bluestem	10
	Unfavorable	1,200	Longlead uniola	10
			Big bluestem	10
			Splitbeard bluestem	5
LtB	Favorable	3,000	Pinehill bluestem	20
Latex	Normal	2,500	Longleaf uniola	15
	Unfavorable	1,800	Beaked panicum	10
			Pineywoods dropseed	5
			Fringeleaf paspalum	5
			Winged elm	5
			Sedge	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
LyC----------	Favorable	1,500	Pinehill bluestem----------	50
Lilbert	Normal	1,200	Fineleaf bluestem----------	10
	Unfavorable	900	Longleaf uniola----------	10
			Pineywoods dropseed----------	10
			Indiangrass----------	5
MaE----------	Favorable	---	Pinehill bluestem----------	25
Maben	Normal	1,200	Cutover muhly----------	17
	Unfavorable	---	Longleaf uniola----------	17
			Beaked panicum----------	9
Me----------	Favorable	1,600	Longleaf uniola----------	20
Mattex	Normal	1,200	Sedge----------	20
	Unfavorable	1,000	Dallisgrass----------	10
			Beaked panicum----------	10
			Virginia wildrye----------	10
			Longtom----------	5
Mo*:				
Mattex----------	Favorable	1,600	Longleaf uniola----------	20
	Normal	1,200	Sedge----------	20
	Unfavorable	1,000	Dallisgrass----------	10
			Beaked panicum----------	10
			Virginia wildrye----------	10
			Longtom----------	5
Owentown----------	Favorable	2,000	Beaked panicum----------	15
	Normal	1,500	Virginia wildrye----------	15
	Unfavorable	1,000	Longleaf uniola----------	15
			Panicum----------	15
MtC----------	Favorable	---	Longleaf uniola----------	28
Meth	Normal	1,400	Beaked panicum----------	18
	Unfavorable	---	Panicum----------	14
			Pinehill bluestem----------	11
			Little bluestem----------	11
			Rough tridens----------	7
MvA*:				
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
Besner----------	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

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
Na----------	Favorable	1,000	Cinnamon fern----------	25
Naccniche	Normal	800	Sedge----------	10
	Unfavorable	600	Hazel alder----------	10
			Huckleberry----------	10
			Red maple----------	5
			Redbay----------	5
			Sweetbay----------	5
			Water oak----------	5
			Willow oak----------	5
Ow----------	Favorable	2,000	Beaked panicum----------	15
Owentown	Normal	1,500	Virginia wildrye----------	15
	Unfavorable	1,000	Longleaf uniola----------	15
			Panicum----------	15
ReC, ReE, ReG-------	Favorable	2,300	Pinehill bluestem----------	50
Redsprings	Normal	1,800	Finsleaf bluestem----------	10
	Unfavorable	1,200	Longleaf uniola----------	10
			Big bluestem----------	10
			Pineywoods dropseed----------	5
			Indiangrass----------	5
			Cutover muhly----------	5
RgC----------	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
RzB----------	Favorable	1,800	Pinehill bluestem----------	50
Rentzel	Normal	1,400	Longleaf uniola----------	10
	Unfavorable	1,000	Beaked panicum----------	10
			Purpletop----------	5
SaB----------	Favorable	3,000	Bluestem----------	25
Sacul	Normal	2,200	Beaked panicum----------	15
	Unfavorable	1,500	Panicum----------	7
			Plumegrass----------	8
			Uniola----------	10
			Sedge----------	5
			Other perennial----------	10
			Other shrubs----------	10
			Other perennial grasses----------	10
StB----------	Favorable	1,800	Pinehill bluestem----------	50
Sawlit	Normal	1,600	Longleaf uniola----------	10
	Unfavorable	1,200	Beaked panicum----------	10
			Purpletop----------	10
SwA*:----------				
Sawlit	Favorable	1,800	Pinehill bluestem----------	50
	Normal	1,600	Longleaf uniola----------	10
	Unfavorable	1,200	Beaked panicum----------	10
			Purpletop----------	10

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
SwA*:				
Sawtown	Favorable	1,800	Pinehill bluestem	50
	Normal	1,600	Slender bluestem	5
	Unfavorable	1,200	Longleaf uniola	5
			Splitbeard bluestem	5
			Southern bayberry	5
			Carolina jessamine	5
			Yaupon	5
			American beautyberry	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
ToC, ToE, ToG	Favorable	2,000	Broomsedge bluestem	20
Tonkawa	Normal	1,200	Pinehill bluestem	20
	Unfavorable	800	Arrowfeather threeawn	15
			Panicum	10
			Indiangrass	10
UtB	Favorable	3,500	Longleaf uniola	15
Ulto	Normal	2,000	Indiangrass	15
	Unfavorable	1,500	Sedge	15
			Pinehill bluestem	10
			Beaked panicum	10
			Panicum	10
			Brownseed paspalum	5
WoB	Favorable	3,000	Pinehill bluestem	15
Woden	Normal	2,000	Beaked panicum	15
	Unfavorable	1,500	Panicum	15
			Longleaf uniola	10
			Brownseed paspalum	10
			Indiangrass	5
			Purpletop	5
WtB	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
WtE	Favorable	2,500	Pinehill bluestem	15
Woodtell	Normal	2,000	Longleaf uniola	10
	Unfavorable	1,500	Panicum	5
			Purpletop	5
			Hawthorn	5
			Greenbrier	5
			Southern red oak	5
			Indiangrass	5

*See description of the map unit for composition and behavior characteristics of the map unit.

Table 8.--Wildlife Habitat

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

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
AyB---- Attoyac	Good	Good	Good	---	Good	Poor	Very poor.	Good	Good	Very poor.
AyE---- Attoyac	Fair	Good	Good	---	Good	Poor	Very poor.	Good	Good	Very poor.
BaB---- 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.
BtB---- Betis	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
BvB---- Bienville	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
BwB---- Bowie	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ChE, CtE---- Cuthbert	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CbG---- Cuthbert	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CsG---- Cuthbert	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	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.
DeA---- Derly	Fair	Fair	Good	Fair	Fair	Good	Good	Fair	Fair	Good.
Dr---- Dreka	Poor	Fair	Fair	Good	Poor	Fair	Fair	Fair	Good	Fair.
Es---- Estes	Very poor.	Poor	Fair	Good	---	Fair	Fair	Poor	Fair	Fair.
GaA*:										
Gallime----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Alazan----	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Ha---- Hannahatchee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Iu---- Iulus	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

See footnote at end of table.

Table 8.--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
KaA--Kawah	Poor	Fair	Good	Good	Good	Fair	Poor	Fair	Fair	Poor.
Kc--Keechi	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
KfC--Kirvin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KfE--Kirvin	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	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.
La--Laneville	Good	Good	Good	Good	---	Poor	Poor	Poor	Good	Poor.
Lf--Laneville	Poor	Fair	Fair	Good	---	Fair	Poor	Poor	Good	Poor.
LtB--Latex	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LyC--Lilbert	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
MaE--Maben	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Me--Mattex	Poor	Fair	Fair	Good	---	Fair	Fair	Fair	Good	Fair.
Mo*:										
Mattex	Poor	Fair	Fair	Good	---	Fair	Fair	Fair	Good	Fair.
Owentown	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
MtC--Meth	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MvA*:										
Mollville	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Besner	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Na--Naconiche	Very poor.	Poor	Poor	Poor	Poor	Fair	Good	Poor	Fair	Fair.
Ow--Owentown	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
PrC--Pirkey	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

Table 8--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
PrD---- Pirkey	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Pt*. Pits										
ReG---- Redsprings	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
ReC---- Redsprings	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ReE---- Redsprings	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RgC---- Redsprings	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RzB---- Rentzel	Poor	Fair	Good	Good	Good	Fair	Poor	Fair	Good	Poor.
SaB---- Sacul	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
StB---- Sawlit	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
SwA*:										
Sawlit----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Sawtown----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TeE---- Tenaha	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
ToC, ToG, ToE---- Tonkawa	Poor	Poor	Fair	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
UtB---- Ulto	Good	Good	Good	Good	Good	Very poor.	Poor	Good	Good	Poor.
WoB---- Woden	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
WtB---- Woodtell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Poor.
WtE---- Woodtell	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 9.--Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AyB---- Attoyac	Slight	Slight	Slight	Slight	Moderate: low strength.	Slight.
AyE---- Attoyac	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
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.
BtB---- Betis	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
BvB---- Bienville	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
BwB---- Bowie	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Moderate: low strength.	Slight.
CbE---- Cuthbert	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: droughty.
CbG---- Cuthbert	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Moderate: droughty.
CsG---- Cuthbert	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
CtE---- Cuthbert	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, droughty.
DaC---- Darco	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
DaE---- Darco	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
DeA---- Derly	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
Dr---- Dreka	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Severe: flooding.

See footnote at end of table.

Table 9.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Es---------- Estes	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding, too clayey.
GaA*:						
Gallime----------	Moderate: wetness.	Slight---------	Moderate: wetness, shrink-swell.	Slight---------	Slight---------	Slight.
Alazan----------	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Moderate: wetness.
Ha---------- Hannahatchee	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Iu---------- Iulus	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, flooding.
KaA---------- Kawah	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
Kc---------- Keechi	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding.	Severe: ponding, flooding.
KfC---------- Kirvin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
KfE---------- Kirvin	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
KgC---------- Kirvin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Severe: small stones.
KsC---------- Kirvin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
La---------- Laneville	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness, shrink-swell.	Severe: flooding.	Severe: low strength, flooding.	Moderate: wetness, flooding.
Lf---------- Laneville	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness, shrink-swell.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
LtB---------- Latex	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Slight.
LyC---------- Lilbert	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.

See footnote at end of table.

Table 9.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MaE--- Maben	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope, slippage.	Severe: low strength.	Moderate: slope.
Me--- Mattex	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.
Mo*:						
Mattex---	Severe: wetnsss.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.
Owentown---	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
MtC--- Meth	Moderate: too clayey.	Moderate: shrink-swell.	Slight---	Moderate: shrink-swell.	Severe: low strength.	Slight.
MvA*:						
Mollville---	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Besner---	Moderate: wetness.	Slight---	Moderate: wetness.	Slight---	Slight---	Slight.
Na--- Naconiche	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Ow--- Owentown	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
PrC--- Pirkey	Moderate: too clayey.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Severe: low strength, unstable fill.	Slight.
PrD--- Pirkey	Moderate: too clayey, slope.	Severe: unstable fill.	Severe: unstable fill.	Severe: slope, unstable fill.	Severe: low strength, unstable fill.	Moderate: slope.
Pt*. Pits						
ReC--- Redsprings	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Moderate: small stones.
ReE--- Redsprings	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: small stones, slope.
ReG--- Redsprings	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RgC--- Redsprings	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Moderate: too clayey, small stones.

See footnote at end of table.

Table 9.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
RzB---- Rentzel	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, too sandy.
SaB---- Sacul	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
StB---- Sawlit	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight.
SwA*:						
Sawlit----	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight.
Sawtown----	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Slight.
TaE---- Tenaha	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
ToC---- Tonkawa	Severe: cutbanks cave.	Slight----	Slight----	Moderate: slope.	Slight----	Severe: droughty.
ToE---- Tonkawa	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
ToG---- Tonkawa	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
UtB---- Ulto	Slight----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Moderate: large stones, droughty.
WoB---- Woden	Slight----	Slight----	Slight----	Slight----	Slight----	Slight.
WtB---- Woodtell	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
WtE---- Woodtell	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 10.--Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "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
AyB Attoyac	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
AyE Attoyac	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
BeB, BeD Bernaldo	Moderate: wetness, percs slowly.	Severe: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
BtB Betis	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
BvB Bienville	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: too sandy.
BwB Bowie	Severe: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Moderate: wetness, too clayey.	Slight	Fair: too clayey.
ChE, CtE Cuthbert	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
CbG, CsG 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.
DeA Derly	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Dr Dreka	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Es Estes	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.

See footnote at end of table.

Table 10.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GaA*:					
Gallima	Moderate: wetness, percs slowly.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Fair: too clayey.
Alazan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Ha Hannahatchee	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
Iu Iulus	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Fair: wetness.
KaA Kawah	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Kc Keechi	Severe: flooding, ponding, percs slowly.	Severe: seepage, flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
KfC Kirvin	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
KfE Kirvin	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
KgC, KsC Kirvin	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
La, Lf Laneville	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
LtB Latex	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Moderate: wetness, too clayey.	Slight	Fair: too clayey, wetness, thin layer.
LyC Lilbert	Severe: percs slowly.	Severe: seepage.	Slight	Severe: seepage.	Good.
MaE Maben	Severe: percs slowly.	Severe: slope, slippage.	Moderate: slope.	Moderate: slope.	Fair: slope.
Me Mattex	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.

See footnote at end of table.

Table 10.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Mo*:					
Mattex	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Owentown	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.
MtC	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Meth					
MvA*:					
Mollville	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
Besner	Moderate: wetness, percs slowly.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Good.
Na	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
Naconiche					
Ow	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.
Owentown					
PrC	Severe: percs slowly.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: too clayey.
Pirkey					
PrD	Severe: percs slowly.	Severe: slope, unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: too clayey.
Pirkey					
Pt*.					
Pits					
ReC	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
Redsprings					
ReE	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
Redsprings					
ReG	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Redsprings					
RgC	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
Redsprings					

See footnote at end of table.

Table 10.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
RzB Rentzel	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage.	Fair: wetness.
SaB Sacul	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
StB Sawlit	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
SwA*:					
Sawlit	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
Sawtown	Severe: wetness, percs slowly.	Severe: seepage.	Moderate: wetness, too clayey.	Severe: seepage.	Fair: too clayey, thin layer.
TeE Tenaha	Severe: percs slowly, poor filter.	Severe: seepage, slope.	Moderate: slope, too sandy.	Severe: seepage.	Fair: too sandy, slope, thin layer.
ToC Tonkawa	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
ToE Tonkawa	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
ToG Tonkawa	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
UtB Ulto	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
WoB Wodan	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
WtB Woodtell	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
WtE Woodtell	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 11.--Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," 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
AyB Attoyac	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
AyE Attoyac	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
BeB, BeD Bernaldo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
BtB Betis	Good	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
BvB Bienville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
BwB Bowie	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
CbE Cuthbert	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CbG Cuthbert	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
CsG Cuthbert	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
CtE Cuthbert	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
DaC, DaE Darco	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too sandy.
DeA Derly	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Dr Draka	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: 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 11.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GaA*:				
Gallime	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Alazan	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Ha	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Hannahatchee				
Iu	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Iulus				
KaA	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Kawah				
Kc	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Keechi				
KfC, KfE, KgC, KsC	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Kirvin				
La, Lf	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
Laneville				
LtB	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Latex				
LyC	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
Lilbert				
MaE	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Maben				
Me	Fair: thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Mattex				
Mo*:				
Mattex	Fair: thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Owentown	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
MtC	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Meth				
MvA*:				
Mollville	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Besner	Good	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

Table 11.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Na Nacconiche	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Ow Owentown	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
PrC, PrD Pirkey	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Pt*. Pits				
ReC, ReE Redsprings	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
ReG Redsprings	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
RgC Redsprings	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
RzB Rentzel	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
SaB Sacul	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
StB Sawlit	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
SwA*: Sawlit	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
Sawtown	Fair: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
TeE Tenaha	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones, slope.
ToC Tonkawa	Good	Probable	Improbable: too sandy.	Poor: too sandy.
ToE Tonkawa	Good	Probable	Improbable: too sandy.	Poor: too sandy.
ToG Tonkawa	Poor: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.

See footnote at end of table.

Table 11.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
UtB---------- Ulto	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
WoB---------- Woden	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.
WtB---------- Woodtell	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
WtE---------- Woodtell	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 12.--Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
AyB---------- Attoyac	Moderate: seepage.	Moderate: piping.	Deep to water----	Favorable--------	Favorable.
AyE---------- Attoyac	Moderate: seepage.	Moderate: piping.	Deep to water----	Slope----------	Slope.
BeB, BeD---------- Bernaldo	Moderate: seepage.	Moderate: piping.	Deep to water----	Favorable--------	Favorable.
BtB---------- Betis	Severe: seepage.	Severe: seepage, piping.	Deep to water----	Too sandy, soil blowing.	Droughty.
BvB---------- Bienville	Severe: seepage.	Severe: seepage, piping.	Deep to water----	Too sandy, soil blowing.	Droughty.
BwB---------- Bowie	Moderate: seepage.	Moderate: piping.	Deep to water----	Favorable--------	Favorable.
CbE---------- Cuthbert	Moderate: seepage.	Moderate: piping.	Deep to water----	Slope, erodes easily, percs slowly.	Slope, erodes easily, droughty.
CbG---------- Cuthbert	Moderate: seepage.	Moderate: piping.	Deep to water----	Slope, erodes easily, percs slowly.	Slope, erodes easily, droughty.
CsG---------- Cuthbert	Severe: slope.	Moderate: piping.	Deep to water----	Slope, percs slowly.	Slope, droughty, percs slowly.
CtE---------- Cuthbert	Moderate: seepage.	Moderate: piping.	Deep to water----	Slope, percs slowly.	Slope, droughty.
DaC---------- Darco	Severe: seepage.	Severe: seepage, piping.	Deep to water----	Too sandy, soil blowing.	Droughty, rooting depth.
DaE---------- Darco	Severe: seepage.	Severe: seepage, piping.	Deep to water----	Slope, too sandy, soil blowing.	Slope, droughty, rooting depth.
DeA---------- Derly	Slight----------	Severe: ponding.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
Dr---------- Dreka	Slight----------	Severe: piping.	Flooding---------	Erodes easily, wetness.	Wetness, erodes easily.
Es---------- Estes	Slight----------	Severe: wetness.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.

See footnote at end of table.

Table 12.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
GaA*:					
Gallime	Severe: seepage.	Moderate: piping.	Deep to water	Soil blowing	Favorable.
Alazan	Moderate: seepage.	Severe: wetness.	Favorable	Erodes easily, wetness, soil blowing.	Erodes easily.
Ha Hannahatchee	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing	Favorable.
Iu Iulus	Moderate: seepage.	Severe: piping.	Flooding	Erodes easily, wetness.	Erodes easily, wetness.
KaA Kawah	Severe: seepage.	Severe: seepage, piping, wetness.	Cutbanks cave	Wetness, too sandy, soil blowing.	Droughty.
Kc Keechi	Moderate: seepage.	Severe: seepage, piping, ponding.	Ponding, flooding, cutbanks cave.	Ponding, too sandy, soil blowing.	Wetness, droughty.
KfC Kirvin	Slight	Severe: hard to pack.	Deep to water	Erodes easily	Erodes easily.
KfE Kirvin	Slight	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
KgC, KsC Kirvin	Slight	Severe: hard to pack.	Deep to water	Favorable	Favorable.
La, Lf Laneville	Slight	Moderate: hard to pack, wetness.	Percs slowly, flooding.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
LtB Latex	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, soil blowing.	Erodes easily.
LyC Lilbert	Severe: seepage.	Moderate: piping.	Deep to water	Soil blowing	Droughty.
MaE Maben	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope.
Me Mattex	Moderate: seepage.	Severe: piping.	Flooding	Wetness	Wetness.
Mo*:					
Mattex	Moderate: seepage.	Severe: piping.	Flooding	Wetness	Wetness.
Owentown	Severe: seepage.	Severe: piping.	Flooding	Wetness, soil blowing.	Droughty.
MtC Meth	Moderate: seepage, slope.	Severe: piping.	Deep to water	Favorable	Favorable.

See footnote at end of table.

Table 12.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
MvA*:					
Mollville	Slight	Severe: ponding.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
Besner	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Favorable.
Na	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, cutbanks cave.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Naconiche					
Ow	Severe: seepage.	Severe: piping.	Flooding	Wetness, soil blowing.	Droughty.
Owentown					
PrC	Moderate: slope.	Moderate: piping.	Deep to water	Erodes easily, percs slowly.	Erodes easily, rooting depth.
Pirkey					
PrD	Severe: slope.	Moderate: piping.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, rooting depth.
Pirkey					
Pt*.					
Pits					
ReC	Slight	Moderate: hard to pack.	Deep to water	Favorable	Favorable.
Redsprings					
ReE	Slight	Moderate: hard to pack.	Deep to water	Slope	Slope.
Redsprings					
ReG	Slight	Moderate: hard to pack.	Deep to water	Slope	Slope.
Redsprings					
RgC	Slight	Moderate: hard to pack.	Deep to water	Favorable	Favorable.
Redsprings					
RzB	Severe: seepage.	Severe: piping.	Favorable	Wetness, soil blowing.	Favorable.
Rentzel					
SaB	Slight	Moderate: hard to pack, wetness.	Percs slowly	Wetness, soil blowing.	Percs slowly.
Sacul					
StB	Moderate: seepage.	Severe: hard to pack.	Percs slowly	Erodes easily, wetness.	Erodes easily, percs slowly.
Sawlit					
SwA*:					
Sawlit	Moderate: seepage.	Severe: hard to pack.	Percs slowly	Erodes easily, wetness.	Erodes easily, percs slowly.
Sawtown	Severe: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily.
TeE	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, soil blowing.	Slope, droughty.
Tenaha					
ToC	Severe: seepage.	Severe: seepage.	Deep to water	Too sandy, soil blowing.	Droughty.
Tonkawa					

See footnote at end of table.

Table 12.--Water Management--Continued

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
ToG, ToE---------- Tonkawa	Severe: seepage.	Severe: seepage.	Deep to water----	Slope, too sandy, soil blowing.	Slope, droughty.
UtB---------- Ulto	Moderate: seepage.	Moderate: piping.	Deep to water----	Soil blowing-----	Droughty.
WoB---------- Woden	Severe: seepage.	Severe: piping.	Deep to water----	Soil blowing-----	Favorable.
WtB---------- Woodtell	Slight----------	Severe: hard to pack.	Deep to water----	Erodes easily, percs slowly.	Erodes easily, percs slowly.
WtE---------- Woodtell	Slight----------	Severe: hard to pack.	Deep to water----	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 13.--Engineering Index Properties

(The symbol < means less than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
AyB---------- Attoyac	0-14	Fine sandy loam	SC-SM, CL-ML, ML, SM	A-4	0	98-100	95-100	70-100	40-65	<23	NP-7
	14-80	Sandy clay loam, loam.	CL, SC	A-4, A-6	0	98-100	95-100	80-100	45-75	23-40	7-24
AyE---------- Attoyac	0-13	Fine sandy loam	SC-SM, CL-ML, ML, SM	A-4	0	98-100	95-100	70-100	40-65	<23	NP-7
	13-80	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	0-4	Very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	90-100	51-75	<25	NP-5
	4-17	Very fine sandy loam, loam.	ML, SM, CL-ML	A-4	0	100	95-100	90-100	40-70	<25	NP-5
	17-49	Loam, sandy clay loam, clay loam.	CL	A-6	0	99-100	98-100	90-100	51-75	26-40	12-24
	49-80	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	0-3	Very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	90-100	51-75	<25	NP-5
	3-14	Very fine sandy loam, loam.	ML, SM, CL-ML	A-4	0	100	95-100	90-100	40-70	<25	NP-5
	14-62	Loam, sandy clay loam, clay loam.	CL	A-6	0	99-100	98-100	90-100	51-75	26-40	12-24
	62-80	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
BtB---------- Betis	0-9	Loamy fine sand	SM, SP-SM	A-2	0	100	97-100	90-100	10-35	---	NP
	9-49	Fine sand, loamy fine sand.	SM, SP-SM	A-2	0	100	97-100	90-100	10-35	---	NP
	49-80	Fine sand, loamy fine sand.	SM	A-2, A-4	0	100	97-100	90-100	25-50	---	NP
BvB---------- Bienville	0-12	Loamy fine sand	SM, SC-SM	A-2-4, A-4	0	100	100	90-100	15-50	<25	NP-5
	12-40	Loamy fine sand, fine sand.	SM	A-2-4, A-4	0	100	100	90-100	15-50	<25	NP-3
	40-80	Loamy fine sand	SM, ML	A-2-4, A-4	0	100	100	90-100	20-55	<25	NP-3
BwB---------- Bowie	0-10	Very 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
	10-49	Sandy clay loam, clay loam.	SC, CL	A-4, A-6	0	90-100	87-100	80-100	40-72	20-40	8-25
	49-80	Sandy clay loam, clay loam, fine sandy loam.	SC, CL	A-4, A-6, A-2	0	80-100	70-100	65-100	34-77	20-40	8-25

See footnote at end of table.

Table 13.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
CbE---------- Cuthbert	0-8	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2-4, A-4	0-5	85-100	78-100	75-98	20-55	<32	NP-7
	8-19	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
	19-36	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
	36-60	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
CbG---------- Cuthbert	0-4	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2-4, A-4	0-5	85-100	78-100	75-98	20-55	<32	NP-7
	4-24	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
	24-60	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
CsG---------- Cuthbert	0-8	Stony fine sandy loam.	SM, SC-SM, CL-ML, ML	A-4	0-5	90-100	85-100	75-98	36-60	<30	NP-6
	8-33	Sandy clay loam, clay.	CH, CL, SC	A-7, A-6	0-5	85-100	75-100	65-100	45-98	37-63	20-40
	33-60	Stratified fine sandy loam to clay.	SC, CL	A-6, A-7, A-2-6	0-5	85-100	80-100	75-100	28-84	21-45	7-26
CtE---------- Cuthbert	0-13	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
	13-25	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
	25-37	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
	37-60	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	0-10	Loamy fine sand	SM	A-2-4	0-2	95-100	95-100	75-100	15-30	16-27	NP-3
	10-54	Loamy fine sand	SM	A-2-4	0-2	95-100	95-100	75-100	15-30	16-20	NP-3
	54-80	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	0-4	Loamy fine sand	SM	A-2-4	0-2	95-100	95-100	75-100	15-30	16-27	NP-3
	4-55	Loamy fine sand	SM	A-2-4	0-2	95-100	95-100	75-100	15-30	16-20	NP-3
	55-80	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

See footnote at end of table.

Table 13.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
DeA---------- Derly	0-7	Silt loam--------	ML, CL, CL-ML	A-4	0	100	100	85-100	55-90	<30	NP-10
	7-11	Clay loam, silty clay loam, clay.	CL, CH	A-7, A-6	0	100	100	90-100	70-95	35-60	20-36
	11-57	Clay loam, clay	CH, CL	A-7, A-6	0	100	100	90-100	75-95	39-60	26-36
	57-80	Loam, clay loam, clay.	CH, CL	A-7, A-6	0	100	100	90-100	56-95	34-60	20-36
Dr---------- Dreka	0-10	Loam----------	CL-ML, CL	A-4, A-6	0	100	95-100	90-100	70-90	20-40	6-21
	10-49	Loam, silty clay loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	70-95	20-44	6-25
	49-80	Clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	100	95-100	90-100	75-98	35-55	20-35
Es---------- Estes	0-9	Clay----------	CL, CH	A-7-6	0	100	100	95-100	69-100	41-55	23-35
	9-60	Silty clay, clay	CL, CH	A-7-6	0	100	100	95-100	75-100	41-60	25-40
	60-80	Sandy clay loam, silty clay loam, clay loam.	CL	A-7-6, A-6	0	100	100	95-100	65-95	30-46	15-30
GaA*:											
Gallime---------	0-8	Very fine sandy loam.	SM, SC, CL, ML	A-4	0	95-100	95-100	90-100	45-65	15-28	3-10
	8-24	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
	24-80	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
Alazan----------	0-10	Loam----------	ML, CL-ML	A-4	0	100	96-100	90-100	51-80	<25	NP-7
	10-80	Loam, sandy clay loam.	CL	A-6, A-4	0	100	96-100	90-100	51-85	25-40	8-22
Ha---------- Hannahatchee	0-6	Fine sandy loam	SC-SM, CL-ML, CL	A-4, A-6	0	98-100	96-100	70-90	40-65	16-30	3-11
	6-80	Fine sandy loam, loam, sandy clay loam.	CL-ML, SC, CL	A-4, A-6	0	98-100	96-100	85-90	45-65	20-31	5-12
Iu---------- Iulus	0-4	Fine sandy loam	CL-ML, ML	A-4	0	95-100	95-100	85-95	51-75	16-25	NP-6
	4-35	Sandy loam, loam	CL-ML, SM, ML, SC-SM	A-4	0	95-100	85-100	80-95	45-75	16-25	NP-6
	35-80	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
KaA---------- Kawah	0-15	Fine sand--------	SP-SM, SM	A-3, A-2-4	0	98-100	95-100	50-80	5-20	<25	NP-4
	15-80	Fine sand--------	SP-SM, SM	A-3, A-2-4	0	98-100	95-100	50-80	5-20	<25	NP-4
Kc---------- Keechi	0-7	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2-4, A-4	0	95-100	95-100	60-85	30-55	16-30	NP-7
	7-64	Stratified loamy fine sand to loam.	SM, ML, SC-SM, CL-ML	A-2-4, A-4	0	95-100	95-100	50-95	15-75	16-30	NP-10
	64-80	Clay loam, sandy clay loam.	CL, CH, SC	A-6, A-7-6	0	95-100	95-100	85-100	45-95	35-60	20-40

See footnote at end of table.

Table 13.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
KfC---------- Kirvin	0-5	Fine sandy loam	SM, ML, CL, SC	A-4	0-2	95-100	95-98	90-95	36-70	<30	NP-8
	5-36	Clay loam, sandy clay, clay.	CL, CH	A-7	0-1	95-100	90-100	85-100	53-95	42-67	24-43
	36-48	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
	48-65	Stratified fine sandy loam to clay loam.	SC, CL, CH	A-4, A-6, A-7	0-1	95-100	90-100	50-90	36-80	25-52	9-32
KfE---------- Kirvin	0-6	Fine sandy loam	SM, ML, CL, SC	A-4	0-2	95-100	95-98	90-95	36-70	<30	NP-8
	6-38	Clay loam, sandy clay, clay.	CL, CH	A-7	0-1	95-100	90-100	85-100	53-95	42-67	24-43
	38-51	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
	51-80	Stratified fine sandy loam to clay loam.	SC, CL, CH	A-4, A-6, A-7	0-1	95-100	90-100	50-90	36-80	25-52	9-32
KgC---------- Kirvin	0-16	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
	16-31	Clay loam, sandy clay, clay.	CL, CH	A-7	0-1	95-100	90-100	85-100	53-95	42-67	24-43
	31-44	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
	44-62	Stratified fine sandy loam to clay loam.	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	0-4	Clay loam--------	CL, CH	A-6, A-7	0-1	95-100	90-100	85-99	51-80	32-52	16-32
	4-41	Clay, sandy clay, clay loam.	CL, CH	A-7	0-2	95-100	88-100	84-99	51-95	45-67	24-43
	41-80	Stratified sandy clay loam to clay loam.	SC, CL, CH	A-4, A-6, A-7	0-1	95-100	90-100	50-90	36-80	25-52	9-32
La---------- Lanaville	0-16	Loam----------	CL-ML, ML, CL	A-4, A-6	0	100	95-100	90-100	80-95	18-40	3-20
	16-48	Loam, clay loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	95-100	90-100	85-98	20-40	6-20
	48-80	Clay loam, clay	CL, CH	A-6, A-7	0	100	95-100	90-100	85-98	35-55	20-35
Lf---------- Lanaville	0-15	Loam----------	CL-ML, ML, CL	A-4, A-6	0	100	95-100	90-100	80-95	18-40	3-20
	15-36	Loam, clay loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	95-100	90-100	85-98	20-40	6-20
	36-80	Clay loam, clay	CL, CH	A-6, A-7	0	100	95-100	90-100	85-98	35-55	20-35
LtB---------- Latex	0-9	Very fine sandy loam.	SM, SC-SM, SC, CL-ML	A-4	0	99-100	96-100	90-100	45-75	19-30	2-9
	9-46	Loam, clay loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0	99-100	95-100	90-100	51-80	20-40	6-25
	46-80	Clay, silty clay, clay loam.	CH, CL	A-7-6	0	99-100	95-100	90-100	75-98	41-70	20-43

See footnote at end of table.

Table 13.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
LyC--------- Lilbert	0-10	Loamy fine sand	SM	A-2-4, A-4	0	95-100	95-100	80-100	17-40	<20	NP-3
	10-29	Loamy fine sand	SM	A-2-4, A-4	0	95-100	95-100	80-100	17-40	<20	NP-3
	29-49	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
	49-80	Sandy clay loam	SC, CL	A-6, A-4	0	90-100	90-100	85-100	35-75	22-39	8-20
MaE--------- Maben	0-4	Fine sandy loam	SM, SC-SM	A-4	0	95-100	90-100	70-85	36-50	<30	NP-7
	4-38	Clay, clay loam, silty clay, silty clay loam.	MH	A-7	0	90-100	90-100	90-100	75-95	50-80	18-40
	38-60	Stratified loam to weathered bedrock.	CL, ML, CH, MH	A-6, A-7	0	95-100	80-95	70-90	60-75	30-60	11-25
Me--------- Mattex	0-8	Clay loam--------	CL, CL-ML, SC	A-4, A-6	0	100	100	85-100	45-75	20-36	5-16
	8-44	Very fine sandy loam, loam, sandy clay loam, clay loam.	CL-ML, CL, SC	A-4, A-6	0	100	100	80-95	45-65	20-38	5-19
	44-80	Clay loam, clay	CL	A-6, A-7	0	100	100	90-100	70-95	38-48	15-22
Mo*:											
Mattex----------	0-5	Loam----------	CL, CL-ML, SC	A-4, A-6	0	100	100	85-100	45-75	20-36	5-16
	5-80	Very fine sandy loam, loam, sandy clay loam, clay loam.	CL-ML, CL, SC	A-4, A-6	0	100	100	80-95	45-65	20-38	5-19
Owentown--------	0-14	Loam----------	SM, ML, CL-ML, SC-SM	A-4	0	100	95-100	80-100	36-66	<28	NP-10
	14-80	Fine sandy loam, loam.	SM, ML, CL-ML, SC-SM	A-4	0	100	95-100	80-100	36-66	<28	NP-10
MtC--------- Meth	0-12	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-4	0	98-100	85-100	65-100	40-75	<25	NP-5
	12-51	Clay, clay loam	CL, SC, CH	A-6, A-7-6, A-7-5	0	100	100	85-100	45-95	36-66	14-34
	51-80	Sandy clay loam, sandy loam, fine sandy loam.	CL, SC, SC-SM, CL-ML	A-6, A-4, A-7-6	0	100	100	75-100	40-60	25-45	5-21
MvA*:											
Mollvilla--------	0-13	Loam----------	ML, CL-ML, CL	A-4, A-6	0	100	100	85-100	50-80	20-35	3-15
	13-21	Loam, sandy clay loam, clay loam.	CL, SC	A-6, A-4	0	100	100	90-100	45-75	25-40	8-22
	21-80	Loam, sandy clay loam, clay loam.	CL	A-6	0	100	100	90-100	70-80	30-40	11-20

See footnote at end of table.

Table 13.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
MvA*:											
Beaner	0-4	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-4	0	100	95-100	90-100	45-70	<25	NP-7
	4-32	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-4	0	100	95-100	90-100	45-70	<25	NP-7
	32-58	Loam, fine sandy loam.	CL-ML, ML, SC-SM, SM	A-4	0	100	95-100	80-100	40-75	<25	NP-7
	58-65	Loam, sandy clay loam.	SC, CL, CL-ML, SC-SM	A-6, A-4	0	100	95-100	80-100	36-75	18-30	6-15
Na	0-12	Mucky sandy loam	SM, SC-SM	A-4, A-2-4	0	98-100	95-100	80-100	25-50	15-25	NP-6
Nacconiche	12-29	Sand, loamy sand, mucky fine sandy loam.	SP-SM, SM, SC-SM	A-2-4	0	98-100	95-100	75-98	10-35	15-25	NP-6
	29-80	Stratified sand or fine sand.	SP-SM, SM, SC-SM	A-2-4	0	98-100	95-100	70-98	10-35	15-25	NP-6
Ow	0-16	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-4	0	100	95-100	80-100	36-66	<28	NP-10
Owentown	16-80	Fine sandy loam, loam.	SM, ML, CL-ML, SC-SM	A-4	0	100	95-100	80-100	36-66	<28	NP-10
PrC	0-15	Very fine sandy loam.	ML, CL-ML	A-4	0-5	98-100	95-100	70-90	50-65	<25	NP-7
Pirkey	15-55	Stratified fine sandy loam to clay.	CL	A-4, A-6, A-7	0-2	98-100	95-100	60-90	60-85	23-45	7-25
	55-80	Stratified fine sandy loam to clay.	CL	A-4, A-6, A-7	0-5	98-100	95-100	75-98	70-90	25-46	7-25
PrD	0-10	Fine sandy loam	ML, CL-ML	A-4	0-5	98-100	95-100	70-90	50-65	<25	NP-7
Pirkey	10-50	Stratified sandy clay loam to clay.	CL	A-4, A-6, A-7	0-2	98-100	95-100	60-90	60-85	23-45	7-25
	50-80	Fine sandy loam to silty clay.	CL	A-4, A-6, A-7	0-5	98-100	95-100	75-98	70-90	25-46	7-25
Pt*.											
Pits											
ReC	0-6	Gravelly fine sandy loam.	SC, CL-ML, CL, SC-SM	A-2-4, A-4, A-2-7	0-5	80-95	65-80	60-80	25-55	20-42	4-20
Redsprings	6-44	Clay loam, clay	CL, CH	A-7-6	0-2	70-100	70-98	65-90	51-75	41-60	18-35
	44-80	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 13.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
ReE---------- Redsprings	0-10	Gravelly fine sandy loam.	SC, CL-ML, CL, SC-SM	A-2-4, A-4, A-2-7	0-5	80-95	65-80	60-80	25-55	20-42	4-20
	10-34	Clay loam, clay	CL, CH	A-7-6	0-2	70-100	70-98	65-90	51-75	41-60	18-35
	34-45	Sandy clay loam, clay loam, clay.	CL, CH	A-6, A-7-6	0-7	95-100	90-100	75-100	51-90	32-56	16-30
	45-60	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
ReG---------- Redsprings	0-5	Gravelly fine sandy loam.	SC, CL-ML, CL, SC-SM	A-2-4, A-4, A-2-7	0-5	80-95	65-80	60-80	25-55	20-42	4-20
	5-48	Clay loam, clay	CL, CH	A-7-6	0-2	70-100	70-98	65-90	51-75	41-60	18-35
	48-56	Sandy clay loam, clay loam, clay.	CL, CH	A-6, A-7-6	0-7	95-100	90-100	75-100	51-90	32-56	16-30
	56-65	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
RgC---------- Redsprings	0-2	Clay loam--------	SC, CL	A-4, A-6, A-7-6	0-3	95-100	85-100	50-90	36-80	25-50	9-27
	2-32	Clay loam, clay	CL, CH	A-7-6	0-7	70-100	70-98	65-85	51-75	41-60	18-30
	32-44	Sandy clay loam, clay loam, clay.	CL, CH	A-6, A-7-6	0-7	95-100	90-100	75-100	51-90	32-52	16-30
	44-60	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
RzB---------- Rentzel	0-9	Loamy fine sand	SM	A-2-4, A-4	0	97-100	95-100	75-98	15-40	<30	NP-4
	9-26	Loamy fine sand	SM	A-2-4, A-4	0	97-100	95-100	75-98	15-40	<30	NP-4
	26-80	Sandy clay loam, fine sandy loam.	SC, CL, SC-SM, CL-ML	A-6, A-4, A-7	0	95-100	90-100	75-98	36-55	20-43	4-22
SaB---------- Sacul	0-8	Fine sandy loam	SM, SC-SM	A-4, A-2	0	75-100	75-100	45-85	25-50	15-25	NP-7
	8-53	Clay, silty clay, clay loam.	CH, CL, SC	A-7	0	85-100	85-100	70-100	40-95	45-70	20-40
	53-80	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
StB---------- Sawlit	0-9	Loam----------	ML, CL, CL-ML	A-4	0	96-100	95-100	85-100	51-75	18-30	NP-10
	9-21	Loam, sandy clay loam, clay loam.	CL-ML, CL	A-4, A-6	0	96-100	95-100	85-100	60-85	20-40	5-20
	21-36	Loam, sandy clay loam, clay loam.	CL-ML, CL	A-4, A-6	0	96-100	95-100	85-100	65-90	24-40	6-22
	36-80	Clay loam, clay	CL, CH	A-7-6, A-6	0	96-100	95-100	85-100	65-95	39-65	20-45
SwA*:											
Sawlit----------	0-9	Loam----------	ML, CL, CL-ML	A-4	0	96-100	95-100	85-100	51-75	18-30	NP-10
	9-21	Loam, sandy clay loam, clay loam.	CL-ML, CL	A-4, A-6	0	96-100	95-100	85-100	60-85	20-40	5-20
	21-36	Loam, sandy clay loam, clay loam.	CL-ML, CL	A-4, A-6	0	96-100	95-100	85-100	65-90	24-40	6-22
	36-80	Clay loam, clay	CL, CH	A-7-6, A-6	0	96-100	95-100	85-100	65-95	39-65	20-45

See footnote at end of table.

Table 13.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
SwA*:											
Sawtown	0-9	Loam	ML, CL-ML	A-4	0	95-100	95-100	90-100	55-90	<25	NP-6
	9-23	Fine sandy loam, very fine sandy loam, loam.	CL-ML, ML, SM, SC-SM	A-4	0	95-100	95-100	85-100	45-80	<25	NP-6
	23-49	Loam, sandy clay loam, clay loam.	CL, CL-ML	A-6, A-4	0	95-100	95-100	90-100	55-85	24-40	6-22
	49-80	Clay loam, clay	CL, CH	A-6, A-7-6	0	95-100	95-100	90-100	65-95	39-65	20-45
TeE	0-4	Loamy fine sand	SM	A-2-4, A-4	0	95-100	95-100	70-95	15-40	16-20	NP-3
Tenaha	4-35	Loamy fine sand	SM	A-2-4, A-4	0	95-100	78-100	70-95	15-40	16-20	NP-3
	35-44	Fine sandy loam, sandy clay loam, loam.	SC, CL	A-6, A-4, A-7-6	0	95-100	95-100	80-100	36-66	25-46	8-26
	44-65	Stratified fine sandy loam to sandy clay loam.	SC, CL	A-6, A-7, A-2-6	0-3	89-100	85-100	80-100	28-84	25-45	11-26
ToC	0-12	Fine sand	SP-SM	A-3, A-2	0	100	97-100	90-100	6-12	<25	NP-3
Tonkawa	12-80	Fine sand	SP-SM	A-3, A-2	0	100	95-100	90-100	6-12	<25	NP-3
ToE	0-8	Fine sand	SP-SM	A-3, A-2	0	100	97-100	90-100	6-12	<25	NP-3
Tonkawa	8-80	Fine sand	SP-SM	A-3, A-2	0	100	95-100	90-100	6-12	<25	NP-3
ToG	0-6	Fine sand	SP-SM	A-3, A-2	0	100	97-100	90-100	6-12	<25	NP-3
Tonkawa	6-80	Fine sand	SP-SM	A-3, A-2	0	100	95-100	90-100	6-12	<25	NP-3
UtB	0-12	Fine sandy loam	SM, SC-SM, SC	A-2-4, A-4	0-10	98-100	85-98	80-98	34-50	15-25	2-10
Ulto	12-21	Fine sandy loam, loam, sandy clay loam.	SC-SM, SC, CL	A-4, A-6	0-10	98-100	85-98	80-98	40-65	20-35	6-15
	21-56	Sandy clay loam, clay loam, sandy loam.	SC, CL	A-6, A-7-6	0-10	95-100	85-98	75-95	49-85	30-44	11-22
	56-80	Fine sandy loam, sandy clay loam, clay loam.	SC, CL	A-4, A-6	0-10	95-100	85-98	75-95	40-75	25-40	8-20
WoB	0-11	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-4	0	98-100	98-100	70-85	40-65	<23	NP-7
Woden	11-80	Fine sandy loam, loam.	SM, ML, CL-ML, SC-SM	A-4	0	98-100	98-100	70-85	40-65	<23	NP-7
WtB	0-6	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
Woodtell	6-28	Clay, clay loam	CL, CH	A-7-6	0	100	90-100	80-100	60-98	40-75	25-46
	28-52	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
	52-64	Stratified 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

See footnote at end of table.

Table 13.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
WtE----------	0-8	Loam----------	CL, SC-SM, CL-ML, ML	A-4, A-6	0	98-100	98-100	95-100	40-89	20-37	3-20
Woodtell	8-36	Clay, silty clay	CH, CL	A-7-6	0	100	95-100	90-100	70-98	40-75	25-48
	36-51	Clay loam, silty clay loam, loam.	CL, CH	A-6, A-7-6	0	100	95-100	90-100	55-99	35-65	15-45
	51-64	Stratified fine sandy loam to shaly silty clay loam.	CL, SC, CL-ML, SC-SM	A-6, A-4, A-7-6	0	95-100	95-100	90-100	40-98	25-68	5-44

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 14.--Physical and Chemical Properties of the Soils

(The symbol < means less than. 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
AyB	0-14	8-20	1.30-1.50	2.0-6.0	0.11-0.16	5.1-6.5	<2	Low	0.28	5	<1
Attoyac	14-80	18-32	1.40-1.65	0.6-2.0	0.13-0.18	4.5-6.0	<2	Low	0.32		
AyE	0-13	8-20	1.30-1.50	2.0-6.0	0.11-0.16	5.1-6.5	<2	Low	0.28	5	<1
Attoyac	13-80	18-32	1.40-1.65	0.6-2.0	0.13-0.18	4.5-6.0	<2	Low	0.32		
BeB	0-4	3-15	1.30-1.50	2.0-6.0	0.11-0.16	5.1-6.5	<2	Low	0.32	5	.5-2
Bernaldo	4-17	3-15	1.30-1.50	2.0-6.0	0.11-0.16	5.1-6.5	<2	Low	0.32		
	17-49	15-30	1.40-1.65	0.6-2.0	0.13-0.18	4.5-6.5	<2	Moderate	0.32		
	49-80	10-30	1.45-1.65	0.6-2.0	0.13-0.18	4.5-6.5	<2	Low	0.32		
BeD	0-3	3-15	1.30-1.50	2.0-6.0	0.11-0.16	5.1-6.5	<2	Low	0.32	5	.5-2
Bernaldo	3-14	3-15	1.30-1.50	2.0-6.0	0.11-0.16	5.1-6.5	<2	Low	0.32		
	14-62	15-30	1.40-1.65	0.6-2.0	0.13-0.18	4.5-6.5	<2	Moderate	0.32		
	62-80	10-30	1.45-1.65	0.6-2.0	0.13-0.18	4.5-6.5	<2	Low	0.32		
BtB	0-9	2-10	1.20-1.50	6.0-20	0.05-0.10	4.5-6.0	<2	Low	0.17	5	.5-2
Betis	9-49	2-10	1.20-1.50	6.0-20	0.05-0.10	4.5-6.0	<2	Low	0.17		
	49-80	5-15	1.20-1.50	6.0-20	0.08-0.11	4.5-6.0	<2	Low	0.17		
BvB	0-12	4-15	1.35-1.65	6.0-20	0.07-0.11	5.1-6.5	<2	Low	0.20	5	<2
Bienville	12-40	2-15	1.35-1.60	2.0-6.0	0.08-0.11	5.1-6.5	<2	Low	0.20		
	40-80	5-20	1.35-1.70	2.0-6.0	0.08-0.13	4.5-6.0	<2	Low	0.20		
BwB	0-10	3-15	1.40-1.69	2.0-6.0	0.10-0.15	5.1-6.5	<2	Low	0.32	5	.5-1
Bowie	10-49	18-35	1.60-1.69	0.6-2.0	0.10-0.16	4.5-5.5	<2	Low	0.32		
	49-80	18-35	1.60-1.80	0.2-0.6	0.10-0.16	4.5-5.5	<2	Low	0.32		
CbE	0-8	2-15	1.20-1.40	2.0-6.0	0.09-0.12	4.5-6.5	<2	Low	0.37	3	.5-2
Cuthbert	8-19	35-60	1.24-1.45	0.2-0.6	0.10-0.15	4.5-5.5	<2	Moderate	0.32		
	19-36	20-50	1.35-1.60	0.2-0.6	0.08-0.14	3.6-5.5	<2	Moderate	0.32		
	36-60	20-45	1.40-1.65	0.06-0.6	0.08-0.14	3.6-5.0	<2	Moderate	0.32		
CbG	0-4	2-15	1.20-1.40	2.0-6.0	0.09-0.12	4.5-6.5	<2	Low	0.37	3	.5-2
Cuthbert	4-24	35-60	1.24-1.45	0.2-0.6	0.10-0.15	4.5-5.5	<2	Moderate	0.32		
	24-60	20-45	1.40-1.65	0.06-0.6	0.08-0.14	3.6-5.0	<2	Moderate	0.32		
CsG	0-8	2-15	1.45-1.60	2.0-6.0	0.07-0.11	4.5-6.5	<2	Low	0.28	3	.5-2
Cuthbert	8-33	35-60	1.25-1.45	0.2-0.6	0.10-0.15	4.5-5.5	<2	Moderate	0.32		
	33-60	20-45	1.40-1.65	0.06-0.6	0.08-0.14	3.6-5.0	<2	Moderate	0.32		
CtE	0-13	2-15	1.20-1.40	2.0-6.0	0.07-0.11	4.5-6.5	<2	Low	0.20	3	.5-2
Cuthbert	13-25	35-60	1.24-1.45	0.2-0.6	0.10-0.15	4.5-5.5	<2	Moderate	0.32		
	25-37	20-50	1.35-1.60	0.2-0.6	0.08-0.14	3.6-5.5	<2	Moderate	0.32		
	37-60	20-45	1.40-1.65	0.06-0.6	0.08-0.14	3.6-5.0	<2	Moderate	0.32		
DaC	0-10	3-15	1.35-1.55	6.0-20	0.05-0.10	4.5-6.5	0-0	Low	0.17	5	.5-1
Darco	10-54	3-15	1.60-1.85	6.0-20	0.05-0.10	4.5-6.5	0-0	Low	0.17		
	54-80	15-30	1.40-1.65	0.6-2.0	0.10-0.15	4.5-6.5	0-0	Low	0.24		
DaE	0-4	3-15	1.35-1.55	6.0-20	0.05-0.10	4.5-6.5	0-0	Low	0.17	5	.5-1
Darco	4-55	3-15	1.60-1.85	6.0-20	0.05-0.10	4.5-6.5	0-0	Low	0.17		
	55-80	15-30	1.40-1.65	0.6-2.0	0.10-0.15	4.5-6.5	0-0	Low	0.24		

See footnote at end of table.

Table 14.--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
DeA----------	0-7	8-20	1.40-1.60	0.6-2.0	0.11-0.16	4.5-6.5	<2	Low---------	0.37	5	.5-2
Derly	7-11	27-40	1.35-1.55	0.06-0.2	0.13-0.18	4.5-6.0	<2	Moderate----	0.37		
	11-57	35-50	1.25-1.50	<0.06	0.13-0.18	4.5-6.0	0-4	High--------	0.32		
	57-80	20-45	1.30-1.55	<0.06	0.13-0.18	5.1-7.3	0-4	High--------	0.32		
Dr----------	0-10	10-30	1.25-1.35	0.6-2.0	0.12-0.18	5.6-7.8	0-2	Low---------	0.37	5	.5-2
Dreka	10-49	18-30	1.30-1.45	0.2-0.6	0.12-0.18	5.6-7.8	0-2	Moderate----	0.32		
	49-80	35-50	1.35-1.55	0.06-0.2	0.12-0.18	5.6-7.8	0-4	High--------	0.32		
Es----------	0-9	40-59	1.40-1.55	<0.06	0.12-0.18	3.6-5.5	0-2	High--------	0.32	5	.5-5
Estes	9-60	40-50	1.30-1.55	<0.06	0.12-0.18	3.6-5.5	0-4	High--------	0.32		
	60-80	25-40	1.45-1.65	0.06-0.2	0.12-0.18	3.6-5.0	0-4	Moderate----	0.32		
GaA*:											
Gallime---------	0-8	10-20	1.30-1.40	2.0-6.0	0.11-0.16	5.1-6.5	<2	Low---------	0.32	5	0-2
	8-24	10-20	1.35-1.50	2.0-6.0	0.11-0.16	5.1-6.5	<2	Low---------	0.32		
	24-80	18-35	1.40-1.65	0.6-2.0	0.13-0.18	4.5-6.0	<2	Moderate----	0.32		
Alazan----------	0-10	5-15	1.40-1.65	2.0-6.0	0.11-0.16	4.5-6.0	0-2	Low---------	0.37	5	.5-2
	10-80	18-25	1.45-1.70	0.6-2.0	0.12-0.18	4.5-6.5	0-2	Low---------	0.37		
Ha----------	0-6	10-20	1.30-1.65	2.0-6.0	0.10-0.15	5.6-7.3	<2	Low---------	0.32	5	.5-2
Hannahatchee	6-80	15-25	1.40-1.60	0.6-2.0	0.12-0.17	5.6-7.3	<2	Low---------	0.32		
Iu----------	0-4	6-15	1.20-1.40	0.6-2.0	0.11-0.18	4.5-5.5	0-2	Low---------	0.37	5	.5-2
Iulus	4-35	6-20	1.26-1.45	0.6-2.0	0.11-0.18	4.5-5.5	0-2	Low---------	0.32		
	35-80	10-18	1.30-1.50	0.6-2.0	0.11-0.18	4.5-5.5	0-2	Low---------	0.32		
KaA----------	0-15	1-5	1.50-1.65	6.0-20	0.04-0.07	5.1-6.5	<2	Low---------	0.15	5	.5-2
Kawah	15-80	1-5	1.50-1.70	6.0-20	0.04-0.07	3.6-6.0	<2	Low---------	0.15		
Kc----------	0-7	5-18	1.45-1.60	2.0-6.0	0.11-0.15	5.1-7.3	0-0	Low---------	0.20	5	.1-1
Keechi	7-64	10-18	1.40-1.55	0.6-2.0	0.06-0.18	5.1-7.3	0-0	Low---------	0.28		
	64-80	30-50	1.40-1.55	0.06-0.2	0.12-0.18	5.1-7.3	0-0	High--------	0.32		
KfC----------	0-5	2-15	1.20-1.40	2.0-6.0	0.09-0.12	5.1-7.3	<2	Low---------	0.37	4	.5-2
Kirvin	5-36	35-50	1.24-1.45	0.2-0.6	0.11-0.15	3.6-5.5	<2	Moderate----	0.32		
	36-48	25-50	1.35-1.60	0.2-0.6	0.11-0.15	3.6-5.0	<2	Moderate----	0.32		
	48-65	20-45	1.40-1.65	0.2-0.6	0.08-0.14	3.6-5.0	<2	Moderate----	0.32		
KfE----------	0-6	2-15	1.20-1.40	2.0-6.0	0.09-0.12	5.1-7.3	<2	Low---------	0.37	4	.5-2
Kirvin	6-38	35-50	1.24-1.45	0.2-0.6	0.11-0.15	3.6-5.5	<2	Moderate----	0.32		
	38-51	25-50	1.35-1.60	0.2-0.6	0.11-0.15	3.6-5.0	<2	Moderate----	0.32		
	51-80	20-45	1.40-1.65	0.2-0.6	0.08-0.14	3.6-5.0	<2	Moderate----	0.32		
KgC----------	0-16	2-15	1.20-1.40	2.0-6.0	0.07-0.11	5.1-7.3	<2	Low---------	0.20	4	.5-2
Kirvin	16-31	35-50	1.24-1.45	0.2-0.6	0.11-0.15	3.6-5.5	<2	Moderate----	0.32		
	31-44	25-50	1.35-1.60	0.2-0.6	0.11-0.15	3.6-5.0	<2	Moderate----	0.32		
	44-62	20-45	1.40-1.65	0.2-0.6	0.08-0.14	3.6-5.0	<2	Moderate----	0.32		
KsC----------	0-4	20-40	1.20-1.40	0.2-0.6	0.12-0.15	5.1-7.3	<2	Moderate----	0.32	4	.5-1
Kirvin	4-41	35-50	1.30-1.45	0.2-0.6	0.11-0.15	3.6-5.5	<2	Moderate----	0.32		
	41-80	20-45	1.40-1.60	0.06-0.2	0.08-0.14	3.6-5.0	<2	Moderate----	0.32		
La----------	0-16	10-26	1.25-1.35	0.6-2.0	0.11-0.16	5.1-6.5	<2	Low---------	0.37	5	1-3
Laneville	16-48	25-35	1.30-1.45	0.2-0.6	0.12-0.18	3.6-5.5	0-2	Moderate----	0.32		
	48-80	35-50	1.40-1.55	0.06-0.2	0.12-0.18	3.6-6.0	0-4	High--------	0.32		
Lf----------	0-15	10-26	1.25-1.35	0.6-2.0	0.11-0.16	5.1-6.5	<2	Low---------	0.37	5	1-3
Laneville	15-36	25-35	1.30-1.45	0.2-0.6	0.12-0.18	3.6-5.5	0-2	Moderate----	0.32		
	36-80	35-50	1.40-1.55	0.06-0.2	0.12-0.18	3.6-6.0	0-4	High--------	0.32		

See footnote at end of table.

Table 14.--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
LtB	0-9	2-18	1.28-1.45	2.0-6.0	0.11-0.16	4.5-6.0	<2	Low	0.37	5	.5-2
Latex	9-46	18-35	1.28-1.45	0.6-2.0	0.11-0.18	4.5-5.5	<2	Moderate	0.32		
	46-80	35-55	1.30-1.65	0.06-0.2	0.12-0.17	4.5-5.0	<2	High	0.32		
LyC	0-10	3-15	1.50-1.60	6.0-20	0.05-0.10	4.5-6.5	<2	Low	0.20	5	.5-2
Lilbert	10-29	3-15	1.50-1.65	6.0-20	0.05-0.10	4.5-6.5	<2	Low	0.20		
	29-49	20-35	1.55-1.69	0.6-2.0	0.10-0.15	4.5-5.5	<2	Low	0.24		
	49-80	20-35	1.60-1.75	0.2-0.6	0.10-0.15	4.5-6.0	<2	Low	0.24		
MaE	0-4	5-20	1.40-1.50	0.6-2.0	0.12-0.16	5.0-6.0	<2	Low	0.28	3	.5-1
Maben	4-38	35-55	1.45-1.55	0.2-0.6	0.14-0.18	4.5-6.0	<2	High	0.28		
	38-60	---	---	0.2-0.6	0.14-0.18	4.5-6.0	<2	Moderate	0.28		
Me	0-8	15-32	1.30-1.45	0.6-2.0	0.12-0.18	4.5-6.0	<2	Low	0.32	5	1-3
Mattex	8-44	20-34	1.30-1.55	0.6-2.0	0.10-0.18	3.6-5.5	<2	Low	0.32		
	44-80	35-50	1.40-1.55	0.06-0.2	0.12-0.18	4.5-6.0	<2	Moderate	0.32		
Mo*:											
Mattex	0-5	15-32	1.30-1.45	0.6-2.0	0.12-0.18	4.5-6.0	<2	Low	0.32	5	1-3
	5-80	15-34	1.30-1.55	0.6-2.0	0.10-0.18	3.6-5.5	<2	Low	0.32		
Owentown	0-14	6-18	1.35-1.55	0.6-2.0	0.11-0.16	5.1-6.0	<2	Low	0.32	5	.2-1
	14-80	6-18	1.40-1.65	0.6-2.0	0.11-0.16	5.1-6.0	<2	Low	0.32		
MtC	0-12	5-20	1.30-1.60	0.6-2.0	0.12-0.18	5.1-6.0	<2	Low	0.32	5	.5-2
Meth	12-51	35-55	1.20-1.65	0.2-0.6	0.15-0.18	4.5-6.0	<2	Moderate	0.28		
	51-80	10-35	1.30-1.70	0.6-2.0	0.12-0.18	4.5-6.0	<2	Low	0.32		
MvA*:											
Mollville	0-13	6-20	1.40-1.65	0.2-0.6	0.15-0.20	4.0-6.0	<2	Low	0.37	5	.5-1
	13-21	20-35	1.50-1.69	0.06-0.2	0.12-0.17	4.0-6.0	<4	Moderate	0.32		
	21-80	15-35	1.50-1.69	0.06-0.2	0.15-0.20	4.0-6.0	<4	Moderate	0.32		
Besner	0-4	5-15	1.20-1.40	2.0-6.0	0.11-0.16	4.5-6.5	<2	Low	0.24	5	.5-2
	4-32	5-15	1.20-1.40	2.0-6.0	0.11-0.16	4.5-6.5	<2	Low	0.24		
	32-58	14-18	1.30-1.50	0.6-2.0	0.12-0.18	4.5-6.5	<2	Low	0.32		
	58-65	15-25	1.30-1.50	0.6-2.0	0.12-0.18	4.5-6.5	<2	Low	0.32		
Na	0-12	6-12	1.20-1.35	0.6-2.0	0.10-0.15	3.6-6.0	<2	Low	0.24	5	4-15
Naconiche	12-29	2-12	1.20-1.45	2.0-6.0	0.08-0.15	3.6-6.0	<2	Low	0.20		
	29-80	2-12	1.20-1.55	2.0-6.0	0.07-0.15	3.6-6.0	<2	Low	0.20		
Ow	0-16	6-18	1.35-1.55	0.6-2.0	0.11-0.16	5.1-6.0	<2	Low	0.32	5	.2-1
Owentown	16-80	6-18	1.40-1.65	0.6-2.0	0.11-0.16	5.1-6.0	<2	Low	0.32		
PrC	0-15	3-15	1.30-1.60	0.6-2.0	0.10-0.15	4.5-6.5	<2	Low	0.37	4	.5-1
Pirkey	15-55	18-35	1.50-1.80	0.06-0.6	0.12-0.14	3.6-5.5	<2	Moderate	0.28		
	55-80	15-50	1.40-1.70	0.06-0.2	0.12-0.14	3.6-7.3	<2	Moderate	0.28		
PrD	0-10	3-15	1.30-1.60	0.6-2.0	0.10-0.15	4.5-6.5	<2	Low	0.37	4	.5-1
Pirkey	10-50	18-35	1.50-1.80	0.06-0.6	0.12-0.14	3.6-5.5	<2	Moderate	0.28		
	50-80	15-50	1.40-1.70	0.06-0.2	0.12-0.14	3.6-7.3	<2	Moderate	0.28		
Pt*.											
Pits											
ReC	0-6	2-15	1.35-1.55	0.6-2.0	0.07-0.11	5.6-7.3	<2	Low	0.24	4	<2
Redsprings	6-44	35-50	1.30-1.45	0.2-0.6	0.11-0.15	4.5-6.5	<2	Moderate	0.32		
	44-80	20-55	1.40-1.60	0.06-0.2	0.08-0.14	4.5-6.0	<2	Moderate	0.32		

See footnote at end of table.

Table 14.--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 K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm				Pct
ReE	0-10	2-15	1.35-1.55	0.6-2.0	0.07-0.11	5.6-7.3	<2	Low	0.24	4	<2
Redsprings	10-34	35-50	1.30-1.45	0.2-0.6	0.11-0.15	4.5-6.5	<2	Moderate	0.32		
	34-45	25-55	1.30-1.50	0.2-0.6	0.11-0.15	4.5-6.0	<2	Moderate	0.32		
	45-60	20-55	1.40-1.60	0.06-0.2	0.08-0.14	4.5-6.0	<2	Moderate	0.32		
ReG	0-5	2-15	1.35-1.55	0.6-2.0	0.07-0.11	5.6-7.3	<2	Low	0.24	4	<2
Redsprings	5-48	35-50	1.30-1.45	0.2-0.6	0.11-0.15	4.5-6.5	<2	Moderate	0.32		
	48-56	25-55	1.30-1.50	0.2-0.6	0.11-0.15	4.5-6.0	<2	Moderate	0.32		
	56-65	20-55	1.40-1.60	0.06-0.2	0.08-0.14	4.5-6.0	<2	Moderate	0.32		
RgC	0-2	20-40	1.35-1.55	0.2-0.6	0.11-0.16	5.6-7.3	0-0	Moderate	0.32	4	.3-1
Redsprings	2-32	35-50	1.30-1.45	0.2-0.6	0.11-0.15	4.5-6.5	0-0	Moderate	0.32		
	32-44	25-50	1.30-1.50	0.2-0.6	0.11-0.15	4.5-6.0	0-0	Moderate	0.32		
	44-60	20-55	1.40-1.60	0.06-0.2	0.08-0.14	4.5-6.0	0-0	Moderate	0.32		
RzB	0-9	5-10	1.25-1.35	6.0-20	0.05-0.10	5.1-6.5	<2	Low	0.17	5	.1-2
Rentzel	9-26	5-10	1.30-1.55	6.0-20	0.05-0.10	5.1-6.5	<2	Low	0.17		
	26-80	15-35	1.40-1.75	0.2-0.6	0.10-0.1	4.5-5.5	<2	Low	0.32		
SaB	0-8	5-20	1.30-1.50	0.6-2.0	0.09-0.12	4.5-6.0	0-0	Low	0.28	5	1-3
Sacul	8-53	45-55	1.25-1.40	0.06-0.2	0.15-0.18	3.6-5.5	0-0	High	0.32		
	53-80	15-40	1.30-1.45	0.2-0.6	0.14-0.18	3.6-5.5	0-0	Low	0.28		
StB	0-9	6-18	1.35-1.50	2.0-6.0	0.11-0.16	4.5-6.0	0-0	Low	0.37	5	.5-2
Sawlit	9-21	18-30	1.35-1.50	0.6-2.0	0.13-0.18	4.5-6.0	0-0	Low	0.37		
	21-36	20-35	1.30-1.55	0.6-2.0	0.13-0.18	4.5-6.0	0-0	Moderate	0.32		
	36-80	35-50	1.20-1.45	<0.06	0.12-0.17	3.6-5.5	0-0	High	0.32		
SwA*:											
Sawlit	0-9	6-18	1.35-1.50	2.0-6.0	0.11-0.16	4.5-6.0	0-0	Low	0.37	5	.5-2
	9-21	18-30	1.35-1.50	0.6-2.0	0.13-0.18	4.5-6.0	0-0	Low	0.37		
	21-36	20-35	1.30-1.55	0.6-2.0	0.13-0.18	4.5-6.0	0-0	Moderate	0.32		
	36-80	35-50	1.20-1.45	<0.06	0.12-0.17	3.6-5.5	0-0	High	0.32		
Sawtown	0-9	6-12	1.35-1.50	2.0-6.0	0.11-0.16	4.5-6.5	<2	Low	0.37	5	.5-2
	9-23	4-12	1.35-1.50	2.0-6.0	0.11-0.16	4.5-6.0	<2	Low	0.37		
	23-49	15-30	1.30-1.55	0.6-2.0	0.11-0.16	3.6-6.0	<2	Moderate	0.32		
	49-80	35-50	1.20-1.45	<0.06	0.12-0.17	3.6-6.5	0-4	High	0.32		
TeE	0-4	3-15	1.50-1.65	6.0-20	0.05-0.10	5.0-6.0	0-0	Low	0.17	3	.5-1
Tenaha	4-35	3-15	1.50-1.65	6.0-20	0.05-0.10	5.0-6.0	0-0	Low	0.24		
	35-44	20-35	1.50-1.65	0.6-2.0	0.10-0.15	4.5-5.5	0-0	Low	0.24		
	44-65	20-40	1.60-1.75	0.2-0.6	0.08-0.14	4.5-5.5	0-0	Low	0.24		
ToC	0-12	2-8	1.30-1.55	6.0-20	0.04-0.07	3.6-6.0	<2	Low	0.15	5	<2
Tonkawa	12-80	2-8	1.30-1.55	6.0-20	0.04-0.07	3.6-5.5	<2	Low	0.15		
ToE	0-8	2-8	1.30-1.55	6.0-20	0.04-0.07	3.6-6.0	<2	Low	0.15	5	<2
Tonkawa	8-80	2-8	1.30-1.55	6.0-20	0.04-0.07	3.6-5.5	<2	Low	0.15		
ToG	0-6	2-8	1.30-1.55	6.0-20	0.04-0.07	3.6-6.0	<2	Low	0.15	5	<2
Tonkawa	6-80	2-8	1.30-1.55	6.0-20	0.04-0.07	3.6-5.5	<2	Low	0.15		
UtB	0-12	5-10	1.45-1.60	2.0-6.0	0.09-0.12	5.1-6.5	<2	Low	0.32	5	<2
Ulto	12-21	10-22	1.40-1.55	0.6-2.0	0.11-0.15	4.5-6.0	<2	Low	0.32		
	21-56	20-35	1.40-1.60	0.6-2.0	0.10-0.16	4.5-6.0	<2	Moderate	0.32		
	56-80	15-30	1.40-1.60	0.6-2.0	0.10-0.15	4.5-6.0	<2	Low	0.32		
WoB	0-11	5-15	1.25-1.40	2.0-6.0	0.11-0.16	5.1-6.5	<2	Low	0.20	5	.5-2
Wodan	11-80	8-18	1.35-1.60	2.0-6.0	0.12-0.18	5.1-6.5	<2	Low	0.20		

See footnote at end of table.

Table 14.--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
WtB----------	0-6	5-20	1.30-1.55	0.6-2.0	0.11-0.15	4.5-6.0	<2	Low---------	0.43	4	1-2
Woodtell	6-28	40-60	1.25-1.40	<0.06	0.12-0.17	4.5-6.0	<2	High--------	0.32		
	28-52	30-50	1.25-1.50	0.06-0.2	0.12-0.17	4.5-6.0	<2	High--------	0.32		
	52-64	15-50	1.25-1.50	0.06-0.2	0.08-0.14	4.5-7.3	<2	High--------	0.32		
WtE----------	0-8	3-18	1.20-1.60	0.6-2.0	0.13-0.20	4.5-6.0	<2	Low---------	0.55	4	.5-1
Woodtell	8-36	40-60	1.20-1.45	<0.06	0.12-0.18	4.5-5.0	<2	High--------	0.32		
	36-51	25-40	1.20-1.50	0.06-0.2	0.12-0.20	4.5-6.0	0-2	High--------	0.32		
	51-64	15-35	1.35-1.65	0.06-0.2	0.10-0.15	4.5-7.3	0-4	Moderate----	0.37		

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 15.-Soil and Water Features

("Flooding" and "water table" and terms such as "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				
AyB, AyE---------- Attoyac	B	None--------	---	---	>6.0	---	---	Moderate	Moderate.
BeB, BeD---------- Bernaldo	B	None--------	---	---	4.0-6.0	Perched	Nov-May	Moderate	Moderate.
BtB---------- Betis	A	None--------	---	---	>6.0	---	---	Low------	Moderate.
BvB---------- Bienville	A	None--------	---	---	4.0-6.0	Apparent	Dec-Apr	Low------	High.
BwB---------- Bowie	B	None--------	---	---	3.5-5.0	Perched	Jan-Apr	Moderate	High.
ChE, ChG, Csg, CtE---------- Cuthbert	C	None--------	---	---	>6.0	---	---	High-----	High.
DaC, DaE---------- Darco	A	None--------	---	---	>6.0	---	---	Low------	Moderate.
DeA---------- Derly	D	None--------	---	---	+.5-1.0	Perched	Oct-May	High-----	High.
Dr---------- Dreka	C	Frequent----	Brief-----	Nov-May	1.0-4.0	Perched	Nov-May	High-----	Low.
Es---------- Estes	D	Frequent----	Long------	Nov-May	0-1.5	Perched	Nov-May	High-----	High.
GaA*: Gallime----------	B	None--------	---	---	4.0-6.0	Apparent	Dec-Mar	Moderate	Moderate.
Alazan----------	C	None--------	---	---	1.5-2.5	Apparent	Jan-Apr	High-----	Moderate.
Ha---------- Hannahatchee	B	Occasional	Brief-----	Mar-May	4.0-6.0	Perched	Mar-May	Moderate	Moderate.
Iu---------- Iulus	B	Occasional	Very brief	Dec-Apr	1.5-4.0	Perched	Dec-Apr	Moderate	High.
KaA---------- Kawah	A	None--------	---	---	1.5-3.0	Apparent	Jan-Dec	Low------	High.
Kc---------- Keechi	C	Frequent----	Long------	Dec-May	+1.-1.5	Perched	Jan-Dec	High-----	Moderate.
KfC, KfE, KgC----- Kirvin	C	None--------	---	---	>6.0	---	---	High-----	High.
KsC---------- Kirvin	D	None--------	---	---	>6.0	---	---	High-----	High.
La---------- Laneville	B	Occasional	Very brief to brief.	Nov-May	1.5-3.0	Perched	Nov-May	High-----	High.

See footnote at end of table.

Table 15.--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				
Lf Laneville	B	Frequent	Very brief to brief.	Nov-May	1.5-3.0	Perched	Nov-May	High	High.
LtB Latex	C	None	---	---	3.0-4.5	Perched	Dec-Apr	Moderate	High.
LyC Lilbert	B	None	---	---	>6.0	---	---	Moderate	High.
MaE Maben	C	None	---	---	>6.0	---	---	High	Moderate.
Ms Mattex	C	Frequent	Long	Dec-Mar	1.0-2.5	Perched	Dec-Mar	High	High.
Mo*:									
Mattex	C	Frequent	Long	Dec-Mar	1.0-2.5	Perched	Dec-Mar	High	High.
Owantown	B	Occasional	Brief	Nov-May	2.5-4.0	Apparent	Oct-Jun	Moderate	Moderate.
MtC Meth	C	None	---	---	>6.0	---	---	High	Moderate.
MvA*:									
Mollville	D	None	---	---	+.5-1.0	Perched	Nov-Jun	High	High.
Besner	B	None	---	---	3.5-5.0	Apparent	Jan-Feb	Low	Moderate.
Na Naconiche	D	Frequent	Long to very long.	Jan-Dec	0-1.0	Apparent	Jan-Dec	High	High.
Ow Owantown	B	Occasional	Brief	Nov-May	2.5-4.0	Apparent	Oct-Jun	Moderate	Moderate.
PrC, PrD Pirkey	C	None	---	---	>6.0	---	---	High	High.
Pt*. Pits									
ReC, ReE, ReG Redsprings	B	None	---	---	>6.0	---	---	High	High.
RgC Redsprings	D	None	---	---	>6.0	---	---	High	High.
RzB Rentzel	C	None	---	---	1.5-3.0	Perched	Jan-Mar	High	High.
SaB Sacul	C	None	---	---	2.0-4.0	Perched	Dec-Apr	High	High.
StB Sawlit	C	None	---	---	1.5-3.0	Perched	Jan-May	High	High.
SwA*:									
Sawlit	C	None	---	---	1.5-3.0	Perched	Jan-May	High	High.
Sawtown	C	None	---	---	3.5-5.0	Perched	Jan-May	Moderate	Moderate.

See footnote at end of table.

Table 15.--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				
TeE---------- Tenaha	B	None--------	---	---	>6.0	---	---	Moderate	Moderate.
ToC, ToE, ToG----- Tonkawa	A	None--------	---	---	>6.0	---	---	Low------	Moderate.
UtB---------- Ulto	B	None--------	---	---	>6.0	---	---	Moderate	Moderate.
WoB---------- Woden	B	None--------	---	---	>6.0	---	---	Moderate	Moderate.
WtB, WtE---------- Woodtell	D	None--------	---	---	>6.0	---	---	High-----	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 16.---Engineering Index Test Data for Selected Soils

(Dashes indicate that data were not available. NP means nonplastic)

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution: Percentage passing sieve-- No. 10	No. 40	No. 200	Percentage smaller than-- .05 mm	.005 mm	.002 mm	Liquid limit[1]	Plasticity index[1]
	AASHTO	Unified							Pct	
Attoyac[2]										
(90TX-401-1)										
Bt1-------- 14-36	A-6(4)	CL	100	94	51	45	31	26	30	15
Sacul[3]										
(90TX-401-4)										
Bt1--------- 8-24	A-7-5(49)	CH	100	100	89	87	79	51	81	46
Sawlit[4]										
(90TX-401-11)										
Bt2-------- 21-34	A-6(8)	CL	100	100	62	54	38	34	36	16
2Bt1------- 38-62	A-7-6(35)	CH	100	100	84	78	56	51	61	49
Tonkawa[5]										
(90TX-401-2)										
A---------- 0-12	A-3(0)	SP-SM	100	99	7	6	5	3	---	NP
Bw2-------- 32-68	A-3(0)	SM	100	99	7	7	1	1	---	NP
Woodtell[6]										
(90TX-401-6)										
Bt1--------- 8-20	A-7-5(46)	CH	100	100	84	81	77	51	79	49
Woodtell[7]										
(90TX-401-13)										
Ap---------- 0-6	A-4(0)	ML	100	100	61	47	11	6	---	NP
Bt1--------- 6-18	A-7-6(33)	CH	100	100	86	81	60	51	61	34

[1] Liquid limit and plasticity index values were determined by the AASHTO-89 methods, except that soil was added to the water.

[2] Pedon location: from the intersection of Farm Road 1662 and Farm Road 839 about 8 miles north of Reklaw, 0.8 mile east on Farm Road 1662, 0.5 mile southeast on private road, and 200 feet east in woodland.

[3] Pedon location: from the intersection of Farm Road 1662 and Farm Road 839 about 8 miles north of Reklaw, 3.2 miles north on Farm Road 839, 150 feet southeast on County Road 4221A, 200 feet south along pipeline, and 50 feet east in woodland.

[4] Pedon location: from the intersection of Farm Road 2867 and Farm Road 1798 about 11 miles southeast of Henderson, 0.9 mile south on Farm Road 1798, 0.4 mile east on County Road 3121, 0.2 mile east on private road, and 200 feet north in pasture.

[5] Pedon location: from the intersection of U.S. Highway 259 and U.S. Highway 79 in Mt. Enterprise, 7.2 miles south on U.S. Highway 259, 4.6 miles east on Farm Road 1087, 0.9 mile north on county road, and 75 feet east in cut-over woodland.

[6] Pedon location: from the intersection of State Highway 43 and State Highway 149 in Tatum, 5 miles southwest on State Highway 43, and 200 feet northwest in woodland.

[7] Pedon location: from the intersection of U.S. Highway 79 and County Road 3107 about 10 miles east of Henderson, 0.9 mile southeast on County Road 3107, and 150 feet west in woodland.

Table 17.--Physical Analyses of Selected Soils

(Dashes indicate data were not available)

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 (0.10-0.05 mm)	Sand: Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	COLE	Bulk density (1/3 bar)	Water Content: 1/3 bar	Water Content: 15 bar
	In		Pct (wt)								Cm/cm	g/cc	Pct (wt)	
Bowie[1, 3]														
(S83TX-401-001)	0-7	Ap	0.4	0.4	2.3	35.2	33.9	72.2	25.1	2.7	--	--	--	2.6
	7-10	E	0.2	0.2	2.0	33.0	32.9	68.3	28.9	2.8	--	--	--	1.4
	10-20	Bt1	0.4	0.3	1.4	23.6	25.1	50.8	26.1	23.1	--	--	--	8.9
	20-36	Bt2[4]	1.9	1.0	1.7	23.5	23.8	51.9	25.0	23.1	--	--	--	9.3
	36-49	Bt2[4]	1.1	0.5	1.8	29.2	26.9	59.5	25.5	15.0	--	--	--	6.3
	49-63	Btv/E1	0.4	0.4	1.7	30.3	27.2	60.0	27.4	12.6	--	--	--	5.4
	63-80	Btv/E2	1.4	0.7	1.8	30.7	27.5	62.1	21.2	16.7	--	--	--	7.7
Darco[2, 3]														
(S89TX-401-001)	0-10	Ap	0.2	0.3	6.7	67.6	11.6	86.4	11.0	2.6	0.037	1.30	32.2	---
	10-27	E1	0.1	0.1	5.6	67.8	11.9	85.4	11.4	3.1	0.033	1.47	19.7	---
	27-41	E2	0.0	0.1	5.3	68.4	12.2	86.0	11.5	2.6	0.037	1.30	32.0	---
	41-54	E3	0.0	0.1	5.1	68.7	11.9	85.8	12.0	2.3	0.027	1.43	20.1	---
	54-64	Bt1	0.2	0.3	4.2	60.8	8.7	74.2	14.3	11.5	0.004	1.54	17.6	---
	64-80	Bt2	1.3	0.7	5.0	51.4	6.1	64.5	11.2	24.3	0.025	1.41	22.1	---
Laneville[2, 3]														
(S90TX-401-001)	0-4	A1	0.0	0.6	1.6	18.0	30.7	50.9	38.2	10.9	0.020	1.34	36.0	---
	4-15	A2	0.6	0.6	0.8	6.1	19.5	27.6	50.1	22.3	0.041	1.34	28.3	---
	15-22	Bw1	0.6	0.6	0.5	4.8	18.0	24.5	45.9	29.6	0.032	1.52	24.7	---
	22-36	Bw2	0.9	0.8	0.7	5.1	20.1	27.6	43.6	28.8	0.045	1.43	27.5	---
	36-42	2Bgb1	1.1	0.8	0.5	4.0	17.6	24.0	38.0	38.0	0.084	1.43	28.3	---
	42-50	2Bgb2	0.5	0.7	0.4	3.9	17.8	23.3	37.4	39.3	0.077	1.52	26.8	---
	50-80	2Bgb3	0.5	1.0	1.1	5.6	15.1	23.3	41.6	35.7	0.103	1.46	29.5	---
Naconiche[2, 3]														
(S90TX-401-002)	0-12	A1	0.1	5.0	36.2	23.1	3.0	67.4	22.7	9.9	---	---	---	---
	12-19	A2	0.2	0.6	19.8	19.7	12.2	52.5	33.5	14.0	---	---	---	---
	19-29	A3	0.3	1.3	50.1	33.3	2.7	87.7	8.2	4.1	---	---	---	---
	29-32	A4	0.1	1.2	41.5	46.2	5.4	94.1	3.0	2.6	---	---	---	---
	32-36	A5	0.0	1.2	27.4	42.3	9.8	80.7	13.5	5.8	---	---	---	---
	36-40	Cg	0.2	2.5	48.2	42.0	4.9	97.8	0.8	1.4	---	---	---	---
	40-45	Ab1	0.3	2.7	55.4	30.8	4.0	93.2	3.1	3.7	---	---	---	---
	45-52	Ab2	0.2	0.4	7.8	24.3	19.5	52.2	28.0	19.8	---	---	---	---
	52-57	C'g	0.2	2.7	75.4	17.8	0.7	96.8	1.7	1.5	---	---	---	---
	57-67	A'b	0.2	0.7	4.8	62.6	11.1	79.4	12.5	8.1	---	---	---	---
	67-73	C''g	0.1	0.2	9.9	74.3	11.8	96.3	1.9	1.8	---	---	---	---
	73-80	A''b	0.2	0.6	11.8	72.0	7.3	91.9	4.7	3.4	---	---	---	---
Redsprings[1, 3]														
(S88TX-401-002)	0-6	A	10.2	7.7	8.6	26.6	10.4	63.5	18.9	17.6	0.016	1.55	17.6	12.1
	6-14	Bt1	5.9	6.2	2.4	20.8	8.6	48.9	20.4	30.7	0.014	1.54	22.2	15.1
	14-24	Bt2	10.6	7.8	5.8	16.0	7.6	47.8	17.7	34.5	0.016	1.53	25.4	17.0
	24-35	Bt3	4.8	2.3	3.5	9.9	6.9	27.4	13.4	59.2	0.003	1.43	30.9	24.3
	35-44	Bt4	2.5	2.0	2.6	5.3	8.9	21.3	14.2	64.5	0.050	1.25	35.3	29.3
	44-55	C/Bt1	4.3	4.5	5.2	6.4	7.4	27.8	16.8	55.4	0.051	1.05	53.0	31.2
	55-64	C/Bt2[4]	2.4	2.9	3.2	4.1	4.1	16.7	13.0	70.3	0.081	1.00	55.6	36.9
	64-76	C/Bt2[4]	8.1	7.7	6.1	6.3	4.8	33.0	12.6	54.4	0.042	1.09	45.2	30.5
	76-80	C/Bt3	3.9	4.1	3.6	4.3	4.8	20.7	16.6	62.7	0.036	1.04	47.6	35.5

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 (0.10-0.05 mm)	Sand: Total (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	COLE	Bulk density (1/3 bar)	Water Content: 1/3 bar	Water Content: 15 bar
	In		Pct (wt)								Cm/cm	g/cc	Pct (wt)	
Tonkawa[2, 3] (S89TX-401-002)	0-12	A	0.1	0.3	10.9	75.4	6.7	93.4	3.5	3.1	0.041	1.24	34.5	---
	12-32	Bw1	0.1	0.2	10.2	78.1	6.1	94.7	1.4	3.9	---	---	---	---
	32-68	Bw2	0.0	0.2	11.1	79.5	5.5	96.3	1.3	2.5	---	---	---	---
	68-80	Bw3	0.0	0.3	11.6	78.6	6.8	97.3	0.9	1.8	---	---	---	---

1 Analysis by National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln Nebraska.

2 Analysis by Soil Characterization Laboratory, Texas Agricultural Experiment Station, College Station, Texas.

3 Location of the pedon sampled is the same as that of the typical pedon described in the section "Soil Series and Their Morphology."

4 Subdivided for sampling purposes.

Table 18.--Chemical Analyses of Selected Soils

(Dashes indicate data were not available. TR indicates a trace amount)

Soil name and sample number	Depth	Horizon	Extractable bases				Cation-exchange capacity	Base saturation	Organic carbon	H20 (1:1)	Aluminum saturation
			Ca	Mg	K	Na					
	In		----Milliequivalents/100 grams of soil----					Pct	Pct	pH	Pct
Bowie[1, 3]											
(S83TX-401-001)	0-7	A	0.8	0.2	0.1	TR	2.4	31	0.76	5.2	15
	7-10	E	0.6	0.1	TR	TR	1.2	70	0.22	5.3	12
	10-20	Bt1	2.8	1.5	0.1	TR	7.4	44	0.32	5.2	15
	20-36	Bt2[4]	0.8	2.1	0.1	TR	7.6	30	0.18	4.9	37
	36-49	Bt2[4]	0.2	0.8	0.1	0.1	4.6	22	0.11	5.1	60
	49-63	Btv/E1	0.1	0.5	0.1	TR	3.4	15	0.07	5.1	56
	63-82	Btv/E2	0.2	1.1	0.1	0.1	4.5	24	0.11	5.1	46
Kawah[2, 3]											
(C5887)	6-15	A2	0.6	0.4	0.0	0.1	---	---	---	---	---
(C5888)	15-30	Bw	0.7	0.4	0.0	0.1	1.7	71	---	4.2	---
Laneville[2, 3]											
(S90TX-401-001)	0-4	A1	4.5	1.8	0.1	0.2	9.0	73	1.63	5.5	---
	4-15	A2	5.0	2.9	0.2	0.2	8.9	77	0.60	5.5	---
	15-22	Bw1	4.4	4.2	0.2	0.2	13.2	68	0.38	4.5	---
	22-36	Bw2	4.3	4.5	0.2	0.3	14.1	65	0.32	4.4	---
	36-42	2Bgb1	5.6	6.6	0.3	0.5	21.5	60	0.31	4.2	---
	42-50	2Bgb2	6.3	7.6	0.3	0.7	22.9	65	0.29	4.0	---
	50-80	2Bgb3	10.5	8.2	0.4	1.2	24.8	82	0.31	5.3	---
Naconiche[2, 3]											
(S90TX-401-002)	0-12	A1	0.9	0.7	0.1	0.1	10.1	18	2.80	4.0	---
	12-19	A2	0.9	0.5	0.1	0.1	27.5	6	7.97	3.8	---
	19-29	A3	0.6	0.4	0.0	0.1	5.2	21	1.82	4.0	---
	29-32	A4	0.7	0.4	0.0	0.1	3.3	36	0.90	4.3	---
	32-36	A5	0.5	0.3	0.0	0.1	9.4	10	1.95	3.9	---
	36-40	Cg	0.8	0.3	0.0	0.1	2.3	52	0.38	5.0	---
	40-45	Ab1	0.8	0.3	0.0	0.1	3.3	36	0.82	4.2	---
	45-52	Ab2	0.8	0.6	0.1	0.1	18.3	9	4.27	4.1	---
	52-57	C'g	0.7	0.3	0.0	0.1	1.0	100	0.18	5.8	---
	57-67	A'b	1.2	0.8	0.0	0.1	7.0	30	1.26	4.4	---
	67-73	C''g	--	--	-	--	---	---	0.21	5.8	---
	73-80	A''b	1.4	0.5	0.0	0.0	2.9	66	0.71	4.8	---
Redsprings[1, 3]											
(S88TX-401-002)	0-6	A	10.2	2.9	0.6	TR	16.3	67	1.60	6.5	---
	6-14	Bt1	5.6	3.0	0.5	TR	14.5	47	0.88	5.7	---
	14-24	Bt2	5.4	2.9	0.3	0.1	14.4	48	0.58	5.5	---
	24-35	Bt3	7.5	6.4	0.2	0.1	20.6	56	0.49	5.6	---
	35-44	Bt4	8.2	9.0	0.3	0.1	22.7	60	0.45	5.7	---
	44-55	C/Bt1	7.6	11.3	0.3	0.2	27.6	60	0.28	5.3	---
	55-64	C/Bt2[4]	6.9	13.3	0.4	0.7	30.2	56	0.28	5.0	1
	64-76	C/Bt2[4]	4.9	10.8	0.3	0.2	25.6	52	0.20	5.0	---
	76-80	C/Bt3	8.5	21.0	0.4	0.3	40.7	65	0.22	5.5	2
Tonkawa[2, 3]											
(S89TX-401-002)	0-12	A	2.5	0.3	0.0	0.0	4.0	70	0.82	5.4	---
	12-32	Bw1	0.2	0.1	0.0	0.0	1.5	20	1.16	4.8	---
	32-68	Bw2	0.1	0.1	0.0	0.0	0.8	25	0.09	5.0	---
	68-80	Bw3	0.1	0.0	0.0	0.0	0.5	20	0.04	5.0	---

1 Analysis by National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska.

2 Analysis by Soil Characterization Laboratory, Texas Agricultural Experiment Station, College Station, Texas.

3 Location of the pedon sampled is the same as that of the typical pedon described in the section "Soil Series and Their Morphology."

4 Subdivided for sampling purposes.

Table 19.--Clay Mineralogy of Selected Soils

(Dashes indicate that the mineral was not detected)

Soil name and Sample number	Depth	Horizon	Clay Minerals (X-ray diffraction)[1]									
			Geo-thite	Hema-tite	Illite	Kaoli-nite	Mica	Mont-morillonite-chlorite	Mont-morillonite-mica	Mont-morillonite	Quartz	Verm-iculite
	In											
Bowie[2,4]												
(S83TX-401-001)	0-7	A	---	---	---	2	1	---	---	---	1	1
	10-20	Bt1	1	---	---	3	2	---	---	---	---	2
	20-35	Bt2	1	---	---	4	2	---	---	---	---	3
	69-82	Btv/E2	2	---	---	4	---	---	2	---	---	2
Redsprings[2,4,10]												
(S88TX-401-002)	0-6	A	2	2	---	2	1	---	---	---	---	---
	14-24	Bt2	3	2	---	3	1	---	---	---	---	---
	44-55	C/Bt1	3	2	---	3	2		1	2	---	---
	64-76	C/Bt3	3	2	---	3	2		---	---	---	---
Sacul[3,5,10]												
(S88TX-401-001)	5-28	Bt[9]	---	---	1	3	--	---	---	3	2	---
Sacul[3,6,10]												
(S88TX-401-002)	10-32	Bt[9]	---	---	1	3	--	---	---	3	2	---
Sacul[3, 7]												
(S88TX-401-003)	8-44	Bt[9]	---	---	1	3	---	---	---	3	2	---
Ulto[2,8,10]												
(S88TX-401-001)	0-6	Ap1	1	1	---	3	1	---	---	---	---	---
	12-22	Bt1	2	2	---	4	1	---	---	2	---	2
	43-56	C1	1	1	---	5	2	---	---	3	1	---
	82-92	C4	1	---	---	5	2	---	---	4	1	---
Ulto[2,4,10]												
(S89TX-401-002)	0-4	Ap	1	---	---	3	1	---	---	---	1	1
	20-33	Bt2	2	1	---	4	1	2	---	---	---	---
	66-78	Btx1	2	1	---	4	---	1	---	---	---	2

[1] Relative amounts: 1 trace; 2 small; 3 moderate; 4 abundant; 5 dominant.

[2] Analysis by National Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska.

[3] Characterization Laboratory, Texas Agricultural Experiment Station, College Station, Texas.

[4] Location of the pedon sampled is the same as that of the typical pedon described in the section "Soil Series and Their Morphology".

[5] Location of pedon: from the intersection of Farm Road 839 and Farm Road 1662 in New Salem near Lake Striker; 4.1 miles north on Farm Road 839; 150 feet southeast on county road to pipeline; 200 feet south on pipeline; 150 feet east in woods.

[6] Location of pedon: from the intersection of Farm Road 839 and Farm Road 1662 in New Salem near Lake Striker; 2 miles east on Farm Road 1662 to county road; 0.6 mile northeast on county road; 50 feet northwest into woods.

[7] Location of pedon: from the intersection of Farm Road 839 and Farm Road 1662 in New Salem near Lake Striker; 4.3 miles north on Farm Road 839 to county road; 5 miles west, then north on county road to forest road; 2 miles east on forest road to pine plantation; site is 200 feet east of road in plantation.

[8] Location of pedon: from the junction of Farm Road 2496 and Farm Road 1798 east of Laneville; 1.4 miles southeast on Farm Road 2496 and 600 feet north in pasture.

[9] Sample is a composite of Bt horizons.

[10] More than one pedon was sampled with this sample ID number, but analysis for each was run at a different lab.

Table 20.--Classification of the Soils

Soil name	Family or higher taxonomic class
Alazan	Fine-loamy, siliceous, thermic Aquic Glossudalfs
Attoyac	Fine-loamy, siliceous, thermic Typic Paleudalfs
Bernaldo	Fine-loamy, siliceous, thermic Glossic Paleudalfs
Besner	Coarse-loamy, siliceous, thermic Typic Glossudalfs
Betis	Sandy, siliceous, thermic Psammentic Paleudults
Bienville	Sandy, siliceous, thermic Psammentic Paleudalfs
Bowie	Fine-loamy, siliceous, thermic Plinthic Paleudults
Cuthbert	Clayey, mixed, thermic Typic Hapludults
Darco	Loamy, siliceous, thermic Grossarenic Paleudults
Darly	Fine, smectitic, thermic Typic Glossaqualfs
Dreka	Fine-silty, siliceous, nonacid, thermic Aeric Fluvaquents
Estes	Fine, smectitic, thermic Aeric Dystraquerts
Gallime	Fine-loamy, siliceous, thermic Glossic Paleudalfs
Hannahatchee	Fine-loamy, siliceous, thermic Dystric Fluventic Eutrochrepts
Iulus	Coarse-loamy, siliceous, thermic Fluvaquentic Dystrochrepts
Kawah	Thermic, coated Aquic Quartzipsamments
Keechi	Coarse-loamy, siliceous, nonacid, thermic Typic Fluvaquents
Kirvin	Clayey, mixed, thermic Typic Hapludults
Laneville	Fine-silty, siliceous, thermic Fluvaquentic Eutrochrepts
Latex	Fine-loamy, siliceous, thermic Glossic Paleudalfs
Lilbert	Loamy, siliceous, thermic Arenic Plinthic Paleudults
Maben	Fine, mixed, thermic Ultic Hapludalfs
Mattex	Fine-loamy, siliceous, acid, thermic Aeric Fluvaquents
Meth	Fine, mixed, thermic Ultic Hapludalfs
Mollville	Fine-loamy, siliceous, thermic Typic Glossaqualfs
Naconiche	Sandy, siliceous, thermic Cumulic Humaquepts
Owentown	Coarse-loamy, siliceous, thermic Fluventic Dystrochrepts
Pirkey	Fine-loamy, siliceous, acid, thermic Ultic Udarents
Redsprings	Fine, kaolinitic, thermic Ultic Hapludalfs
Rentzel	Loamy, siliceous, thermic Arenic Plinthaquic Paleudults
Sacul	Clayey, mixed, thermic Aquic Hapludults
Sawlit	Fine-loamy, siliceous, thermic Aquic Glossudalfs
Sawtown	Fine-loamy, siliceous, thermic Typic Glossudalfs
Tenaha	Loamy, siliceous, thermic Arenic Hapludults
Tonkawa	Thermic, coated Typic Quartzipsamments
Ulto	Fine-loamy, siliceous, thermic Ultic Hapludalfs
Woden	Coarse-loamy, siliceous, thermic Typic Paleudalfs
Woodtell	Fine, smectitic, thermic Vertic Hapludalfs