United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
the Louisiana Agricultural
Experiment Station

Soil Survey of De Soto Parish, Louisiana

How To Use This Soil Survey

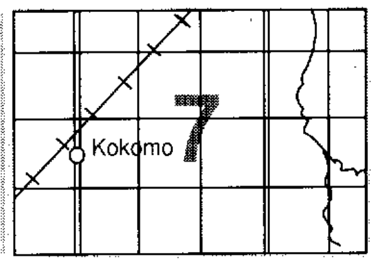
General Soil Map

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.

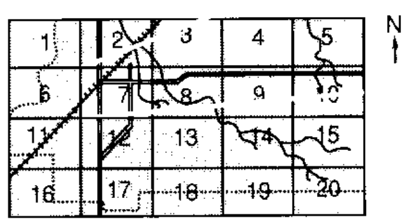
Detailed Soil Maps

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



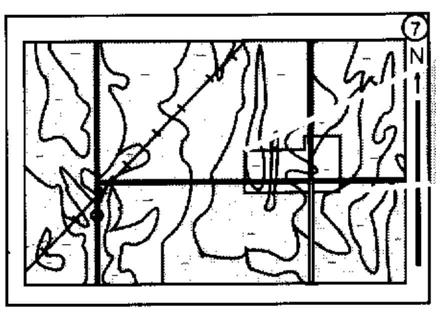
MAP SHEET

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.

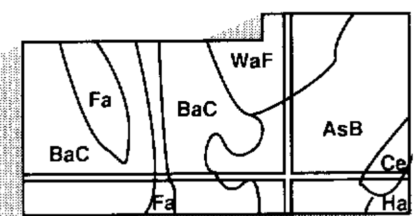


INDEX TO MAP SHEETS

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



MAP SHEET



AREA OF INTEREST

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 **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **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 Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1986. Soil names and descriptions were approved in 1986. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1986. This survey was made cooperatively by the Soil Conservation Service and the Louisiana Agricultural Experiment Station. It is part of the technical assistance furnished to the De Soto 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.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Bahiagrass seeded in an area of pine on Bowie fine sandy loam, 1 to 5 percent slopes.

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Issued October 1991

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Foreword

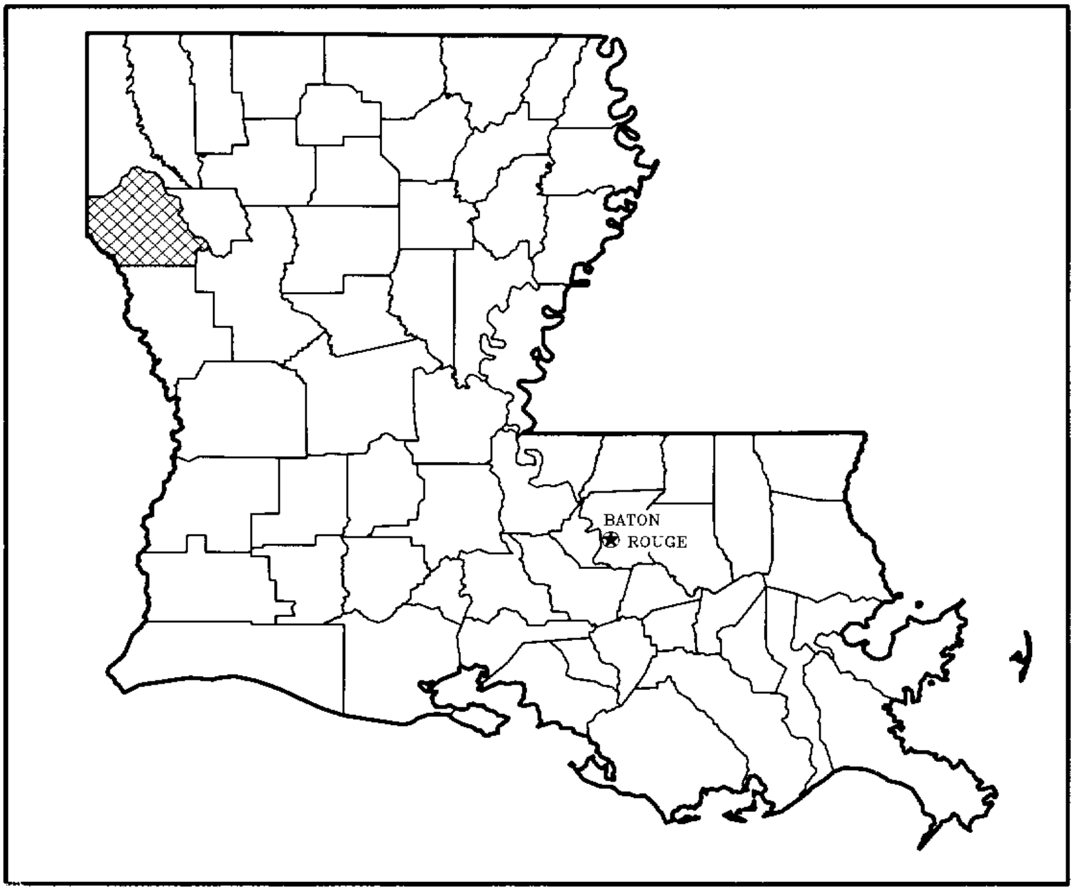
This soil survey contains information that can be used in land-planning programs in De Soto Parish. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

This soil survey is designed for many different users. Farmers, 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.

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

Horace J. Austin
State Conservationist
Soil Conservation Service



Location of De Soto Parish in Louisiana.

Soil Survey of De Soto Parish, Louisiana

By Jimmy P. Edwards, Michael Cooley, and Curtis L. Godfrey, Soil Conservation Service

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

De Soto Parish is in the northwestern part of Louisiana. It has a total area of 572,371 acres, of which 564,757 acres is land and 7,614 acres is streams, lakes, and reservoirs. The parish is bordered by Caddo Parish on the north, Red River Parish on the east, Natchitoches and Sabine Parishes on the south, and Panola and Shelby Counties, Texas, on the west. In 1980, the population of the parish was about 25,664. Mansfield, the parish seat, had a population of 6,485. About 72 percent of the population is rural, and the rest is urban.

The parish is made up of two major physiographic areas—uplands and alluvial plains. Elevation ranges from about 120 feet above sea level on an alluvial plain along the Red River in the southeastern part of the parish to about 370 feet in the uplands at Grove Hill Church *(16)*.

The uplands are in the Western Coastal Plains Major Land Resource Area. They make up about 95 percent of the parish. In most areas the landscape is hilly and is dissected by well defined drainageways. The soils are level to steep and are sandy or loamy. They generally are acid throughout and are low in fertility. Most areas are used as woodland. A small acreage is used for pasture, cropland, or homesite development.

The alluvial plains make up about 5 percent of the parish. They are in the Southern Mississippi Valley Alluvium Major Land Resource Area. The soils range from loamy to clayey and from well drained to very poorly drained. Most of the acreage is used for cultivated crops, mainly soybeans, corn, and grain sorghum. A small acreage is used for pasture or homesite development. Few limitations affect the use of the fertile, loamy soils on natural levees and in other high positions for cultivated crops. The clayey soils are mainly in low positions and are limited by wetness. In some areas they are subject to flooding.

This soil survey updates the survey of De Soto Parish published in 1905 *(20)*. It provides additional information and has larger maps, which show the soils in greater detail.

General Nature of the Parish

This section gives general information about the parish. It describes agriculture, climate, history and development, industry, and transportation facilities.

Agriculture

The economy of De Soto Parish depends heavily on forest resources. According to a recent report of the Louisiana Cooperative Extension Service, about 377,100 acres in the parish, or 66 percent of the total acreage, is commercial woodland. The rest of the acreage is mainly pasture or cropland. Most of the cropland is on the alluvial plains along the Red River. The principal crops are soybeans, grain sorghum, and cotton. Truck and garden crops and pecan orchards also are important.

The acreage of cotton and corn has significantly decreased during the past 30 years. These crops have been replaced by soybeans and grain sorghum. The recent trend is toward a small decrease in the acreage of cropland and an increase in the acreage of pine woodland.

De Soto Parish has 56 dairies, which produce about 86 million pounds of milk per year. The average dairy herd consists of about 141 cows. There are 314 producers of beef cattle and 38 producers of horses in the parish.

According to the 1982 Census of Agriculture, the number of farms in the parish decreased from 720 in 1974 to 679 in 1982. About 84 percent of the farms are considered small. Half of the farmers reported income from off-farm work. The average size of the farms is less than 300 acres.

Climate

Prepared by the National Climatic Data Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Converse, Louisiana, in the period 1953 to 1977. 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 47 degrees F and the average daily minimum temperature is 34 degrees. The lowest temperature on record, which occurred at Converse on January 12, 1962, is 5 degrees. In summer, the average temperature is 79 degrees and the average daily maximum temperature is 91 degrees. The highest recorded temperature, which occurred at Converse on August 13, 1962, 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 nearly 49 inches. Of this, nearly 25 inches, or about 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 18 inches. The heaviest 1-day rainfall during the period of record was 8.1 inches at Converse on April 29, 1953. Thunderstorms occur on about 50 days each year.

The average seasonal snowfall is about 1 inch. The greatest snow depth at any one time during the period of record was 5 inches.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The sun shines 70 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 10 miles per hour, in spring.

History and Development

The earliest known inhabitants of this survey area were the Caddo Indians. In 1835, Jehiel Brooks negotiated a treaty with Tehowahimmo, Mattan, Toockroach, and other Caddo Indians. The treaty secured a large tract of land, including what is now De Soto Parish.

De Soto Parish was formed from Natchitoches Parish in April 1843 by an act of the State Legislature of Louisiana. It was named in honor of Hernando de Soto, the famed Spanish explorer of the Mississippi River. Mansfield, the parish seat, was incorporated on April 15, 1847.

The earliest towns in the survey area were Screamerville and Augusta. Screamerville, on the west bank of Bayou Grand Cane, was settled in 1824 by Americans of English descent who migrated from the Eastern States. Augusta was settled by descendants of the French and Spanish who lived in "No Man's Land," a long-disputed neutral area between Louisiana and Texas. Augusta was one of four important landings on Bayou Pierre that received goods brought by boat up the Red River. The three other landings were Smithport, Marseilles, and Newport. In about 1830, Logansport was established on the bluffs of the Sabine River. For a time, it was a thriving port.

On April 8, 1864, Union troops met Confederate forces a short distance east of Mansfield in the Battle of Mansfield. General Banks commanded the Union troops, and General Richard Taylor commanded the Confederate forces.

Agriculture has always been a major enterprise in De Soto Parish. A large percentage of the working population is employed in agricultural work. The number of parish residents employed in other industries, however, has increased in recent years.

Industry

The potential for industrial development in De Soto Parish improved significantly when a major lignite-mining enterprise was established and a large plant generating electrical power was constructed near Mansfield. These industries employ many people and contribute significantly to the economy of the parish. Other important industries include plants that manufacture paper products, garments, trailers, heavy construction equipment, and petroleum and wood products.

Lignite mining is expected to continue for many years because a large amount of lignite is available near the surface. An estimated 546 million tons of lignite is in the Dolet Hills, in the southeastern part of the parish *(14)*.

Currently, most of the lignite extracted from this area is used locally by steam generators to produce electricity.

Transportation Facilities

The highway system in De Soto Parish consists of 643 miles of roads, of which 187 are paved. The major routes through the parish are U.S. Highways 171 and 84. Interstate 49, which is expected to be completed in 1990, will cross the eastern part of the parish.

Railroads provide freight service to major retail centers in Shreveport, New Orleans, and points beyond. Several commercial trucking firms serve the parish. An airport near Mansfield serves small private and commercial aircraft.

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; and the kinds of crops and native plants growing on the soils. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the 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 generally are collected for laboratory analyses. 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 several 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. 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 soil 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 unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in 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.

The descriptions, names, and delineations of the soils on the general soil map of this parish do not fully agree with those on the maps of Caddo, Natchitoches, and Red River Parishes. Differences are the result of a better knowledge of soils, modifications in series concepts, and variations in the intensity of mapping or in the extent of the soils in the parishes.

Dominantly Level and Very Gently Sloping, Loamy and Clayey Soils on Flood Plains and Stream Terraces

These soils are on the flood plains along rivers, bayous, and small streams that drain the uplands and on low terraces near the flood plains. Slopes range from 0 to 3 percent.

These soils make up about 19 percent of the parish. Most of the acreage is used for cultivated crops or pasture. The soils that are frequently flooded are used mainly as woodland. The wetness caused by a seasonal high water table and by the flooding is the main limitation affecting most agricultural and urban uses.

1. Gallion-Caspiana

Level, well drained soils that are loamy throughout; formed in Red River alluvium

This map unit consists of soils in high and intermediate positions on natural levees along old tributaries of the Red River. Slopes are long and smooth and are 0 to 1 percent.

This unit makes up about 1.5 percent of the parish. It is about 55 percent Gallion soils, 26 percent Caspiana soils, and 19 percent soils of minor extent.

Typically, the Gallion soils in high positions on the levees have a surface layer of brown silt loam, and those in intermediate positions have a surface layer of brown silty clay loam. The subsoil is yellowish red silt loam and silty clay loam. The underlying material is dark reddish brown silty clay loam and yellowish red silt loam.

Typically, the Caspiana soils in high positions have a surface layer of very dark grayish brown silt loam, and those in intermediate positions have a surface layer of dark brown silty clay loam. The subsurface layer is dark brown silt loam. The subsoil is yellowish red silty clay loam and silt loam. The underlying material is yellowish red very fine sandy loam.

Of minor extent in this unit are the somewhat poorly drained Armistead and Moreland soils in intermediate and low positions on the levees.

Most areas are used for soybeans, cotton, or small grain. A few small areas are used as pasture, as woodland, or as sites for urban structures.

The major soils are well suited to cultivated crops and pasture. The loamy surface layer, high or medium fertility, and level slopes favor these uses. The soils in high positions on the levees have few limitations. Those in intermediate positions have slight limitations because of wetness and somewhat poor tilth. The soils in both positions are well suited to the production of hardwoods. Few limitations affect this use. The soils have good potential for woodland and openland wildlife habitat.

The major soils are moderately well suited to urban uses. The main limitations are moderate permeability, a moderate shrink-swell potential, and low strength, which affects local roads and streets.

2. Buxin-Moreland

Level, poorly drained and somewhat poorly drained soils *that are clayey throughout; formed in Red River alluvium*

This map unit consists of soils in depressions and in low positions on levees on the flood plains along the Red River. The soils are subject to rare flooding during unusually wet periods. The landscape is mainly one of broad flats. Slopes are less than 1 percent.

This unit makes up about 1.5 percent of the parish. It is about 62 percent Buxin soils, 33 percent Moreland soils, and 5 percent soils of minor extent.

The Buxin soils are poorly drained. Typically, the surface layer is dark reddish brown clay. The subsoil is dark reddish brown and reddish brown clay. Below this is a buried soil that has a surface layer and subsoil of dark gray, mottled clay. The underlying material is yellowish red, mottled clay.

The Moreland soils are somewhat poorly drained. Typically, the surface layer is dark brown clay. The subsurface layer is dark reddish brown clay. The subsoil is dark reddish brown and reddish brown, mottled clay.

Of minor extent in this unit are the somewhat poorly drained Armistead soils in the slightly higher areas and the poorly drained Perry soils in landscape positions similar to those of the Buxin and Moreland soils.

Most areas are used for soybeans or grain sorghum. A small acreage is used as pasture or woodland.

The major soils are moderately well suited to cultivated crops and pasture. The level slopes and high natural fertility favor these uses. Wetness and poor tilth are the main limitations. A surface drainage system is needed. The soils are moderately well suited to hardwoods. The potential production of hardwoods is high. The wetness and the clayey texture of the surface layer, however, limit the use of equipment and result in a moderate seedling mortality rate. The soils have good potential for woodland and wetland wildlife habitat.

The major soils are poorly suited to most urban uses. The main management concerns are the flooding, the wetness, very slow permeability, a very high shrink-swell potential, and low strength, which affects local roads and streets. The soils can be drained and protected from flooding.

3. Yorktown-Perry

Level, very poorly drained and poorly drained soils that are clayey throughout; formed in Red River alluvium

This map unit consists of soils in low positions on natural levees, in depressions, and in backswamps on the flood plains along the Red River. The landscape is one of broad flats that have many depressional areas. The Yorktown soils are frequently flooded and in most areas are ponded for very long periods. The Perry soils are occasionally flooded. Slopes are 0 to 1 percent.

This unit makes up about 1 percent of the parish. It is about 50 percent Yorktown soils, 45 percent Perry soils, and 5 percent soils of minor extent.

The Yorktown soils are very poorly drained and are in depressions and backswamps. They remain wet throughout the year. Typically, the surface layer is dark gray, mottled clay. The subsoil is dark gray and gray, mottled clay in the upper part and dark reddish brown, mottled clay in the lower part.

The Perry soils are poorly drained and are in depressions and low positions on the levees. Typically, the surface layer is very dark grayish brown clay. The upper part of the subsoil is dark gray, mottled clay. The lower part is reddish brown, mottled clay.

Of minor extent in this unit are the poorly drained Buxin and somewhat poorly drained Moreland soils. These soils are higher on the landscape than the Yorktown soils.

Most areas are used as woodland. Some small areas of the Perry soils have been cleared and are used for cultivated crops or for pasture. Soybeans and grain sorghum are the main crops.

The Yorktown soils generally are not suited to cultivated crops, woodland, or pasture. The wetness caused by flooding and ponding is too severe for these uses. The Perry soils are poorly suited to cultivated crops and moderately well suited to pasture and woodland. The wetness and the clayey texture of the surface layer are the main limitations. They severely limit the selection of crops and pasture plants and the period of grazing. In the areas used as woodland, the flooding and the wetness severely restrict the use of equipment and result in a moderate or high seedling mortality rate. The soils have good potential for woodland and wetland wildlife habitat.

The major soils are not suited to most urban uses. The flooding and the wetness generally are too severe for these uses. Major flood-control structures are needed.

4. Guyton-Iuka-Cahaba

Level and very gently sloping, poorly drained, moderately well drained, and well drained soils that have a loamy surface layer and a loamy or sandy subsoil; formed in local alluvium

This map unit consists of soils on the flood plains along the major streams that drain the uplands and on low terraces near the streams. The soils on the flood plains are frequently flooded. Slopes are 0 to 1 percent on the flood plains and 1 to 3 percent on the stream terraces.

This unit makes up about 15 percent of the parish. It is about 45 percent Guyton soils, 29 percent Iuka soils, 11 percent Cahaba soils, and 15 percent soils of minor extent.

The Guyton soils are level and poorly drained. They are on flood plains and low stream terraces. Typically, the surface layer is dark grayish brown, dark brown, and grayish brown silt loam. The subsurface layer is light brownish gray, mottled silt loam. The subsoil is grayish brown and light brownish gray, mottled silty clay loam and silt loam.

The Iuka soils are level and moderately well drained. They are on flood plains. Typically, the surface layer is dark brown fine sandy loam or brown loam. The subsurface layer is dark yellowish brown loamy sand. The underlying material is yellowish brown loam in the upper part and yellowish brown, gray, and pale brown loamy sand in the lower part.

The Cahaba soils are well drained and very gently sloping. They are on low stream terraces. Typically, the surface layer is dark yellowish brown fine sandy loam. The subsurface layer is yellowish brown fine sandy loam. The subsoil is yellowish red loam and red sandy clay loam. The underlying material is yellowish red sandy loam.

Of minor extent in this unit are the somewhat excessively drained Bienville soils, the poorly drained Bonn and Wrightsville soils, the moderately well drained Elysian soils, and the well drained Ochlockonee soils. Bienville, Bonn, and Elysian soils are on low terraces adjacent to the flood plains. Bonn and Wrightsville soils are in positions on the terraces similar to those of the Guyton soils, and Bienville and Elysian soils are on ridges and mounds. Ochlockonee soils are on low ridges on the flood plains.

Most areas are used as woodland. A few small tracts have been cleared and are used for pasture and for homesite development.

The major soils are moderately well suited to woodland. The potential production of hardwood and pine trees is high, but wetness and flooding restrict the use of equipment and increase the seedling mortality rate. The Cahaba soils have few limitations. The major soils have good potential for woodland and wetland wildlife habitat. The Guyton and Iuka soils are poorly suited to cultivated crops and somewhat poorly suited to pasture. The selection of crops and pasture plants and the period of grazing are limited because of the wetness and the frequency and duration of flooding. The Cahaba soils are moderately well suited to cultivated crops and well suited to pasture. They are limited mainly by a slight hazard of erosion.

The major soils generally are not suited to urban uses because the flooding is too severe. In areas of the Cahaba soils, however, few limitations affect most urban uses.

Dominantly Level to Steep, Loamy and Sandy Soils on Uplands and Stream Terraces

These well drained to poorly drained soils are on ridgetops and side slopes in the uplands and on broad flats on uplands and stream terraces. Slopes range from less than 1 percent on the broad flats to 30 percent on the side slopes.

These soils make up about 81 percent of the parish. Most of the acreage is woodland. A few large areas and many small areas are used for pasture, cultivated crops, or homesite development. The hazard of erosion on the more sloping soils and wetness in the level soils are the main limitations affecting most agricultural and urban uses. Additional limitations on sites for urban uses are a moderate to very high shrink-swell potential, moderate to very slow permeability, and low strength, which affects local roads and streets.

5. Keithville-Eastwood-Metcalf

Nearly level to strongly sloping, moderately well drained and somewhat poorly drained soils that have a loamy surface layer and a loamy and clayey subsoil; formed in old stream or marine sediment

This map unit consists of soils on ridgetops and side slopes in the uplands. In some areas the landscape has low relief. In these areas the soils are on long, smooth slopes on broad, nearly level or gently sloping ridgetops and gently sloping side slopes. In other areas the relief is moderate. The landscape in these areas is one of short, complex slopes on narrow, gently sloping ridgetops and strongly sloping side slopes along deeply incised streams. Slopes range from 0 to 12 percent.

This unit makes up about 29 percent of the parish. It is about 42 percent Keithville soils, 32 percent Eastwood soils, 22 percent Metcalf soils, and 4 percent soils of minor extent.

The Keithville soils are gently sloping and moderately well drained. They are on narrow or broad ridgetops and gentle side slopes. Typically, the surface layer is very dark grayish brown very fine sandy loam. The subsurface layer is yellowish brown very fine sandy loam. The upper part of the subsoil is strong brown loam and clay loam and light gray silt loam. The lower part is red and light brownish gray clay and silty clay. The subsoil is mottled throughout.

The Eastwood soils are moderately well drained and are gently sloping or strongly sloping. They are on narrow ridgetops and on side slopes. Typically, the surface layer is grayish brown or dark grayish brown fine sandy loam. The upper part of the subsoil is red and yellowish brown clay. The lower part is light olive gray and yellowish brown clay loam. The subsoil is mottled throughout. The underlying material is stratified light olive gray clay loam and yellowish brown sandy clay loam.

The Metcalf soils are somewhat poorly drained and nearly level. They are on broad ridgetops. Typically, the surface layer is dark brown silt loam. The subsoil is yellowish brown and light brownish gray, mottled loam and silt loam in the upper part and gray clay and light brownish gray silty clay in the lower part.

Of minor extent in this unit are the moderately well drained Bowie and well drained Meth soils on ridgetops and side slopes and the poorly drained Guyton, moderately well drained luka, and well drained Ochlockonee soils along drainageways.

Most areas are used as woodland. Many small areas are used as pasture. A few small areas are used for cultivated crops or for building site development.

The major soils are well suited to woodland. The potential production of pine timber is high. The main management concerns are a moderate seedling mortality rate and a moderate equipment limitation caused by wetness. Erosion is a hazard in the strongly sloping areas. The soils have good potential for woodland wildlife habitat. They generally are moderately well suited to cultivated crops and well suited to pasture. The strongly sloping soils, however, generally are not suited to cultivated crops because of a severe hazard of erosion. The main limitations affecting cropland are the wetness, the slope, low fertility, and a moderately high or high level of aluminum, which is potentially toxic to crops.

The Keithville and Metcalf soils are moderately well suited to most urban uses, but the Eastwood soils are poorly suited. The main limitations are the wetness, the slope, very slow permeability, a high or very high shrink-swell potential, and low strength, which affects local roads and streets.

6. Eastwood-Meth

Gently sloping to strongly sloping, moderately well drained and well drained soils that have a loamy surface layer and a clayey and loamy subsoil; formed in old stream or marine sediment

This map unit consists of soils on convex ridgetops and side slopes in the uplands. The landscape has moderate relief. It is mainly one of gently sloping ridgetops and moderately sloping and strongly sloping side slopes. Slopes range from 1 to 12 percent.

This unit makes up about 10 percent of the parish. It is about 70 percent Eastwood soils, 17 percent Meth soils, and 13 percent soils of minor extent.

The Eastwood soils are moderately well drained and are gently sloping or strongly sloping. Typically, the surface layer is grayish brown or dark grayish brown fine sandy loam. The upper part of the subsoil is red and yellowish brown clay. The lower part is light olive gray and yellowish brown clay loam. The subsoil is mottled throughout. The underlying material is stratified light olive gray clay loam and yellowish brown sandy clay loam.

The Meth soils are well drained and moderately sloping. They are on the upper parts of the side slopes. Typically, the surface layer is dark yellowish brown fine sandy loam. The subsurface layer is brown fine sandy loam. The subsoil is red sandy clay and sandy clay loam.

Of minor extent in this unit are the moderately well drained Bowie and Keithville, somewhat poorly drained Metcalf, and well drained Ruston soils on ridgetops and the poorly drained Guyton, moderately well drained luka, and well drained Ochlockonee soils along the major drainageways.

Most areas are used as woodland. A few small areas are used for pasture or homesite development.

The major soils are moderately well suited to woodland. The main management concern is a moderate equipment limitation caused by the clayey subsoil in the Eastwood soils. Erosion is a hazard along logging roads and skid trails. The soils have a good potential for woodland wildlife habitat. They generally are moderately well suited to cultivated crops and well suited to pasture. The main limitations are the slope, low fertility, and a high level of aluminum, which is potentially toxic to crops. The strongly sloping Eastwood soils generally are not suited to cultivated crops because of the hazard of erosion.

The major soils are poorly suited to most urban uses. The main limitations are the slope, a moderate to very high shrink-swell potential, very slow and moderately slow permeability, and low strength, which affects local roads and streets.

7. Forbing-Gore-Wrightsville

Level to moderately sloping, moderately well drained and poorly drained soils that have a loamy surface layer and a clayey or loamy and clayey subsoil; formed in old stream sediment

These soils are on ridgetops, side slopes, and broad flats in the uplands and on broad flats on stream terraces. In most areas the landscape is one of low relief. Slopes are long and gentle on the ridgetops, side slopes, and stream terraces in these areas. In other areas the landscape is one of moderate relief. It is a complex of narrow ridgetops and convex side slopes in the uplands and broad flats on stream terraces at low elevations. Slopes range from 0 to 8 percent.

This unit makes up about 5 percent of the parish. It is about 34 percent Forbing soils, 28 percent Gore soils, 24 percent Wrightsville soils, and 14 percent soils of minor extent.

The Forbing soils are moderately well drained and are very gently sloping and moderately sloping. They are on ridgetops and side slopes in the uplands. Typically, the surface layer and subsurface layer are brown silt loam. The subsoil is yellowish red clay in the upper part and red and dark red clay in the lower part.

The Gore soils are moderately well drained and gently sloping. They are on ridgetops and side slopes in the uplands. Typically, the surface layer is dark brown silt loam. The subsoil is yellowish red clay in the upper part, light brownish gray and gray clay in the next part, and yellowish red clay in the lower part. The underlying material is reddish brown clay. The subsoil and underlying material are mottled throughout.

The Wrightsville soils are level and poorly drained. They are on broad flats in the uplands and on stream terraces. Typically, the surface layer is grayish brown silt loam. The subsurface layer is light gray, mottled silt loam. The subsoil is light brownish gray silty clay loam and silt loam in the upper part and grayish brown silty clay and silty clay loam in the lower part. The underlying material is grayish brown silty clay loam. The subsoil and underlying material are mottled throughout.

Of minor extent in this unit are the Guyton, Iuka, Kolin, and Metcalf soils. The poorly drained Guyton soils are in drainageways and on broad flats in the uplands and on stream terraces. The moderately well drained Iuka soils are along drainageways. The moderately well drained Kolin and somewhat poorly drained Metcalf soils are on broad ridgetops.

Most areas are used as woodland. A few large areas are used as pasture. A few small areas are used for homesite development. A few small tracts adjacent to the major lakes have been developed for recreational and urban uses.

The major soils are moderately well suited to woodland. In some areas logging activities are limited by wetness during winter and early spring. In the more sloping areas, erosion is a hazard along logging roads and skid trails. The soils have good potential for woodland wildlife habitat. They are poorly suited to cultivated crops. The main limitations are low fertility, the wetness, the hazard of erosion, and a moderately high level of aluminum, which is potentially toxic to crops. The soils are moderately well suited to pasture. Applications of lime and fertilizer are needed for optimum forage production.

The major soils are poorly suited to most urban uses. The wetness, very slow permeability, and a high or very high shrink-swell potential are the main limitations.

8. Sacul-Kirvin-Keithville

Gently sloping to steep, moderately well drained and well drained soils that have a loamy surface layer and a clayey and loamy subsoil; formed in old stream or marine sediment

These soils are on convex ridgetops and side slopes in the uplands. In some areas the landscape is one of moderate relief. It has long, smooth slopes on broad ridgetops and gently sloping or strongly sloping side slopes. In other areas the landscape has high relief. It has short, complex slopes on narrow ridgetops and strongly sloping to steep side slopes along deeply incised streams. Slopes range from 1 to 30 percent.

This unit makes up about 26 percent of the parish. It is about 44 percent Sacul soils, 36 percent Kirvin soils, 11 percent Keithville soils, and 9 percent soils of minor extent.

The Sacul soils are moderately well drained and are gently sloping, strongly sloping, or steep. Typically, the surface layer is dark grayish brown fine sandy loam. The subsurface layer is yellowish brown fine sandy loam. The subsoil is red clay in the upper part and mottled red and light brownish gray sandy clay and sandy clay loam in the lower part. The underlying material is light brownish gray and grayish brown sandy loam.

The Kirvin soils are well drained and are gently sloping and strongly sloping. Typically, the surface layer is brown or dark brown fine sandy loam. The subsoil is red, mottled clay and clay loam. The underlying material is yellowish red, mottled clay loam.

The Keithville soils are moderately well drained and gently sloping. Typically, the surface layer is very dark grayish brown very fine sandy loam. The subsurface layer is yellowish brown very fine sandy loam. The subsoil is strong brown loam and clay loam in the upper part, strong brown clay loam and light gray silt loam in the next part, and red and light brownish gray clay and silty clay in the lower part.

Of minor extent in this unit are the moderately well drained Beauregard and Bowie and somewhat poorly drained Metcalf soils on broad ridgetops; the moderately well drained Eastwood soils on narrow ridgetops and strongly sloping side slopes; the poorly drained Guyton, moderately well drained Iuka, and well drained Ochlockonee soils along drainageways; and the well drained Mahan and Ruston soils on narrow, convex ridgetops.

Most areas are used as woodland. A few large areas and many small areas are used for pasture or homesite development.

The major soils are well suited to woodland. In some areas, however, logging activities are limited by the wetness. In other areas erosion is a hazard along logging roads and skid trails. The soils have good potential for woodland wildlife habitat. They generally are moderately well suited to cultivated crops and well suited to pasture. The main limitations are the slope, low fertility, and a high level of aluminum, which is potentially toxic to crops. Applications of lime and fertilizer are needed. The strongly sloping and steep soils are poorly suited to crops.

The major soils are poorly suited to most urban uses. The main limitations are the slope, the wetness, a moderate or high shrink-swell potential, moderately slow or very slow permeability, and low strength, which affects local roads and streets.

9. Bowie-Ruston

Gently sloping to moderately sloping, moderately well drained and well drained soils that are loamy throughout; formed in old stream sediment

These soils are on convex ridgetops and side slopes in the uplands. The landscape has low or moderate relief. It consists of broad or narrow ridgetops and gently sloping or moderately sloping side slopes.

This unit makes up about 7 percent of the parish. It is about 73 percent Bowie soils, 23 percent Ruston soils, and 4 percent soils of minor extent.

The Bowie soils are moderately well drained and gently sloping. Typically, the surface layer is dark grayish brown fine sandy loam. The subsurface layer is pale brown fine sandy loam. The subsoil is yellowish brown loam and clay loam.

The Ruston soils are well drained and are gently sloping or moderately sloping. Typically, the surface layer is brown or dark grayish brown fine sandy loam. The subsurface layer is light yellowish brown fine sandy loam. The subsoil is yellowish red and red sandy clay loam and fine sandy loam.

Of minor extent in this unit are the moderately well drained Beauregard soils on toe slopes and at the head of drainageways, the well drained Larue and somewhat excessively drained Flo soils at high elevations, the somewhat poorly drained Metcalf soils on broad ridgetops, and the poorly drained Guyton, moderately well drained Iuka, and well drained Ochlockonee soils along the major drainageways.

Most areas are used as woodland. A few small areas are used for pasture or homesite development.

The major soils are well suited to woodland. Few limitations affect this use. These soils have good potential for woodland wildlife habitat. They are moderately well suited to cultivated crops. The main limitations are the slope, low fertility, and a moderately high level of aluminum, which is potentially toxic to crops. The soils are well suited to pasture. Applications of lime and fertilizer are needed for maximum forage production.

The major soils are moderately well suited to most urban uses. The main limitations are moderate or moderately slow permeability, the slope, and low strength, which affects local roads and streets.

10. Sacul-Larue-Mahan

Gently sloping to steep, moderately well drained and well drained soils that have a loamy or sandy surface layer and a clayey and loamy or a loamy subsoil; formed in old stream or marine sediment

These soils are on convex ridgetops and side slopes in the uplands. The landscape has high relief. It is mainly one of narrow ridgetops and moderately sloping to steep side slopes along deeply incised streams.

This unit makes up about 4 percent of the parish. It is about 67 percent Sacul soils, 25 percent Larue soils, 5 percent Mahan soils, and 3 percent soils of minor extent.

The Sacul soils are moderately well drained and are gently sloping, strongly sloping, or steep. Typically, the surface layer is dark grayish brown fine sandy loam. The subsurface layer is yellowish brown fine sandy loam. The subsoil is red clay in the upper part and mottled red and light brownish gray sandy clay and sandy clay loam in the lower part. The underlying material is light brownish gray and grayish brown sandy loam.

The Larue soils are well drained and are gently sloping or strongly sloping. They are on ridgetops and on the upper parts of side slopes. Typically, the surface layer is brown loamy fine sand. The subsurface layer is light yellowish brown loamy fine sand. The subsoil is yellowish red sandy clay loam.

The Mahan soils are well drained and are gently sloping or moderately sloping. They are on ridgetops. Typically, the surface layer is very dark grayish brown fine sandy loam. The subsurface layer is brown fine sandy loam. The subsoil is yellowish red loam in the upper part, red clay in the next part, and red sandy clay loam in the lower part. The underlying material is red sandy clay loam.

Of minor extent in this unit are the well drained Kirvin, moderately well drained Bowie, and somewhat excessively drained Flo soils on ridgetops and the upper parts of side slopes and the poorly drained Guyton, moderately well drained Iuka, and well drained Ochlockonee soils along the major drainageways.

Most areas are used as woodland. A few small tracts are used for pasture or homesite development.

The major soils are moderately well suited to woodland. The main limitations are droughtiness in the Larue soils and the hazard of erosion on the steep Sacul soils. The major soils have good potential for woodland wildlife habitat. They generally are moderately well suited to cultivated crops and pasture. The slope, low fertility, droughtiness, and the hazard of erosion are the main management concerns. Applications of lime and fertilizer are needed. The steeply sloping soils are not suited to cultivated crops because of a severe hazard of erosion.

The major soils are poorly suited to most urban uses. The main limitations are the slope, a high shrink-swell potential, and moderate or slow permeability.

Broad Land Use Considerations

The soils in the survey area vary widely in their suitability for major land uses. Table 4 shows the extent of the map units shown on the general soil map. It indicates the suitability of each for major land uses and the soil properties that limit use. Soil suitability ratings are based on the practices commonly used in the survey area to overcome soil limitations. These ratings reflect the ease of overcoming the limitations. They also reflect the problems that will persist even if such practices are used.

Each map unit is rated for *cultivated crops, pasture, woodland,* and *urban uses.* Cultivated crops are those grown extensively in the survey area. Pasture refers to areas of native and improved grasses grazed by livestock. Woodland refers to areas of native or introduced trees. Urban uses include residential, commercial, and industrial developments.

Approximately 7 percent of the parish is used for cultivated crops, mainly soybeans, small grain, and cotton. This cropland is mainly in the Gallion-Caspiana and Buxin-Moreland map units. The Gallion-Caspiana map unit is well suited to cultivated crops, and the Buxin-Moreland map unit is only moderately well suited, mainly because of wetness and poor tilth. The Keithville-Eastwood-Metcalf, Eastwood-Meth, Sacul-Kirvin-Keithville, Bowie-Ruston, and Sacul-Larue-Mahan map units are only moderately well suited, mainly because of the hazard of erosion and low fertility, and the Yorktown-Perry, Guyton-Iuka-Cahaba, and Forbing-Gore-Wrightsville map units are poorly suited or unsuited, mainly because of the hazard of erosion, flooding, and wetness.

Approximately 17 percent of the parish is used as pasture. The Gallion-Caspiana, Keithville-Eastwood-Metcalf, Eastwood-Meth, Sacul-Kirvin-Keithville, and Bowie-Ruston map units are well suited to grasses and legumes for pasture. The Buxin-Moreland, Forbing-Gore-Wrightsville, and Sacul-Larue-Mahan map units are only moderately well suited to pasture, and the Guyton-Iuka-Cahaba map unit is somewhat poorly suited. The main limitations are slope and low fertility in areas on uplands and wetness and flooding on flood plains. The Yorktown-Perry map unit generally is not suited to pasture because of the wetness caused by ponding and flooding.

In 1985, about 277,100 acres in the parish was commercial woodland. The Gallion-Caspiana, Keithville-Eastwood-Metcalf, Sacul-Kirvin-Keithville, and Bowie-Ruston map units are well suited to commercial woodland, and the Buxin-Moreland, Guyton-Iuka-Cahaba, Eastwood-Meth, Forbing-Gore-Wrightsville, and Sacul-Larue-Mahan map units are moderately well suited. Wetness, flooding, slope, and a clayey texture in the surface layer or subsoil are the main limitations. The Yorktown-Buxin map unit generally is not suited to commercial woodland because of ponding and flooding.

About 3 percent of the parish is urban or built-up land. The Gallion-Caspiana, Keithville-Eastwood-Metcalf, and Bowie-Ruston map units are moderately well suited to urban uses, and the rest of the map units in the parish are poorly suited or unsuited. The main limitations are a high or very high shrink-swell potential, moderately slow or very slow permeability, slope, flooding, wetness, and low strength, which affects local roads and streets. The Yorktown-Perry and Guyton-Iuka-Cahaba map units generally are not suited to urban uses because of flooding and wetness. Suitable sites for houses or small commercial buildings are available, however, in most areas of these map units.

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 "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, Caspiana silt loam is a phase of the Caspiana series.

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

A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, 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. Elysian-Guyton complex, gently undulating, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in the mapped areas are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Guyton and Iuka soils, frequently flooded, is an undifferentiated group in this survey area.

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.

The descriptions, names, and delineations of the soils on the detailed soil maps of this parish do not fully agree with those on the maps of Caddo, Natchitoches, and Red River Parishes. Differences result from a better knowledge of soils, modifications in series concepts, and variations in the intensity of mapping or in the extent of the soils in the parishes.

Nearly all of the soils in De Soto Parish were mapped at the same level of detail, except for those on narrow flood plains that are frequently flooded. The flooding so limits use and management that it is of little importance to separate all of the soils on these flood plains in mapping.

Table 5 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.

Ar—Armistead clay. This level, somewhat poorly drained soil is on natural levees on the flood plains along the Red River. It is subject to rare flooding, which occurs during unusually wet periods. Individual areas range from about 20 to 150 acres in size. Slopes are dominantly less than 1 percent.

Typically, the surface layer is dark reddish brown, slightly acid clay about 6 inches thick. The upper part of the subsurface layer is dark reddish brown, medium acid clay about 6 inches thick. The lower part is dark reddish brown, strongly acid silty clay loam about 11 inches thick. The subsoil to a depth of about 60 inches is yellowish red silt loam and silty clay loam. It is strongly acid in the upper and lower parts and slightly acid in the middle part.

Included with this soil in mapping are a few small areas of Buxin, Gallion, and Moreland soils. Buxin and Moreland soils are lower on the landscape than the Armistead soil. They are clayey throughout. Gallion soils are in the slightly higher landscape positions. They are loamy throughout. Included soils make up about 10 percent of the map unit.

The Armistead soil is characterized by high fertility. Water and air move through the upper part of this soil at a slow rate and through the lower part at a moderately slow rate. Water runs off the surface at a slow rate. The surface layer is very sticky when wet and dries slowly once it becomes wet. A seasonal high water table fluctuates between depths of 1 and 3 feet during the period December through April. An adequate supply of water is available to plants in most years. The shrink-swell potential is high in the clayey upper part of the soil and low in the loamy lower part.

Most areas are used for crops, mainly cotton, soybeans, and grain sorghum. A few small areas are used as pasture.

This soil is moderately well suited to cultivated crops. It is limited mainly by wetness, a slow rate of water intake, and poor tilth. Maintaining good tilth is difficult. The soil is sticky when wet and hard when dry, and it becomes cloddy if farmed when too wet or too dry. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing can improve surface drainage and permit more efficient use of farm equipment. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material help to maintain fertility, tilth, and the content of organic matter. Most crops other than legumes respond well to additions of nitrogen fertilizer. Lime and fertilizer generally are not needed.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, ryegrass, Dallisgrass, tall fescue, white clover, and winterpea. The main limitations are the wetness and the slow rate of water intake. Grazing when the soil is wet results in compaction of the surface layer and poor tilth and reduces the productivity of the soil. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is well suited to woodland. The trees that can be planted for commercial timber production are eastern cottonwood and American sycamore. The potential productivity is moderately high. The main management concerns are a moderate equipment limitation, moderate seedling mortality, and a moderate windthrow hazard, which result from wetness and the clayey surface layer.

This soil is somewhat poorly suited to urban development. It has moderate limitations if used as a site for dwellings or local roads and streets and severe limitations if used as a site for most sanitary facilities. The main limitations are the wetness, the flooding, the slow and moderately slow permeability, and low strength, which affects local roads and streets. The maximum potential can be achieved through the installation of subsurface or other water-control systems. Reinforcing the foundations and footings of dwellings and replacing or strengthening the base material of roads help to overcome the limited load-supporting capacity of the soil. If constructed on mounds, the buildings can be elevated above the level of flooding. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the restricted permeability. Sewage lagoons or self-contained sewage disposal units can be used.

This soil is poorly suited to recreational development. The main limitation is the clayey surface layer. Areas used for playgrounds can be improved by adding several inches of loamy fill material.

The capability subclass is IIw, the pasture group is 1A, and the woodland ordination symbol is 4W.

Ba—Beauregard silt loam, 1 to 3 percent slopes. This very gently sloping, moderately well drained soil is in the uplands. It is at the head of drainageways and on toe slopes adjacent to the drainageways. Individual areas range from about 10 to 150 acres in size.

Typically, the surface layer is dark grayish brown, medium acid silt loam about 3 inches thick. The subsurface layer is grayish brown, strongly acid silt loam about 5 inches thick. The upper part of the subsoil is yellowish brown and light yellowish brown, mottled, strongly acid silt loam about 19 inches thick. The lower part to a depth of about 65 inches is light brownish gray and grayish brown, mottled, strongly acid and very strongly acid silty clay loam that has nodules of plinthite.

Included with this soil in mapping are a few small areas of Bowie and Guyton soils. Bowie soils are in the slightly more convex landscape positions. They do not have grayish mottles in the upper part of the subsoil. Guyton soils are in level and concave areas. They are grayish throughout. Included soils make up about 10 percent of the map unit.

The Beauregard soil is characterized by low fertility and a high level of exchangeable aluminum, which is potentially toxic to most crops. Water and air move through this soil at a slow rate. Water runs off the surface at a slow or medium rate. A seasonal high water table is at a depth of 1 to 3 feet during the period December through March.

Most areas are used as woodland or pasture. A few small areas are used for crops or for homesite development. The main crops are soybeans and grain sorghum. Also, cotton is grown in places.

This soil is well suited to woodland. Based on a 50-year site curve, the mean site index for loblolly pine is 90. The main management concerns are moderate seedling mortality, a moderate equipment limitation, and a moderate windthrow hazard, which are caused by wetness. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Special site preparation, such as harrowing, bedding, and improving surface drainage, helps to establish seedlings, reduces the seedling mortality rate, and improves the early growth of seedlings. Preparing the site and harvesting the trees only during the drier periods minimize compaction.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, white clover, and winterpea. The main limitations are the wetness and the low fertility. Grazing when the soil is wet results in compaction of the surface layer and thus in reduced forage production. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. It is limited mainly by the hazard of erosion, the slope, the wetness, the low fertility, and the potentially toxic level of exchangeable aluminum in the root zone. The soil is friable and can be easily kept in good tilth. A traffic pan forms easily if the soil is tilled when wet. Deep plowing or chiseling can break up the pan. Maintaining crop residue on or near the surface helps to control runoff and helps to maintain tilth and the organic matter content. Runoff and erosion can be controlled by farming on the contour or across the slope. Field ditches can remove excess water from low areas. Most crops respond well to applications of lime and fertilizer, which help to overcome the low fertility and reduce the level of exchangeable aluminum in the root zone.

This soil is somewhat poorly suited to urban development. It has moderate limitations if used as a site for buildings or local roads and streets and severe limitations if used as a site for most sanitary facilities. The main limitations are the wetness, the slow permeability, and low strength, which affects local roads and streets. Replacing or strengthening the base material of roads helps to overcome the limited load-supporting capacity of the soil. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the slow permeability. Sewage lagoons or self-contained sewage disposal systems can be used.

This soil is moderately well suited to recreational development. The main limitations are the wetness and the slow permeability. Erosion is a hazard on sites for playgrounds. A good drainage system is needed in intensively used areas, such as playgrounds and camp areas. Erosion can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is IIe, the pasture group is 8F, and the woodland ordination symbol is 9W.

Be—Bienville loamy fine sand, 1 to 3 percent slopes. This very gently sloping, somewhat excessively drained soil is on low stream terraces. Individual areas range from about 10 to 150 acres in size.

Typically, the surface layer is brown, medium acid loamy fine sand about 7 inches thick. The subsurface layer is pale brown, slightly acid loamy fine sand about 6 inches thick. The upper 23 inches of the subsoil is yellowish brown loamy fine sand and very pale brown fine sand. The lower part to a depth of about 71 inches is pale brown and brown loamy fine sand. The subsoil is slightly acid in the upper part and medium acid in the lower part.

Included with this soil in mapping are a few small areas of Cahaba and Guyton soils. Cahaba soils are slightly higher on the landscape than the Bienville soil. Also, they contain more clay in the subsoil. Guyton soils are on flats or in concave areas and drainageways. They are grayish and loamy throughout. Included soils make up about 10 percent of the map unit.

The Bienville soil is characterized by low fertility. Water and air move through this soil at a moderately rapid rate. Water runs off the surface at a slow rate. This sandy soil dries quickly after rains. A seasonal high water table is at a depth of about 4 to 6 feet during the period December through April. Plants generally are adversely affected by a lack of water during dry periods in the summer and fall of most years. The shrink-swell potential is low.

Most areas are used as woodland. A few are used for crops, pasture, or homesite development. The main crops are corn, grain sorghum, and soybeans. Also, garden crops are grown in places.

This soil is moderately well suited to woodland. The trees that are suitable for planting are loblolly pine, shortleaf pine, and longleaf pine. The potential production of pine timber is high because additional moisture is provided by the seasonal high water table. Based on a 50-year site curve, the mean site index for loblolly pine is 96. Seedling mortality is moderate because of droughtiness. Also, trafficability is poor when this sandy soil is dry. Selecting containerized planting stock and planting only during moist periods can reduce the seedling mortality rate. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Organic matter can be conserved by restricting burning and leaving slash well distributed.

This soil is moderately well suited to pasture. The chief suitable pasture plants are improved bermudagrass, bahiagrass, weeping lovegrass, ryegrass, and crimson clover. The main limitation is the low fertility. Also, establishing the pasture plants is difficult because of droughtiness. Periodic mowing and clipping help to maintain a uniform distribution of plants and prevent selective grazing. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. It is limited mainly by the droughtiness and the low fertility. The soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Leaving crop residue on or near the surface conserves moisture and helps to maintain fertility. Crops respond well to additions of lime and fertilizer.

This soil is moderately well suited to urban development. It has slight limitations if used as a site for buildings or local roads and streets and moderate or severe limitations if used as a site for most sanitary facilities. The main limitation on sites for sewage lagoons or sanitary landfills is excessive seepage. Cutbanks in shallow excavations cave in easily. Revegetating disturbed areas on construction sites as soon as possible helps to control erosion. Mulching, applying fertilizer, and irrigating help to establish lawn grasses and other small-seeded plants.

This soil is moderately well suited to recreational development. The sandy texture of the surface layer is the main limitation. The slope is an additional limitation on sites for playgrounds. Erosion and sedimentation can be controlled and the beauty of the area enhanced by irrigating, applying fertilizer, and controlling traffic, all of which help to maintain an adequate plant cover.

The capability subclass is IIs, the pasture group is 9A, and the woodland ordination symbol is 10S.

Bn—Bonn silt loam. This level, poorly drained soil is on low terraces near the major drainageways. It is subject to rare flooding, which occurs during unusually wet periods. Individual areas range from about 10 to 60 acres in size. Slopes are dominantly less than 1 percent.

Typically, the surface layer is dark grayish brown, slightly acid silt loam about 6 inches thick. The subsurface layer is light brownish gray, strongly acid silt loam about 4 inches thick. The next 15 inches is gray and light brownish gray silt loam and grayish brown, mottled silty clay loam. The subsoil to a depth of about 60 inches is grayish brown, moderately alkaline silty clay loam and silt loam. It has concentrations of sodium salts.

Included with this soil in mapping are a few small areas of Guyton soils. These soils are in landscape positions similar to those of the Bonn soil. They do not have concentrations of sodium salts in the subsoil. They make up about 10 percent of the map unit.

The Bonn soil is characterized by low fertility. Water and air move through this soil at a very slow rate. Water runs off the surface at a slow rate. A seasonal high water table fluctuates between a depth of 2 feet and the surface during the period December through April. The effective rooting depth and the amount of available moisture are limited by the concentrations of sodium salts in the subsoil. The surface layer remains wet for long periods after heavy rains. Plants generally are adversely affected by a lack of water during dry periods in the summer and fall of most years. The shrink-swell potential is low.

Most areas are used as native grass pasture. A few small areas are used for cultivated crops.

This soil is moderately well suited to pasture. The main limitations are the high content of sodium salts and the wetness. The concentrations of sodium in the subsoil limit forage production. Salt-tolerant grasses, such as bahiagrass, grow best. The use of equipment is limited by the wetness. Grazing when the soil is wet results in compaction of the surface layer and poor tilth and thus reduces the productivity of the soil.

This soil is poorly suited to woodland. The potential production of commercial timber is low. The wetness and the high concentrations of sodium salts are the main limitations. Salt-tolerant trees, such as eastern redcedar, grow best. Because of the wetness, seedling mortality is high and the use of equipment is limited. Harvesting only during the drier periods helps to prevent compaction of the surface layer.

This soil is poorly suited to cultivated crops. It is limited mainly by the high content of sodium salts, the wetness, and the low fertility. Late-planted crops, such as soybeans, can be grown. A drainage system is needed for most cultivated crops and pasture plants. Land grading and smoothing help to remove excess water. Deep cutting during land grading should not expose the subsoil, which is high in content of sodium. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material improve fertility and help to maintain tilth and the content of organic matter.

This soil is poorly suited to urban development. The main limitations are the wetness, the flooding, the very slow permeability, and low strength, which affects local roads and streets. The design of roads and streets can offset the limited load-supporting capacity of the soil. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the very slow permeability. Sewage lagoons or self-contained sewage disposal units can be used. If constructed on mounds, buildings can be elevated above the level of flooding.

This soil is poorly suited to recreational development. It is limited mainly by the flooding, the wetness, and the very slow permeability. A good drainage system is needed. Measures that control flooding are needed in camp areas and on playgrounds.

The capability subclass is IVs, the pasture group is 8I, and the woodland ordination symbol is 5T.

Bo—Bowie fine sandy loam, 1 to 5 percent slopes. This gently sloping, moderately well drained soil is mainly on the tops of ridges in the uplands. In areas of low relief, it also is on side slopes. Individual areas range from about 20 to 200 acres in size.

Typically, the surface layer is dark grayish brown, strongly acid fine sandy loam about 5 inches thick. The subsurface layer is pale brown, strongly acid fine sandy loam about 6 inches thick. The upper part of the subsoil is yellowish brown, strongly acid loam about 12 inches thick. The lower part to a depth of about 70 inches is yellowish brown, mottled, very strongly acid clay loam. It commonly has nodules of plinthite.

Included with this soil in mapping are a few small areas of Beauregard, Metcalf, and Ruston soils. Beauregard and Metcalf soils are on the less convex slopes. Beauregard soils have grayish mottles in the upper part of the subsoil. Metcalf soils are clayey in the lower part of the subsoil. Ruston soils are on the more convex slopes. They have a reddish subsoil. Included soils make up about 15 percent of the map unit.

The Bowie soil is characterized by low fertility and a moderately high level of exchangeable aluminum, which is potentially toxic to some crops. Water and air move through this soil at a moderately slow rate. Water runs off the surface at a medium rate. A seasonal high water table is about 3 to 5 feet below the surface during the period January through April. The soil dries quickly after rains. The shrink-swell potential is low.

Most areas are used as woodland or pasture. A few are used for homesite development or crops. The main crops are corn (fig. 1), soybeans, and grain sorghum. Also, garden crops are grown in places.

This soil is well suited to woodland. The potential production of pine timber is high. Based on a 50-year site curve, the site index for loblolly pine is 86. Few limitations affect woodland management. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Logging only during the drier periods minimizes compaction.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, and crimson clover. The main limitation is the low fertility, and the main hazard is erosion. Seedbeds should be prepared on the contour or across the slope if possible. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. It is limited mainly by the hazard of erosion, the slope, the low fertility, and the potentially toxic level of exchangeable aluminum in the root zone. The soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Returning all crop residue to the soil and including grasses, legumes, or grass-legume mixtures in the cropping sequence help to maintain fertility and tilth. All tillage should be on the contour or across the slope. Crops respond well to applications of lime and fertilizer, which help to overcome the low fertility and reduce the moderately high level of exchangeable aluminum.

This soil is moderately well suited to urban development. It has slight limitations if used as a site for buildings and moderate or severe limitations if used as a site for local roads and streets or for most sanitary facilities. The main limitations are the wetness, the moderately slow permeability, and low strength, which affects local roads and streets. Preserving the existing plant cover during construction helps to control erosion. The hazard of erosion is increased if the surface is exposed during site development. The design of roads and streets can offset the limited load-supporting capacity of the soil. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the moderately slow permeability. The restricted permeability can be overcome by increasing the size of the absorption field.

This soil is well suited to recreational development.

Figure 1.—Corn in an area of Bowie fine sandy loam, 1 to 5 percent slopes. This crop typically is harvested for grain or silage.

Few limitations affect most recreational uses. Erosion is a hazard, however, on sites for playgrounds. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is IIIe, the pasture group is 8B, and the woodland ordination symbol is 9A.

Bx—Buxin clay. This level, poorly drained soil is in depressions and low areas on natural levees along the Red River. It is subject to rare flooding, which occurs during unusually wet periods. Individual areas range from about 15 to 300 acres in size. Slopes are dominantly less than 1 percent.

Typically, the surface layer is dark reddish brown, neutral clay about 6 inches thick. The subsoil is clay about 16 inches thick. It is dark reddish brown and neutral in the upper part and reddish brown and mildly alkaline in the lower part. Below this is a buried surface layer of dark gray, mottled, mildly alkaline clay and a buried subsoil of dark gray, moderately alkaline clay. The underlying material to a depth of about 60 inches is yellowish red, mottled, moderately alkaline clay.

Included with this soil in mapping are a few small areas of Armistead, Gallion, and Moreland soils. Armistead and Gallion soils are at the higher elevations. They have a loamy subsoil. Moreland soils are in landscape positions similar to those of the Buxin soil. They do not have a buried surface layer within 36 inches of the surface. Included soils make up about 15 percent of the map unit.

The Buxin soil is characterized by high fertility. Water and air move through this soil at a very slow rate. Water runs off the surface at a slow rate and stands in low areas for short periods after heavy rains. The surface layer is very sticky when wet and dries slowly once it becomes wet. A seasonal high water table fluctuates between a depth of about 3 feet and the surface during the period December through April. An adequate water supply is available to plants in most years. The shrink-swell potential is high.

Most areas are used as cropland or pasture. A few are used for woodland or homesite development. The main crops are soybeans and grain sorghum.

This soil is moderately well suited to cultivated crops. It is limited mainly by the wetness, the very slow permeability, and poor tilth. Maintaining good tilth is difficult. The soil can be worked only within a narrow range in moisture content. Proper row arrangement, field ditches, and vegetated outlets help to remove excess surface water. Land grading and smoothing can improve surface drainage and permit more efficient use of farm equipment. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material improve fertility and help to maintain tilth and the content of organic matter.

This soil is moderately well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, Dallisgrass, tall fescue, ryegrass, and white clover. The main limitations are the wetness and the very slow permeability. Grazing when the soil is wet results in compaction of the surface layer and damages the plant community. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer is needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to woodland. The trees suitable for planting are eastern cottonwood, American sycamore, and sweetgum. The wetness and the clayey surface layer limit the use of equipment. Also, seedling mortality is high because of the wetness.

This soil is poorly suited to urban development. It has severe limitations if used as a site for buildings, local roads and streets, or most sanitary facilities. The main management concerns are the flooding, the wetness, the high shrink-swell potential, and low strength, which affects local roads and streets. Surface drainage or other water-control systems are needed to remove excess water. Reinforcing the foundations and footings of dwellings and replacing or strengthening the base material of roads help to overcome the limited load-supporting capacity of the soil. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the very slow permeability. Sewage lagoons or self-contained sewage disposal units can be used.

This soil is poorly suited to recreational development. The main limitations are the clayey surface layer, the very slow permeability, and the wetness. Areas used for playgrounds can be improved by adding several inches of loamy fill material. A surface drainage system is needed in most recreational areas.

The capability subclass is IIIw, the pasture group is 1A, and the woodland ordination symbol is 3W.

Ca—Cahaba fine sandy loam, 1 to 3 percent slopes. This very gently sloping, well drained, loamy soil is on low stream terraces. Individual areas range from about 20 to 150 acres in size.

Typically, the surface layer is dark yellowish brown, medium acid fine sandy loam about 6 inches thick. The subsurface layer is yellowish brown, medium acid fine sandy loam about 10 inches thick. The upper part of the subsoil is yellowish red, medium acid loam about 4 inches thick. The lower part is red, medium acid and strongly acid sandy clay loam about 26 inches thick. The underlying material to a depth of about 65 inches is yellowish red, very strongly acid sandy loam.

Included with this soil in mapping are a few small areas of Bienville, Bonn, and Guyton soils. Bienville soils are slightly lower on the landscape than the Cahaba soil. They have a sandy subsoil. Bonn and Guyton soils are lower on the landscape than the Cahaba and Bienville soils. They are grayish and mottled throughout. Included soils make up about 15 percent of the map unit.

The Cahaba soil is characterized by low fertility. Water and air move through the subsoil at a moderate rate. Water runs off the surface at a medium rate. The soil dries quickly after rains. The effective rooting depth is 60 inches or more. The shrink-swell potential is low.

Most areas are used as woodland. A few are used for pasture, homesite development, or crops. The main crops are soybeans, corn, and grain sorghum. Also, garden crops are grown in places.

This soil is well suited to woodland. The potential production of loblolly pine timber is high. Based on a 50-year site curve, the mean site index for loblolly pine is 87. Few limitations affect timber production and harvesting. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, and crimson clover. The main management concerns are the low fertility and a moderate hazard of erosion. Proper stocking rates and pasture rotation help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. The main limitation is the low fertility. The soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material help to maintain tilth and the content of organic matter, improve fertility, and control erosion. Tillage should be on the contour or across the slope. Crops respond well to additions of lime and fertilizer.

This soil is well suited to urban development. It has slight limitations if used as a site for buildings or for local roads and streets. Seepage is a limitation on sites for most sanitary facilities. Also, cutbanks in shallow excavations cave in easily, especially when the soil is very dry. Preserving the existing plant cover during construction helps to control erosion. Topsoil can be stockpiled and used to reclaim areas disturbed by cutting and filling.

This soil is well suited to recreational development. Few limitations affect most recreational uses. Erosion is a hazard on sites for playgrounds. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is IIe, the pasture group is 8B, and the woodland ordination symbol is 9A.

Cs—Caspiana silt loam. This level, well drained soil is in high positions on natural levees on the flood plains along the Red River. Individual areas range from about 25 to 300 acres in size. Slopes are dominantly less than 1 percent.

Typically, the surface layer is very dark grayish brown, slightly acid silt loam about 7 inches thick. The subsurface layer is dark brown, slightly acid silt loam about 6 inches thick. The next 5 inches is dark brown and reddish brown, neutral silt loam. The subsoil is about 15 inches of yellowish red, slightly acid silty clay loam and silt loam. The underlying material to a depth of about 62 inches is yellowish red, mildly alkaline very fine sandy loam.

Included with this soil in mapping are a few small areas of Armistead and Gallion soils. Armistead soils are at the slightly lower elevations. They have a clayey surface layer and subsurface layer. Gallion soils are at the slightly higher elevations. They have a surface layer that is lighter colored than that of the Caspiana soil. Included soils make up about 10 percent of the map unit.

The Caspiana soil is characterized by high fertility. Water and air move through this soil at a moderate rate. Water runs off the surface at a slow rate. The soil dries quickly after rains. A seasonal high water table is 4 to 6 feet below the surface during the period December through April. The shrink-swell potential is moderate in the subsoil.

Most areas are used as cropland. A few are used for pasture or homesite development. The main crops are cotton, soybeans, corn, oats, and grain sorghum.

This soil is well suited to cultivated crops. Few limitations affect this use. The soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Excessive cultivation, however, can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Land grading and smoothing can improve surface drainage and permit more efficient use of farm equipment. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material help to maintain fertility, tilth, and the content of organic matter. Crops respond well to applications of fertilizer. Lime generally is not needed.

This soil is well suited to pasture. Few limitations affect this use. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, tall fescue, white clover, and winterpea. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Proper grazing practices, weed control, and fertilizer are needed if the maximum quality of forage is to be achieved.

This soil is well suited to woodland. The trees that are suitable for commercial timber production are eastern cottonwood, sweetgum, and American sycamore. Preparing the site and harvesting the trees only during the drier periods minimize compaction.

This soil is moderately well suited to urban development. It has moderate limitations if used as a site for buildings or most sanitary facilities. The main limitations are the wetness, the moderate shrink-swell potential, and low strength, which affects local roads and streets. Reinforcing the foundations and footings of dwellings and replacing or strengthening the base material of roads help to overcome the moderate shrink-swell potential and the limited load-supporting capacity of the soil. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the moderate permeability. Enlarging the absorption field can help to overcome the moderate permeability, and installing subsurface drains can lower the water table.

This soil is well suited to recreational development. Few limitations affect this use. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability class is I, the pasture group is 2C, and the woodland ordination symbol is 3A.

Ct—Caspiana silty clay loam. This level, well drained soil is in intermediate positions on natural levees on the flood plains along the Red River. Individual areas range from about 25 to 150 acres in size. Slopes are dominantly less than 1 percent.

Typically, the surface layer is dark brown, slightly acid silty clay loam about 9 inches thick. The subsurface layer is dark brown and reddish brown, slightly acid silty clay loam about 4 inches thick. The subsoil is about 37 inches thick. The upper part is reddish brown, neutral silty clay loam, and the lower part is yellowish red, neutral silt loam. The underlying material to a depth of about 62 inches is reddish brown, moderately alkaline silt loam.

Included with this soil in mapping are a few small areas of Armistead and Gallion soils. Armistead soils are at the slightly lower elevations. They have a clayey surface layer and subsurface layer. Gallion soils are at the slightly higher elevations. They have a surface layer that is lighter colored than that of the Caspiana soil. Included soils make up about 10 percent of the map unit.

The Caspiana soil is characterized by high fertility. Water and air move through this soil at a moderate rate. Water runs off the surface at a slow rate. The surface layer is sticky when wet and dries slowly once it becomes wet. A seasonal high water table is 4 to more than 6 feet below the surface during the period December through April. The shrink-swell potential is moderate.

Most areas are used as cropland. A few are used for pasture or homesite development. The main crops are cotton, soybeans, corn, oats, and grain sorghum.

This soil is well suited to cultivated crops. It is limited mainly by the wetness and poor tilth. Maintaining good tilth is difficult. The soil can be worked only within a narrow range in moisture content. Land grading and smoothing can improve surface drainage and permit more efficient use of farm equipment. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material help to maintain fertility, tilth, and the content of organic matter. Crops respond well to applications of fertilizer. Lime generally is not needed.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, ryegrass, Dallisgrass, tall fescue, bahiagrass, white clover, and winterpea. The main limitation is the wetness. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Proper grazing practices, weed control, and fertilizer are needed if the maximum quality of forage is to be achieved.

This soil is well suited to woodland. The trees suitable for commercial timber are eastern cottonwood, sweetgum, and American sycamore. Preparing the site and harvesting only during the drier periods can minimize compaction and the formation of ruts, which reduce the productivity of the soil.

This soil is moderately well suited to urban development. It has moderate limitations if used as a site for buildings or most sanitary facilities and severe limitations if used as a site for local roads and streets. The main limitations are the wetness, the moderate permeability, and low strength, which affects local roads and streets. Reinforcing the foundations and footings of dwellings and replacing or strengthening the base material of roads help to overcome the moderate shrink-swell potential and the limited load-supporting capacity of the soil. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the moderate permeability. The water table can be lowered by subsurface drains. The moderate permeability can be overcome by increasing the size of the absorption field.

This soil is well suited to recreational development. Few limitations affect this use. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is IIw, the pasture group is 2C, and the woodland ordination symbol is 3A.

Ea—Eastwood fine sandy loam, 1 to 5 percent slopes. This gently sloping, moderately well drained soil is mainly on the tops of ridges in the uplands. In areas of low relief, it also is on side slopes. Individual areas range from about 20 to 30 acres in size.

Typically, the surface layer is grayish brown, medium acid fine sandy loam about 4 inches thick. The subsoil is about 48 inches thick. The upper part is red, mottled, strongly acid silty clay and red, mottled, very strongly acid clay. The next part is yellowish brown, mottled, very strongly acid clay. The lower part is light olive gray and yellowish brown, mottled, very strongly acid clay loam. The underlying material to a depth of about 60 inches is stratified, light olive gray clay loam and yellowish brown sandy clay loam. It is very strongly acid.

Included with this soil in mapping are a few small areas of Bowie and Keithville soils. These soils are at the slightly higher elevations. Bowie soils are loamy throughout. Keithville soils have a subsoil that is loamy in the upper part and clayey in the lower part. Included soils make up about 15 percent of the map unit.

The Eastwood soil is characterized by low fertility and a high level of exchangeable aluminum, which is potentially toxic to most crops. Water and air move through the subsoil at a very slow rate. Water runs off the surface at a medium rate. The soil dries slowly after heavy rains. The shrink-swell potential is very high in the subsoil.

Most areas are used as woodland. A few are used as pasture or cropland. The main crops are corn, soybeans, and grain sorghum. Garden crops also are grown.

This soil is moderately well suited to woodland. The potential production of pine timber is high. Based on a 50-year site curve, the mean site index for loblolly pine is 93. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Conventional harvesting methods generally can be used, but they may be hindered during rainy periods, generally from December through February. Planting and harvesting only during dry periods can minimize the formation of ruts and surface compaction.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, and crimson clover. The main management concerns are the low fertility and a moderate hazard of erosion. Seedbeds should be prepared on the contour or across the slope if possible. Limiting tillage during seedbed preparation helps to control runoff and erosion. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. It is limited mainly by the low fertility, the slope, and the potentially toxic level of aluminum in the root zone. In areas where part of the subsoil is mixed into the plow layer, maintaining good tilth is difficult. In places irregular slopes hinder tillage. Tillage should be on the contour or across the slope. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material improve fertility, help to maintain tilth and the content of organic matter, and control erosion. Crops respond well to additions of lime and fertilizer, which help to overcome the low fertility and reduce the level of exchangeable aluminum in the root zone.

This soil is poorly suited to urban development. It has severe limitations if used as a site for buildings, local roads and streets, or most sanitary facilities. The main limitations are the very slow permeability, the slope, the very high shrink-swell potential, and low strength, which affects local roads and streets. Preserving the existing plant cover during construction helps to control erosion. The design of roads and streets can offset the limited load-supporting capacity of the subsoil. Septic tank absorption fields do not function properly during rainy periods because of the very slow permeability. The restricted permeability can be overcome by increasing the size of the absorption field. The very high shrink-swell potential is a limitation on sites for dwellings. The adverse effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential.

This soil is moderately well suited to recreational development. The main limitation is the very slow permeability. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is IIIe, the pasture group is 8D, and the woodland ordination symbol is 10C.

Ec—Eastwood fine sandy loam, 5 to 12 percent slopes. This strongly sloping, moderately well drained soil is on side slopes in the uplands. It is dissected by many drainageways. Individual areas range from about 15 to 150 acres in size.

Typically, the surface layer is dark grayish brown and yellowish brown, very strongly acid fine sandy loam about 6 inches thick. The subsoil is about 40 inches thick. The upper part is red, very strongly acid clay. The next part is mottled red, brown, and gray, very strongly acid clay. The lower part is light olive gray and yellowish brown, mottled, very strongly acid silty clay loam. The underlying material to a depth of about 60 inches is stratified light olive gray and olive yellow, slightly acid clay loam.

Included with this soil in mapping are a few small areas of Bowie and Keithville soils. Bowie soils are on ridgetops. They are loamy throughout. Keithville soils are on broad ridgetops. They are loamy in the upper part of the subsoil. Included soils make up about 15 percent of the map unit.

The Eastwood soil is characterized by low fertility. Water and air move through the subsoil at a very slow rate. Water runs off the surface at a rapid rate. The shrink-swell potential is very high in the subsoil.

Most areas are used as woodland. A few are used as pasture.

This soil is moderately well suited to woodland. The potential production of pine timber is moderately high. Based on a 50-year site curve, the mean site index for loblolly pine is 86. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Maintaining a good plant cover helps to control erosion. On yarding paths, skid trails, firebreaks, and unused access roads, erosion can be controlled by water bars, a good plant cover, or both. Conventional methods of harvesting can be used. Planting and harvesting only during dry periods can minimize compaction and the formation of ruts.

This soil is moderately well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, and crimson clover. The main management concerns are the low fertility and a severe hazard of erosion. Seedbeds should be prepared on the contour or across the slope if possible. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil generally is not suited to cultivated crops. The hazard of erosion is too severe for most cultivated crops. The low fertility and the potentially toxic level of aluminum in the root zone are additional limitations.

This soil is poorly suited to urban development. It has severe limitations if used as a site for buildings, local roads and streets, or most sanitary facilities. The main limitations are the very slow permeability, the slope, the very high shrink-swell potential, and low strength, which affects local roads and streets. Preserving the existing plant cover during construction helps to control erosion. The design of roads and streets can offset the limited load-supporting capacity of the soil. The slope limits the installation of septic tank absorption fields. Installing the absorption lines on the contour helps to keep the effluent from seeping to the surface in downslope areas. The adverse effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential.

This soil is poorly suited to recreational development. The main limitations are the very slow permeability and the slope. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover. The plant cover can be maintained by applying fertilizer and controlling traffic.

The capability subclass is VIe, the pasture group is 8E, and the woodland ordination symbol is 9C.

Eg—Elysian-Guyton complex, gently undulating. These soils are on low stream terraces near the Sabine River and its tributaries. The moderately well drained Elysian soil is on low, oblong mounds that are 2 to 5 feet high and 40 to 100 feet in diameter. The poorly drained Guyton soil is in swales that are less than 200 feet wide. It is subject to rare flooding, which occurs during unusually wet periods. Individual areas range from about 50 to 300 acres in size. They are about 70 percent Elysian soil and 20 percent Guyton soil. The two soils occur as areas so intricately intermingled that it is not practical to map them separately at the scale used. Slopes are 0 to 1 percent between the mounds and 1 to 5 percent on the mounds.

Typically, the Elysian soil has a surface layer of dark grayish brown, strongly acid fine sandy loam about 3 inches thick. The upper part of the subsoil is yellowish brown, strongly acid fine sandy loam about 22 inches thick. The lower part to a depth of about 65 inches is strong brown and yellowish brown loam and yellowish brown, pale brown, light gray, light brownish gray, and gray fine sandy loam. It is strongly acid and very strongly acid.

The Elysian soil is characterized by low fertility. Water and air move through this soil at a moderate rate. Runoff is medium or slow. A seasonal high water table is about 3 to 6 feet below the surface during the period December through May. Plants generally are adversely affected by a lack of water during dry periods in summer and fall. The shrink-swell potential is low.

Typically, the Guyton soil has a surface layer of dark brown, strongly acid silt loam about 4 inches thick. The subsurface layer is about 14 inches thick. The upper part is light brownish gray, mottled, strongly acid silt loam, and the lower part is light gray, mottled, very strongly acid silt loam. The upper part of the subsoil is light brownish gray, mottled, medium acid silty clay loam and light gray silt loam. The lower part to a depth of about 62 inches is grayish brown, mottled, slightly acid silt loam.

The Guyton soil is characterized by low fertility and a high level of exchangeable aluminum, which is potentially toxic to most crops. Water and air move through this soil at a slow rate. Water runs off the surface at a slow rate. A seasonal high water table fluctuates between the surface and a depth of 1 foot during the period December through May. The wetness causes poor aeration and restricts the root development of many plants. The shrink-swell potential is low.

Included with these soils in mapping are a few small areas of Bonn and Cahaba soils. Bonn soils are in landscape positions similar to those of the Guyton soil. They have concentrations of sodium salts in the subsoil. Cahaba soils are at the higher elevations. They have a reddish, loamy subsoil. Included soils make up about 10 percent of the map unit.

Most areas are used as woodland. A small acreage is used for pasture or cultivated crops, mainly corn, oats, and soybeans.

These soils are moderately well suited to woodland. The potential production of pine and hardwoods is high.

Based on a 50-year site curve, the mean site index for loblolly pine is 90. Wetness can restrict the use of equipment in winter and spring and can cause moderate seedling mortality. Soil compaction can be minimized by using suitable logging systems, laying out skid trails in advance, and harvesting timber when the soils are least susceptible to compaction.

These soils are moderately well suited to cultivated crops. The main limitations are the wetness in areas of the Guyton soil and the slope in areas of the Elysian soil. The low fertility and the potentially toxic level of exchangeable aluminum are additional limitations. The uneven surface resulting from the numerous mounds interferes with tillage. The wetness delays planting and harvesting in most years. Land grading and smoothing can improve surface drainage only if a large amount of soil is moved. Proper management of crop residue helps to maintain the content of organic matter, improves tilth, and reduces the hazard of erosion. Most crops and pasture plants respond well to additions of lime and fertilizer.

These soils are moderately well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, tall fescue, ryegrass, and winterpea. The low fertility and the wetness are the main limitations. Also, the Elysian soil can be somewhat droughty. Excess surface water can be removed by ditches or by land grading and smoothing. Fertilizer and lime are needed if optimum forage production is to be achieved.

These soils are poorly suited to urban development. The wetness and the flooding are the main management concerns. The Elysian soil is better suited to most urban uses than the Guyton soil. Suitable areas generally are small. Protection from flooding is needed. A drainage system can remove excess water from homesites. Constructing on natural or constructed mounds can elevate the homesite above the level of flooding. Sewage lagoons or self-contained sewage disposal units can be used.

These soils are moderately well suited to intensive recreational uses. The wetness and the uneven surface are the main limitations. A drainage system is needed in most recreational areas. Land grading and smoothing can improve playgrounds and camp areas.

The capability subclass is IIIw. The Elysian soil is in pasture group 8B, and the Guyton soil is in pasture group 8G. The woodland ordination symbol assigned to the Elysian soil is 9A, and that assigned to the Guyton soil is 9W.

Fb—Flo loamy fine sand, 1 to 5 percent slopes. This gently sloping, somewhat excessively drained soil is on the tops of ridges in the uplands. Individual areas range from about 10 to 150 acres in size.

Typically, the surface layer is dark grayish brown, slightly acid loamy fine sand about 6 inches thick. The subsurface layer is brown, slightly acid loamy fine sand about 20 inches thick. The subsoil to a depth of about 65 inches is medium acid loamy fine sand. It is brown in the upper part and strong brown in the lower part.

Included with this soil in mapping are a few small areas of Kirvin and Larue soils. These soils are in landscape positions similar to those of the Flo soil. Kirvin soils have a clayey subsoil. Larue soils have a loamy subsoil. Included soils make up about 10 percent of the map unit.

The Flo soil is characterized by low or very low fertility. Water and air move through this soil at a rapid rate. Water runs off the surface at a very slow rate. The soil dries quickly and becomes droughty. Most crops and pasture plants are adversely affected by a lack of water during the summer and fall of most years. The shrink-swell potential is low.

Most areas are used as woodland. A few are used as pasture, for homesite development, or for crops, mainly watermelons.

This soil is moderately well suited to woodland. The trees that are suitable for planting are loblolly pine, shortleaf pine, and longleaf pine. Based on a 50-year site curve, the mean site index for shortleaf pine is 72. Tree growth is limited by the droughtiness. Also, the sandy texture of the surface layer limits the use of equipment, particularly during dry periods. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Seedling mortality generally is moderate because of the droughtiness. Selecting special planting stock that is larger than is typical or selecting containerized planting stock can reduce the seedling mortality rate. Organic matter can be conserved by restricting burning and leaving slash well distributed.

This soil is moderately well suited to pasture. The chief suitable pasture plants are improved bermudagrass, weeping lovegrass, bahiagrass, and crimson clover. The main limitations are the droughtiness and the low or very low fertility. The use of equipment is limited by the sandy texture of the surface layer. Periodic mowing and clipping can help to maintain a uniform distribution of plants and prevent selective grazing. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. It is limited mainly by the droughtiness and the low or very low fertility. It is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Returning all crop residue to the soil and including grasses, legumes, or grass-legume mixtures in the cropping sequence help to maintain fertility and tilth. Crops respond well to additions of lime and fertilizer.

This soil is moderately well suited to urban development. It has slight limitations if used as a site for buildings or local roads and streets and severe limitations if used as a site for most sanitary facilities. Seepage is a hazard on sites for sewage lagoons or sanitary landfills. Self-contained sewage disposal units can be used to prevent the contamination of nearby water sources. The droughtiness hinders the growth of lawn grasses and ornamentals. Irrigation can help to establish lawns and golf fairways. Cutbanks in shallow excavations cave in easily.

This soil is moderately well suited to recreational development. It is limited mainly by the sandy texture of the surface layer and by the droughtiness. Erosion and sedimentation can be controlled and the beauty of the area enhanced by irrigating, applying fertilizer, and controlling traffic, all of which help to maintain an adequate plant cover.

The capability subclass is IIIs, the pasture group is 9A, and the woodland ordination symbol is 8S.

Fc—Flo loamy fine sand, 5 to 12 percent slopes. This strongly sloping, somewhat excessively drained soil is on side slopes in the uplands. Individual areas range from about 10 to 150 acres in size.

Typically, the surface layer is dark grayish brown, strongly acid loamy fine sand about 6 inches thick. The subsurface layer is brown, medium acid loamy fine sand about 19 inches thick. The next 38 inches is light yellowish brown, medium acid loamy fine sand. The subsoil to a depth of about 65 inches is strong brown, medium acid loamy fine sand.

Included with this soil in mapping are a few small areas of Kirvin and Larue soils. These soils are in landscape positions similar to those of the Flo soil. They make up about 10 percent of the map unit.

The Flo soil is characterized by low or very low fertility. Water and air move through this soil at a rapid rate. Water runs off the surface at a very slow rate. The soil dries quickly and becomes droughty. Most crops and pasture plants are adversely affected by a lack of water during late summer and early fall in most years. The shrink-swell potential is low.

Most areas are used as woodland. A few are used as pasture.

This soil is moderately well suited to woodland. The trees suitable for planting are loblolly pine, shortleaf pine, and longleaf pine. Based on a 50-year site curve, the mean site index for shortleaf pine is 72. Tree growth is limited somewhat by the droughtiness, and the sandy texture of the surface layer limits the use of equipment. Trafficability is poor when this sandy soil is dry. Cut and fill slopes can be eroded unless treated. Seeding and mulching can reduce the hazard of erosion. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Seedling mortality generally is moderate because of the droughtiness. Organic matter can be conserved by restricting burning and leaving slash well distributed.

This soil is moderately well suited to pasture. The chief suitable pasture plants are improved bermudagrass, weeping lovegrass, bahiagrass, and crimson clover. The main limitations are the droughtiness, the slope, and the low or very low fertility. Erosion is a hazard on the steeper slopes. The use of equipment is limited somewhat by the sandy texture of the surface layer. Seedbeds should be prepared on the contour or across the slope if possible. Periodic mowing and clipping can help to maintain a uniform distribution of plants and prevent selective grazing. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is poorly suited to cultivated crops. It is limited mainly by the droughtiness, the slope, and the low or very low fertility. Erosion is the main hazard. The soil is friable and can be easily kept in good tilth. It can be easily worked when moist, but traction is poor when the surface layer is dry. Leaving crop residue on or near the surface conserves moisture, maintains tilth, and helps to control erosion. Crops respond well to additions of lime and fertilizer.

This soil is somewhat poorly suited to urban development. It has moderate or severe limitations if used as a site for buildings, local roads and streets, or most sanitary facilities. Excessive seepage and the slope are the main management concerns on sites for sewage lagoons and sanitary landfills. Erosion is a hazard in the steeper areas. Only the part of the site used for construction should be disturbed.

This soil is moderately well suited to recreational development. The main limitations are the sandy texture of the surface layer, the slope, and the droughtiness. Erosion and sedimentation can be controlled and the beauty of the area enhanced by irrigating, applying fertilizer, and controlling traffic, all of which help to maintain an adequate plant cover.

The capability subclass is IVe, the pasture group is 9A, and the woodland ordination symbol is 8S.

Fr—Forbing silt loam, 1 to 3 percent slopes. This very gently sloping, moderately well drained soil is on the tops of ridges in the uplands. It is mainly near the major lakes in the parish. Individual areas range from about 25 to 200 acres in size.

Typically, the surface layer is brown, strongly acid silt loam about 4 inches thick. The upper part of the subsoil is red, strongly acid clay. The lower part to a depth of about 70 inches is red and dark red, moderately alkaline clay.

Included with this soil in mapping are a few small areas of Gore soils. These soils are in landscape positions similar to those of the Forbing soil. They have grayish layers in the subsoil. They make up about 10 percent of the map unit.

The Forbing soil is characterized by low fertility. Water and air move through this soil at a very slow rate. Water runs off the surface at a medium rate. The shrink-swell potential is very high in the subsoil.

Most areas are used as woodland. A few are used for pasture or crops. The main crops are soybeans and grain sorghum. Also, garden crops are grown in places.

This soil is moderately well suited to woodland. The potential production of pine timber is moderately high. Based on a 50-year site curve, the mean site index for loblolly pine is 70. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling. Because the clayey subsoil is sticky when wet, most planting and harvesting equipment can be used only during dry periods.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, and crimson clover. The main limitations are the low fertility and the slope. Preparing a seedbed on the contour or across the slope helps to control erosion. Limiting tillage during seedbed preparation helps to control runoff and erosion. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. It is limited mainly by the slope and the low fertility. In areas where part of the clayey subsoil is mixed into the plow layer, maintaining good tilth is difficult. The soil can be worked only within a narrow range in moisture content. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material improve fertility and help to maintain tilth and the content of organic matter. All tillage should be on the contour or across the slope. Areas that have smooth slopes can be terraced and then farmed on the contour. Crops respond well to additions of fertilizer.

This soil is poorly suited to urban development. It has severe limitations if used as a site for buildings, local roads and streets, or most sanitary facilities. The main limitations are the very slow permeability, the very high shrink-swell potential, and low strength, which affects local roads and streets. Preserving the existing plant cover during construction helps to control erosion. The hazard of erosion is increased if the surface is exposed during site development. Septic tank absorption fields do not function properly during rainy periods because of the very slow permeability. The restricted permeability can be overcome by increasing the size of the absorption field. The adverse effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential.

This soil is moderately well suited to recreational development. The main limitation is the very slow permeability. Erosion and sedimentation can be controlled and the beauty of the area enhanced by applying fertilizer and controlling traffic, both of which help to maintain an adequate plant cover.

The capability subclass is IIIe, the pasture group is 8D, and the woodland ordination symbol is 6C.

Fs—Forbing silt loam, 3 to 8 percent slopes. This moderately sloping, moderately well drained soil is on side slopes in the uplands. It is mainly near the major lakes in the parish. Individual areas range from about 25 to 200 acres in size.

Typically, the surface layer is brown, strongly acid silt loam about 3 inches thick. The subsurface layer is brown, medium acid silt loam. The subsoil to a depth of about 70 inches is clay. The upper part is yellowish red and is strongly acid and slightly acid. The lower part is red and dark red and is moderately alkaline.

Included with this soil in mapping are a few small areas of Gore soils. These soils are on ridgetops. They have grayish layers in the subsoil. They make up about 10 percent of the map unit.

The Forbing soil is characterized by low fertility. Water and air move through this soil at a very slow rate. Water runs off the surface at a rapid rate. The shrink-swell potential is very high in the subsoil.

Most areas are used as woodland. A few are used as pasture.

This soil is moderately well suited to woodland. The potential production of pine timber is moderately high. Based on a 50-year site curve, the mean site index is 70. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling. Conventional methods of harvesting can be used. Planting and harvesting only during dry periods can minimize compaction and the formation of ruts.

This soil is moderately well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, and crimson clover. The main limitations are the slope and the low fertility. Seedbeds should be prepared on the contour or across the slope if possible. Limiting tillage during seedbed preparation helps to control runoff and erosion. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is poorly suited to cultivated crops. It is limited mainly by the low fertility and the slope. Erosion is the major hazard in cultivated areas. Also, maintaining good tilth is difficult. The soil can be worked only within a narrow range in moisture content. Irregular slopes hinder tillage in places. All tillage should be on the contour or across the slope if possible. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material help to maintain tilth, fertility, and the content of organic matter. These measures also help to control erosion. Crops respond well to additions of lime and fertilizer.

This soil is poorly suited to urban development. It has severe limitations if used as a site for buildings, local roads and streets, or most sanitary facilities. The main limitations are the very slow permeability, the slope, the very high shrink-swell potential, and low strength, which affects local roads and streets. Preserving the existing plant cover during construction helps to control erosion. The hazard of erosion is increased if the surface is exposed during site development. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the very slow permeability. The restricted permeability can be overcome by increasing the size of the absorption field. The adverse effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential.

This soil is poorly suited to recreational development. The main limitations are the very slow permeability and the slope. Erosion is a hazard on sites for playgrounds. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover in picnic areas and camp areas and by applying fertilizer and controlling traffic.

The capability subclass is IVe, the pasture group is 8D, and the woodland ordination symbol is 6C.

Ga—Gallion silt loam. This level, well drained soil is in high positions on natural levees along tributaries of the Red River. Individual areas range from about 5 to 150 acres in size. Slopes are dominantly less than 1 percent.

Typically, the surface layer is brown, strongly acid silt loam about 7 inches thick. The subsoil is about 37 inches thick. It is yellowish red, medium acid silty clay loam in the upper part and yellowish red, medium acid and slightly acid silt loam in the lower part. The underlying material to a depth of about 66 inches is dark reddish brown silty clay loam and yellowish red silt loam. It is medium acid.

Included with this soil in mapping are a few small areas of Caspiana soils. These soils are slightly lower on the landscape than the Gallion soil. Also, they have a darker surface layer. They make up about 10 percent of the map unit.

The Gallion soil is characterized by medium fertility. Water and air move through the subsoil at a slow rate. Water runs off the surface at a slow rate. The soil dries quickly after rains. An adequate supply of water is available to plants in most years. The shrink-swell potential is moderate in the subsoil.

Most areas are used for crops, mainly cotton, soybeans, corn, oats, and grain sorghum. A few areas are used for pasture or homesite development.

This soil is well suited to cultivated crops. Few limitations affect this use. The soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Excessive cultivation, however, can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. The organic matter content can be maintained by leaving crop residue on the surface, plowing under cover crops, and using a suitable cropping system. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material help to maintain fertility, tilth, and the content of organic matter. Crops respond well to applications of fertilizer. Lime generally is not needed.

This soil is well suited to pasture. Few limitations affect this use. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, tall fescue, white clover, and winterpea. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Proper grazing practices, weed control, and fertilizer are needed if the maximum quality of forage is to be achieved.

This soil is well suited to woodland. The trees that are suitable for planting are eastern cottonwood and American sycamore. The potential production of hardwood timber is high.

This soil is moderately well suited to urban development. It has moderate limitations if used as a site for buildings or most sanitary facilities and severe limitations if used as a site for local roads and streets. The main limitations are the moderate permeability, the moderate shrink-swell potential, and low strength, which affects local roads and streets. The design of roads and streets can offset the limited load-supporting capacity of the soil. Properly designing foundations and footings helps to prevent the structural damage caused by shrinking and swelling of the subsoil. Septic tank absorption fields do not function properly during rainy periods because of the moderate permeability. The restricted permeability can be overcome by increasing the size of the absorption field.

This soil is well suited to recreational development. Few limitations affect this use.

The capability class is I, the pasture group is 2D, and the woodland ordination symbol is 9A.

Gn—Gallion silty clay loam. This level, well drained soil is in intermediate positions on natural levees along tributaries of the Red River. Individual areas range from about 5 to 75 acres in size. Slopes are dominantly less than 1 percent.

Typically, the surface layer is brown, slightly acid silty clay loam about 10 inches thick. The subsoil is about 37 inches thick. The upper part is reddish brown, slightly acid silty clay loam. The lower part is reddish brown, slightly acid silt loam. The underlying material to a depth of about 60 inches is yellowish red, moderately alkaline, stratified silt loam and very fine sandy loam.

Included with this soil in mapping are a few small areas of Caspiana soils. These soils are in the slightly lower landscape positions. They have a surface layer that is darker than that of the Gallion soil. They make up about 10 percent of the map unit.

The Gallion soil is characterized by medium fertility. Water and air move through this soil at a moderate rate. Water runs off the surface at a slow rate. The surface layer is sticky when wet and dries slowly once it becomes wet. An adequate supply of water is available to plants in most years. The shrink-swell potential is moderate.

Most areas are used as cropland. A few are used for pasture or homesite development. The main crops are cotton, soybeans, corn, oats, and grain sorghum.

This soil is well suited to cultivated crops. The wetness and poor tilth are the main limitations. Maintaining good tilth is difficult. The soil can be worked only within a narrow range in moisture content. It is sticky when wet and hard when dry, and it becomes cloddy if farmed when too wet or too dry. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Land grading and smoothing can improve surface drainage and permit more efficient use of farm equipment. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material help to maintain fertility, tilth, and the content of organic matter. Crops respond well to additions of fertilizer. Lime generally is not needed.

This soil is well suited to pasture. Few limitations affect this use. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, white clover, and winterpea. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Proper grazing practices, weed control, and fertilizer are needed if the maximum quality of forage is to be achieved.

This soil is well suited to woodland. The trees that are suitable for planting are eastern cottonwood and American sycamore. The potential production of hardwood timber is high.

This soil is moderately well suited to urban development. It has moderate limitations if used as a site for buildings or most sanitary facilities and severe limitations if used as a site for local roads and streets. The main limitations are the moderate permeability, the moderate shrink-swell potential, and low strength, which affects local roads and streets. The design of roads and streets can offset the limited load-supporting capacity of the soil. The adverse effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the moderate permeability. The restricted permeability can be overcome by increasing the size of the absorption field.

This soil is well suited to recreational development. Few limitations affect this use.

The capability subclass is IIw, the pasture group is 2D, and the woodland ordination symbol is 9A.

Go—Gore silt loam, 1 to 5 percent slopes. This gently sloping, moderately well drained soil is mainly on the tops of ridges in the uplands. In areas of low relief, it also is on side slopes. It generally is near the major lakes in the parish. Individual areas range from about 10 to 150 acres in size.

Typically, the surface layer is dark brown, medium acid silt loam about 4 inches thick. The subsoil is about 51 inches thick. The upper part is yellowish red, mottled, strongly acid silty clay and very strongly acid clay. The next part is light brownish gray and gray, mottled, very strongly acid clay. The lower part is yellowish red, mottled, very strongly acid clay. The underlying material to a depth of about 65 inches is reddish brown, mottled, very strongly acid clay.

Included with this soil in mapping are a few small areas of Forbing and Wrightsville soils. Forbing soils are in landscape positions similar to those of the Gore soil. They do not have grayish layers in the subsoil. Wrightsville soils are on broad flats. They are grayish throughout. Included soils make up about 10 percent of the map unit.

The Gore soil is characterized by low fertility and a high level of exchangeable aluminum, which is potentially toxic to most crops. Water and air move through this soil at a very slow rate. Water runs off the surface at a medium rate. The shrink-swell potential is high in the subsoil.

Most areas are used as woodland. A few are used as pasture.

This soil is moderately well suited to woodland. The potential production of pine timber is moderately high. Based on a 50-year site curve, the mean site index for loblolly pine is 76. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Conventional methods of harvesting timber generally are suitable, but surface compaction can occur if heavy equipment is used when the soil is wet. Planting and harvesting only during dry periods can minimize compaction and the formation of ruts.

This soil is moderately well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, and crimson clover. The main limitations are the slope and the low fertility. Erosion is the main hazard. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Seedbeds should be prepared on the contour or across the slope if possible. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is poorly suited to cultivated crops. It is limited mainly by the low fertility, the potentially toxic level of exchangeable aluminum in the root zone, and the hazard of erosion. Maintaining good tilth is difficult. The soil can be worked only within a narrow range in moisture content. Irregular slopes hinder tillage in places. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material help to maintain fertility, tilth, and the content of organic matter. These measures also help to control erosion. All tillage should be on the contour or across the slope. Crops respond well to additions of lime and fertilizer.

This soil is poorly suited to urban development. It has severe limitations if used as a site for buildings, local roads and streets, or most sanitary facilities. The main limitations are the very slow permeability, the high shrink-swell potential, and low strength, which affects local roads and streets. Preserving the existing plant cover during construction helps to control erosion. The hazard of erosion is increased if the surface is exposed during site development. The design of roads and streets can offset the limited load-supporting capacity of the soil. Septic tank absorption fields do not function properly during rainy periods because of the very slow permeability. The restricted permeability can be overcome by increasing the size of the absorption field. The adverse effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential.

This soil is moderately well suited to recreational development. The main limitation is the very slow permeability. Erosion and sedimentation can be controlled and the beauty of the area enhanced by applying fertilizer and controlling traffic, both of which help to maintain an adequate plant cover.

The capability subclass is IVe, the pasture group is 8D, and the woodland ordination symbol is 7C.

Gu—Guyton silt loam. This level, poorly drained soil is on broad flats in the uplands. It is subject to rare flooding, which occurs during unusually wet periods. Individual areas range from about 10 to 300 acres in size. Slopes are dominantly less than 1 percent.

Typically, the surface layer is grayish brown, mottled, strongly acid silt loam about 5 inches thick. The subsurface layer is light brownish gray, mottled, very strongly acid silt loam about 20 inches thick. The upper part of the subsoil is light brownish gray, mottled, strongly acid silty clay loam. The lower part to a depth of about 62 inches is light brownish gray and gray, strongly acid silty clay loam.

Included with this soil in mapping are a few small areas of Beauregard, Bonn, and Wrightsville soils. Beauregard soils are higher on the landscape than the Guyton soil. They have a brownish subsoil that contains plinthite. Bonn and Wrightsville soils are in landscape positions similar to those of the Guyton soil. Bonn soils have a high concentration of sodium salts in the subsoil. Wrightsville soils have a clayey subsoil. Included soils make up about 15 percent of the map unit.

The Guyton soil is characterized by low fertility and a high level of exchangeable aluminum, which is potentially toxic to most crops. Water and air move through this soil at a slow rate. Water runs off the surface at a slow rate. The soil dries slowly after heavy rains. A seasonal high water table fluctuates between the surface and a depth of 1 foot during the period December through May. The wetness in spring restricts the root development of some plants. The shrink-swell potential is low.

Most areas are used as woodland. A few are used for pasture or crops, mainly soybeans and grain sorghum. In places garden crops are grown.

This soil is moderately well suited to woodland. The trees suitable for planting are loblolly pine and sweetgum. The potential production of these trees is high. Based on a 50-year site curve, the mean site index for loblolly pine is 90. The soil remains wet for long periods in winter and spring. Mechanical site preparation and harvesting activities should not be scheduled for wet periods. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling.

This soil is moderately well suited to pasture. The chief suitable pasture plants are common bermudagrass, bahiagrass, ryegrass, and winterpea. The main management concerns are the low fertility and the wetness. The wetness limits the choice of plants and the period of grazing. Also, it somewhat limits the use of equipment. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. It is limited mainly by the wetness, the low fertility, and the potentially toxic level of aluminum in the root zone. Land grading and smoothing can improve surface drainage and permit more efficient use of farm equipment. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material improve fertility and help to maintain tilth and the organic matter content. Crops respond well to additions of lime and fertilizer, which improve fertility and reduce the level of exchangeable aluminum.

This soil is poorly suited to urban development. It has severe limitations if used as a site for buildings, local roads and streets, or most sanitary facilities. The main management concerns are the flooding, the wetness, the slow permeability, and low strength, which affects local roads and streets. A drainage system improves sites for roads and buildings. Major structures, such as levees, help to protect the sites from flooding. The design of roads and streets can offset the limited load-supporting capacity of the soil. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the slow permeability. The restricted permeability can be overcome by increasing the size of the absorption field.

This soil is poorly suited to recreational development. The main limitation is the wetness. A drainage system or other water-control systems are needed to remove excess water.

The capability subclass is IIIw, the pasture group is 8G, and the woodland ordination symbol is 9W.

GY—Guyton and Iuka soils, frequently flooded. These level soils are on the narrow flood plains along streams that drain the uplands. The poorly drained Guyton soil is in low areas. It is flooded for very brief to long periods, mainly in winter and spring. The moderately well drained Iuka soil is on ridges and natural levees. It is flooded for brief or very brief periods from December through April. The Guyton soil makes up about 50 percent of the map unit, and the Iuka soil makes up about 35 percent. Each of these soils could be mapped separately. The frequent flooding so limits use and management, however, that the soils were not separated in mapping. Most areas are made up of both soils, but the proportion of each soil varies from place to place. Individual areas range from about 25 to 350 acres in size. Slopes are dominantly less than 1 percent.

Typically, the Guyton soil has a surface layer of dark grayish brown, strongly acid silt loam about 8 inches thick. The subsurface layer is light brownish gray, mottled, strongly acid silt loam about 21 inches thick. The upper part of the subsoil is grayish brown, mottled clay loam and light brownish gray silt loam. It is strongly acid. The lower part to a depth of about 65 inches is grayish brown and light brownish gray, mottled, medium acid silty clay loam.

The Guyton soil is characterized by low fertility and a high level of exchangeable aluminum, which is potentially toxic to most crops. Water and air move through this soil at a slow rate. Water runs off the surface at a slow rate. A seasonal high water table fluctuates between the surface and a depth of 1 foot during the period December through May. The soil dries slowly after heavy rains. The shrink-swell potential is low.

Typically, the Iuka soil has a surface layer of dark brown, mottled, strongly acid fine sandy loam about 6 inches thick. The subsurface layer is dark yellowish brown, mottled, strongly acid loamy sand about 8 inches thick. Below this is about 10 inches of yellowish brown, mottled, strongly acid loam. The underlying material to a depth of about 60 inches is yellowish brown, gray, and pale brown, mottled, very strongly acid loamy sand.

The Iuka soil is characterized by low fertility. Water and air move through this soil at a moderate rate. Water runs off the surface at a slow rate. A seasonal high water table is 1 to 3 feet below the surface during the period December through April. The soil dries quickly after rains. The shrink-swell potential is low.

Included with these soils in mapping are a few small areas of Ochlockonee soils. These included soils are slightly higher on the landscape than the Iuka soil. They do not have grayish mottles within 20 inches of the surface. They make up about 15 percent of the map unit.

Most areas are used as woodland. A few are used as pasture or cropland. Grain sorghum is the main crop. Also, garden crops are grown in places.

These soils are moderately well suited to woodland. They are suited only to the trees that can tolerate seasonal wetness. The trees suitable for planting are loblolly pine, sweetgum, eastern cottonwood, and yellow poplar. The production of pine timber is high. Based on a 50-year site curve, the mean site index for loblolly pine is 90 in areas of the Guyton soil and 100 in areas of the Iuka soil. The wetness caused by flooding and the water table limits the use of equipment and results in a high seedling mortality rate. Also, the trees are subject to windthrow because of the high water table.

If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling. Conventional harvesting methods generally can be used, but they may be hindered during rainy periods, generally from December through April. Operating standard wheeled and tracked equipment when the soils are moist causes compaction and the formation of ruts, which reduce the productivity of the soils. The trees should be planted and harvested only during the drier periods. Special site preparation, such as harrowing and bedding, can help to establish seedlings, reduce the seedling mortality rate, and improve the early growth of the seedlings.

These soils are somewhat poorly suited to pasture. The chief suitable pasture plants are common bermudagrass, white clover, and bahiagrass. The main limitation is the wetness caused by flooding and the seasonal high water table. The wetness limits the choice of plants and the period of grazing. Grazing when the soils are wet results in compaction of the surface layer and poor tilth. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. During periods of flooding, cattle can be moved to the adjacent protected areas or to pastures at the higher elevations. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

These soils are poorly suited to cultivated crops. They are limited mainly by the flooding. Additional limitations are the seasonal high water table, the low fertility, and the potentially toxic level of exchangeable aluminum in the root zone. Most climatically adapted crops can be grown if the soils are protected from flooding and a drainage system is installed. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material improve fertility and help to maintain tilth and the content of organic matter. Crops respond well to additions of lime and fertilizer, which improve fertility and reduce the level of exchangeable aluminum.

These soils generally are not suited to urban uses. The hazard of flooding is too severe for these uses. Additional limitations are the wetness, the slow permeability, and low strength, which affects local roads and streets. The roads and streets can be built above the level of flooding. Major flood-control structures and extensive local drainage systems are needed.

These soils are poorly suited to recreational development. They are limited mainly by the flooding and the wetness. Protection from flooding is needed.

The capability subclass is Vw, and the pasture group is 2B. The woodland ordination symbol assigned to the Guyton soil is 9W, and that assigned to the Iuka soil is 11W.

IU—Iuka and Ochlockonee soils, frequently flooded. These level soils are on bottom land. They are frequently flooded for very brief or brief periods from December through April (fig. 2). The moderately well drained Iuka soil is on low ridges and in level areas between the ridges. The well drained Ochlockonee soil is on the higher ridges. The Iuka soil makes up about 50 percent of the map unit, and the Ochlockonee soil makes up about 35 percent. Each of these soils could be mapped separately. The frequent flooding so limits use and management, however, that the soils were not separated in mapping. Most areas are made up of both soils, but the proportion of each soil varies from place

Figure 2.—Flooding in an area of Iuka and Ochlockonee soils. These soils are frequently flooded.

to place. Individual areas range from about 25 to 350 acres in size. Slopes are dominantly less than 1 percent.

Typically, the Iuka soil has a surface layer of brown, strongly acid loam about 6 inches thick. The subsurface layer is brown, strongly acid fine sandy loam about 8 inches thick. The next 11 inches is pale brown, mottled, very strongly acid loam. The underlying material to a depth of about 60 inches is light brownish gray, mottled, very strongly acid sandy loam.

The Iuka soil is characterized by low fertility. Water and air move through the subsoil at a moderate rate. Water runs off the surface at a slow rate. A seasonal high water table is 1 to 3 feet below the surface during the period December through April. The shrink-swell potential is low.

Typically, the Ochlockonee soil has a surface layer of brown, strongly acid silt loam about 6 inches thick. The upper part of the underlying material is dark yellowish brown, extremely acid silt loam. The lower part to a depth of about 70 inches is yellowish brown and light brownish gray, very strongly acid silty clay loam.

The Ochlockonee soil is characterized by low fertility and a moderately high level of exchangeable aluminum, which is potentially toxic to some crops. Water and air move through this soil at a moderately rapid rate. Water runs off the surface at a slow rate. A seasonal high water table is 3 to 5 feet below the surface during the period December through April. The shrink-swell potential is low.

Included with these soils in mapping are a few small areas of Guyton soils. Guyton soils are lower on the landscape than the Iuka and Ochlockonee soils. They are grayish throughout. They make up about 15 percent of the map unit.

Most areas are used as woodland. A few are used as pasture.

These soils are moderately well suited to woodland. The potential production of pine and hardwoods is very high. Based on a 50-year site curve, the mean site index for loblolly pine is 100. The wetness caused by flooding and a seasonal high water table limits the use of equipment. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling. Conventional harvesting methods generally can be used, but they may be hindered during rainy periods, generally from December through April. Logging only during the drier periods minimizes compaction.

These soils are moderately well suited to pasture. Suitable pasture plants are common bermudagrass, improved bermudagrass, white clover, and bahiagrass. The main management concern is the flooding. The wetness caused by flooding limits the choice of plants and the period of grazing. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. During periods of flooding, cattle can be moved to the adjacent protected areas or to pastures at the higher elevations. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

These soils are poorly suited to cultivated crops. They are limited mainly by the flooding. Additional limitations are the low fertility and the potentially toxic level of exchangeable aluminum in the root zone. Only late-planted crops are suitable because of the wetness during winter and spring. The soils are friable and can be easily kept in good tilth. They can be worked throughout a wide range in moisture content. Crops respond well to additions of lime and fertilizer, which improve fertility and reduce the level of exchangeable aluminum. Major structures, such as levees, can protect the soils from flooding.

These soils are not suited to urban development. The wetness caused by flooding generally is too severe for these uses. An additional limitation is the seasonal high water table. Roads and streets can be built above the level of flooding. Major flood-control structures are needed.

These soils are poorly suited to recreational development. They are limited mainly by the flooding and the wetness. Protection from flooding is needed.

The capability subclass is Vw, the pasture group is 2B, and the woodland ordination symbol is 11W.

Ke—Keithville very fine sandy loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is mainly on the tops of ridges in the uplands. In areas of low relief, it also is on side slopes. Individual areas range from about 25 to 200 acres in size.

Typically, the surface layer is very dark grayish brown, strongly acid very fine sandy loam about 4 inches thick. The subsurface layer is yellowish brown, strongly acid very fine sandy loam about 7 inches thick. The upper 23 inches of the subsoil is strong brown, mottled, strongly acid loam and very strongly acid clay loam. The next 5 inches is strong brown, mottled, very strongly acid clay loam and light gray silt loam. The lower part to a depth of about 75 inches is red and light brownish gray, very strongly acid clay and silty clay.

Included with this soil in mapping are a few small areas of Eastwood and Metcalf soils. Eastwood soils are on strongly sloping side slopes. They have a subsoil that is clayey in the upper part. Metcalf soils are lower on the landscape than the Keithville soil. Also, they have wider vertical streaks of grayish silt loam in the middle part of the subsoil. Included soils make up about 15 percent of the map unit.

The Keithville soil is characterized by low fertility. Water and air move through this soil at a very slow rate. Water runs off the surface at a medium rate. A seasonal high water table is 2 to 3 feet below the surface during the period December through April. The shrink-swell potential is high in the subsoil.

Most areas are used as woodland. Some are used for pasture, crops, or urban development. The main crops are soybeans and corn. Also, garden crops are grown in places.

This soil is well suited to woodland. The potential production of pine timber is high. Based on a 50-year site curve, the mean site index for loblolly pine is 90. The wetness limits the use of equipment during rainy periods. Erosion is a hazard in disturbed areas where vegetation has been removed. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Conventional methods of harvesting timber generally are suitable, but surface compaction can occur if heavy equipment is used when the soil is wet. Planting and harvesting only during dry periods can minimize compaction and the formation of ruts.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, and crimson clover. The main limitation is the low fertility. The hazard of erosion is moderate. Seedbeds should be prepared on the contour or across the slope if possible. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. It is limited mainly by the low fertility and a moderate hazard of erosion. It also has a potentially toxic level of exchangeable aluminum in the root zone. The soil is friable and can be easily kept in good tilth. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material improve fertility and help to maintain tilth and the content of organic matter. These measures also help to control erosion. Crops respond well to additions of lime and fertilizer, which improve fertility and reduce the level of exchangeable aluminum.

This soil is moderately well suited to urban development. It has moderate limitations if used as a site for buildings or local roads and streets and moderate or severe limitations if used as a site for most sanitary facilities. The main limitations are the very slow permeability, the wetness, the high shrink-swell potential, and low strength, which affects local roads and streets. Preserving the existing plant cover during construction helps to control erosion. The hazard of erosion is increased if the surface is exposed during site development. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the very slow permeability. Sewage lagoons or self-contained sewage disposal units can be used. The design of roads and streets can offset the limited load-supporting capacity of the soil. The adverse effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential.

This soil is moderately well suited to recreational development. The main limitation is the very slow permeability. Erosion is a hazard on sites for playgrounds. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is IIIe, the pasture group is 8B, and the woodland ordination symbol is 9W.

Kh—Kirvin fine sandy loam, 1 to 5 percent slopes. This gently sloping, well drained soil is on the convex tops of ridges in the uplands. Individual areas range from about 20 to 500 acres in size.

Typically, the surface layer is brown, strongly acid fine sandy loam about 6 inches thick. The subsurface layer is pale brown, strongly acid fine sandy loam about 7 inches thick. The subsoil is about 37 inches thick. The upper part is red, mottled, strongly acid and very strongly acid clay. The lower part is red, mottled, very strongly acid clay loam. The underlying material to a depth of about 65 inches is yellowish red, mottled, very strongly acid clay loam. The content of small ironstone fragments varies throughout the subsoil and underlying material.

Included with this soil in mapping are a few small areas of Bowie, Mahan, and Ruston soils. Bowie soils are on the less convex slopes. They are loamy throughout. Mahan and Ruston soils are in landscape positions similar to those of the Kirvin soil. Mahan soils have a clay mineral composition that differs from that of the Kirvin soil. They have a low shrink-swell potential. Ruston soils are loamy throughout. Included soils make up about 15 percent of the map unit.

The Kirvin soil is characterized by low fertility and a high level of exchangeable aluminum, which is potentially toxic to most crops. Water and air move through this soil at a moderately slow rate. Water runs off the surface at a medium rate. The shrink-swell potential is moderate in the subsoil.

Most areas are used as woodland. A few are used for pasture, cropland, or homesite development. The main crops are soybeans, corn, and grain sorghum. Also, garden crops are grown in places.

This soil is moderately well suited to woodland. The potential production of pine timber is moderately high. Based on a 50-year site curve, the mean site index for loblolly pine is 83. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Maintaining a plant cover helps to control erosion.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, and crimson clover. The main management concerns are the low fertility and a moderate hazard of erosion. Seedbeds should be prepared on the contour or across the slope if possible. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. It is limited mainly by the slope, the low fertility, and the potentially toxic level of exchangeable aluminum in the root zone. The soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Returning all crop residue to the soil and including grasses, legumes, or grass-legume mixtures in the cropping sequence help to maintain fertility and tilth and control erosion. Minimum tillage, terraces, diversions, and grassed waterways help to control erosion. Crops respond well to additions of lime and fertilizer, which improve fertility and reduce the level of exchangeable aluminum.

This soil is moderately well suited to urban development. It has moderate limitations if used as a site for buildings and severe limitations if used as a site for local roads and streets or most sanitary facilities. The main limitations are the moderately slow permeability, the moderate shrink-swell potential, and low strength, which affects local roads and streets. Preserving the existing plant cover during construction helps to control erosion. The design of roads and streets can offset the limited load-supporting capacity of the subsoil. Septic tank absorption fields do not function properly during rainy periods because of the moderately slow permeability. The restricted permeability can be overcome by increasing the size of the absorption field. Properly designing foundations and footings and diverting runoff away from buildings help to prevent the structural damage caused by shrinking and swelling.

This soil is moderately well suited to recreational development. It is limited mainly by the slope and the moderately slow permeability. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is IIIe, the pasture group is 8D, and the woodland ordination symbol is 8A.

Kn—Kirvin fine sandy loam, 5 to 12 percent slopes. This strongly sloping, well drained soil is on side slopes along drainageways in the uplands. Individual areas range from about 15 to 150 acres in size.

Typically, the surface layer is dark brown, medium acid fine sandy loam about 3 inches thick. The subsurface layer is strong brown, strongly acid fine sandy loam about 4 inches thick. The subsoil is red, strongly acid clay about 41 inches thick. It is mottled in the lower part. The underlying material to a depth of about 60 inches is red and yellowish red, mottled, strongly acid sandy clay loam. The soil has fragments of ironstone throughout.

Included with this soil in mapping are a few small areas of Bowie, Mahan, and Ruston soils. Bowie soils are mainly on ridgetops. They are loamy throughout. Mahan and Ruston soils are in landscape positions similar to those of the Kirvin soil. Mahan soils have a clay mineral composition that differs from that of the Kirvin soil. They have a low shrink-swell potential. Ruston soils are loamy throughout. Included soils make up about 15 percent of the map unit.

The Kirvin soil is characterized by low fertility and a high level of exchangeable aluminum, which is potentially toxic to most crops. Water and air move through this soil at a moderately slow rate. Water runs off the surface at a rapid rate. The soil dries quickly after rains. The shrink-swell potential is moderate in the subsoil.

Most areas are used as woodland. Some are used for pasture or urban development.

This soil is well suited to woodland. The potential production of pine timber is moderately high. Based on a 50-year site curve, the mean site index for loblolly pine is 83. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Rills and gullies can form on yarding paths, skid trails, and firebreaks unless the surface is protected by adequate water bars, a plant cover, or both. Management that minimizes the risk of erosion is essential in harvesting timber.

This soil is moderately well suited to pasture. The chief suitable pasture plants are common bermudagrass, bahiagrass, ryegrass, and crimson clover. The main management concerns are the low fertility and a severe hazard of erosion. Seedbeds should be prepared on the contour or across the slope if possible. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is poorly suited to cultivated crops. It is limited mainly by the low fertility, the slope, and the potentially toxic level of aluminum in the root zone. The hazard of erosion generally is too severe for row cropping. The risk of erosion can be reduced by minimizing tillage, constructing gradient terraces, and farming on the contour. Waterways that are shaped and seeded to perennial grasses also help to control erosion.

This soil is moderately well suited to urban development. It has moderate or severe limitations if used as a site for buildings and severe limitations if used as a site for local roads and streets or most sanitary facilities. The main limitations are the moderately slow permeability, the moderate shrink-swell potential, the slope, and low strength, which affects local roads and streets. Preserving the existing plant cover during construction helps to control erosion. The design of roads and streets can offset the limited load-supporting capacity of the subsoil. The slope limits the installation of septic tank absorption fields. Installing the absorption lines on the contour helps to keep the effluent from seeping to the surface in downslope areas. Increasing the size of the absorption field helps to overcome the restricted permeability.

This soil is moderately well suited to recreational development. The main limitations are the slope and the moderately slow permeability. Paths and trails should be established across the slope or on the contour. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is VIe, the pasture group is 8E, and the woodland ordination symbol is 8A.

Ko—Kolin silt loam, 1 to 5 percent slopes. This moderately well drained, gently sloping soil is mainly on the tops of ridges in the uplands. In areas of low relief, it also is on side slopes. Individual areas range from 10 to 175 acres in size.

Typically, the surface layer is dark brown, strongly acid silt loam about 5 inches thick. The subsurface layer is brown, strongly acid silt loam about 5 inches thick. The upper 17 inches of the subsoil is reddish yellow and strong brown silt loam and yellowish brown silty clay loam. The next 11 inches is yellowish brown silty clay loam and light brownish gray silt. The lower part to a depth of about 85 inches is red and strong brown silty clay and clay. The subsoil is mottled throughout. It is strongly acid in the upper and middle parts and medium acid or slightly acid in the lower part.

Included with this soil in mapping are a few small areas of Gore and Wrightsville soils. Gore soils are in landscape positions similar to those of the Kolin soil. They have a subsoil that is reddish and clayey in the upper part. Wrightsville soils are on broad flats. They are grayish throughout. Included soils make up about 15 percent of the map unit.

The Kolin soil is characterized by low fertility and a high level of exchangeable aluminum, which is potentially toxic to most crops. Water and air move through this soil at a very slow rate. Water runs off the surface at a medium rate. A perched seasonal high water table is at a depth of 1 to 3 feet during the period December through April.

Most areas are used as woodland or pasture. A few are used for crops or homesite development. The main crops are soybeans, corn, and grain sorghum.

This soil is well suited to woodland. Based on a 50-year site curve, the mean site index for loblolly pine is 80. The wetness can restrict the use of equipment in winter and spring. Planting and harvesting only during the drier periods can minimize compaction and the formation of ruts.

This soil is moderately well suited to cultivated crops. The main management concerns are the low fertility and the potentially toxic level of exchangeable aluminum in the root zone. Erosion is the main hazard. The soil is friable and can be easily kept in good tilth, but a surface crust can form if the soil is clean tilled. Properly managing crop residue, stripcropping, farming on the contour, and terracing help to control runoff and erosion. Most crops respond well to additions of lime and fertilizer, which improve fertility and reduce the level of exchangeable aluminum.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, and crimson clover. The low fertility is the main limitation. Erosion is a hazard in areas where the plant cover is removed. Seedbeds should be prepared on the contour or across the slope if possible. Applications of lime and fertilizer can overcome the low fertility and increase forage production.

This soil is poorly suited to urban development. The wetness is the main limitation. Other limitations are the high shrink-swell potential and low strength, which affects local roads and streets. The design of foundations and roads and streets can offset the shrink-swell potential and the limited load-supporting capacity of the subsoil.

This soil is moderately well suited to recreational development. The main limitation is the very slow permeability. Erosion is a hazard in areas where the plant cover is not maintained and in intensively used areas, such as playgrounds.

The capability subclass is IIIe, the pasture group is 8B, and the woodland ordination symbol is 8W.

La—Larue loamy fine sand, 1 to 5 percent slopes. This gently sloping, well drained soil is on the broad, convex tops of ridges in the uplands. Individual areas range from about 10 to 150 acres in size.

Typically, the surface layer is brown, strongly acid loamy fine sand about 6 inches thick. The subsurface layer is light yellowish brown, strongly acid loamy fine sand about 18 inches thick. The subsoil to a depth of about 62 inches is yellowish red, strongly acid sandy clay loam.

Included with this soil in mapping are a few small areas of Flo and Ruston soils. These soils are in landscape positions similar to those of the Larue soil. Flo soils are sandy throughout. Ruston soils are loamy throughout. Included soils make up about 15 percent of the map unit.

The Larue soil is characterized by low fertility. Water and air move through this soil at a moderate rate. Water runs off the surface at a slow rate. The soil dries quickly after rains and is somewhat droughty. Plants are adversely affected by a lack of water during dry periods in the summer and fall of most years.

Most areas are used as woodland. A few are used for pasture, crops, or homesite development. The main crops are grain sorghum, corn, cotton, and watermelons.

This soil is moderately well suited to woodland. The trees suitable for commercial timber are loblolly pine, shortleaf pine, and longleaf pine. The potential production of pine timber is moderately high, although tree growth is somewhat limited by the droughtiness. Based on a 50-year site curve, the mean site index for loblolly pine is 80. The sandy texture of the surface layer limits the use of wheeled equipment, especially when the soil is dry. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. The high temperature of the surface layer in summer and the low available water capacity of the soil increase the seedling mortality rate. Planting only during wet periods can increase the seedling survival rate.

This soil is well suited to pasture. The chief suitable pasture plants are improved bermudagrass, weeping lovegrass, bahiagrass, and crimson clover. The main limitations are the droughtiness and the low fertility. The use of equipment can be limited by the sandy texture of the surface layer, especially when the soil is very dry. Periodic mowing and clipping can help to maintain a uniform distribution of plants and prevent selective grazing. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. Crop production is limited mainly by the droughtiness and the low fertility. The soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. In areas where water of suitable quality is available, irrigation can prevent crop damage during dry periods in most years. Sprinkler irrigation systems are suitable. Returning all crop residue to the soil or regularly adding other organic material improves fertility and helps to maintain the content of organic matter. Minimizing tillage conserves moisture. Crops respond well to applications of lime and fertilizer.

This soil is moderately well suited to urban development. It has slight limitations if used as a site for buildings or for local roads and streets and slight or severe limitations if used as a site for most sanitary facilities. Seepage is a hazard on sites for sewage lagoons or sanitary landfills. Self-contained sewage disposal units or community sewage systems can be used. The sides of shallow excavations are unstable and cave in easily.

This soil is moderately well suited to recreational development. It is limited mainly by the sandy texture of the surface layer and by the droughtiness. Additions of loamy fill material improve the suitability for playgrounds. Irrigating and applying fertilizer help to establish lawn grasses and ornamentals.

The capability subclass is IIIs, the pasture group is 9A, and the woodland ordination symbol is 8S.

Le—Larue loamy fine sand, 5 to 12 percent slopes. This strongly sloping, well drained soil is on side slopes in the uplands. Individual areas range from about 10 to 150 acres in size.

Typically, the surface layer is brown, strongly acid loamy fine sand about 6 inches thick. The subsurface layer is light yellowish brown, strongly acid loamy fine sand about 19 inches thick. The subsoil to a depth of about 61 inches is strongly acid sandy clay loam. It is red in the upper part and yellowish red in the lower part.

Included with this soil in mapping are a few small areas of Flo and Ruston soils. These soils are in landscape positions similar to those of the Larue soil. Flo soils are sandy throughout. Ruston soils are loamy throughout. Included soils make up about 15 percent of the map unit.

The Larue soil is characterized by low fertility. Water and air move through this soil at a moderate rate. Water runs off the surface at a slow rate. The soil dries quickly after rains and is somewhat droughty. Plants generally are adversely affected by a lack of water during dry periods in the summer and fall of most years. The shrink-swell potential is low.

Most areas are used as woodland. A few are used for pasture, crops, or urban development. The main crops are grain sorghum and watermelons.

This soil is moderately well suited to woodland. The trees suitable for planting are loblolly pine, longleaf pine, and shortleaf pine. The potential production of pine timber is moderately high, although tree growth is somewhat limited by the droughtiness. Based on a 50-year site curve, the mean site index for loblolly pine is 80. Trafficability is poor when this sandy soil is very dry. The seedling mortality rate generally is high because of the droughtiness. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Organic matter can be conserved by restricting burning and leaving slash well distributed.

This soil is moderately well suited to pasture. The chief suitable pasture plants are improved bermudagrass, weeping lovegrass, bahiagrass, and crimson clover. The main limitations are the droughtiness, the slope, and the low fertility. The use of equipment can be limited by the sandy texture of the surface layer, especially when the soil is very dry. Preparing a seedbed on the contour helps to prevent excessive erosion. Periodic mowing and clipping can help to maintain a uniform distribution of plants and prevent selective grazing. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is poorly suited to cultivated crops. It is limited mainly by the droughtiness, the slope, and the low fertility. The soil is friable and can be easily kept in good tilth. It can be easily worked when moist, but traction is poor when the soil is very dry. Leaving crop residue on or near the surface conserves moisture, maintains tilth, and helps to control erosion. Crops respond well to applications of lime and fertilizer.

This soil is moderately well suited to urban development. It has moderate or severe limitations if used as a site for buildings, local roads and streets, or most sanitary facilities. The slope and seepage are limitations on sites for sewage lagoons. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Self-contained sewage disposal units or community systems can be used.

This soil is moderately well suited to recreational development. The main limitations are the sandy texture of the surface layer, the slope, and the droughtiness. Erosion and sedimentation can be controlled and the beauty of the area enhanced by irrigating, applying fertilizer, and controlling traffic, all of which help to maintain an adequate plant cover.

The capability subclass is IVe, the pasture group is 9A, and the woodland ordination symbol is 8S.

Ma—Mahan fine sandy loam, 1 to 8 percent slopes. This gently sloping and moderately sloping, well drained soil is on the convex tops of ridges in the uplands. Individual areas range from about 20 to 250 acres in size.

Typically, the surface layer is very dark grayish brown, medium acid fine sandy loam about 5 inches thick. The subsurface layer is brown, medium acid fine sandy loam about 4 inches thick. The upper part of the subsoil is yellowish red, medium acid loam about 4 inches thick. The next part is red, medium acid and strongly acid clay about 37 inches thick. The lower part is red, mottled, strongly acid sandy clay loam about 13 inches thick. The underlying material to a depth of about 75 inches is red, mottled, strongly acid sandy clay loam. The soil has fragments of ironstone throughout.

Included with this soil in mapping are a few small areas of Kirvin and Sacul soils. These soils are in landscape positions similar to those of the Mahan soil. Kirvin soils have a clay mineral composition that differs from that of the Mahan soil and have a higher shrink-swell potential. Sacul soils have grayish mottles in the upper part of the subsoil. Also included are small areas of soils that are similar to the Mahan soil but have continuous layers of ironstone in the subsoil. Included soils make up about 15 percent of the map unit.

The Mahan soil is characterized by low fertility and a high level of exchangeable aluminum, which is potentially toxic to most crops. Water and air move through this soil at a moderate rate. Water runs off the surface at a medium rate. The shrink-swell potential is low in the subsoil.

Most areas are used as woodland. A few are used for pasture, crops, or homesite development. The main crops are soybeans, corn, and grain sorghum. Also, garden crops are grown in places.

This soil is well suited to the production of pine timber. The trees suitable for planting are loblolly pine and shortleaf pine. Based on a 50-year site curve, the mean site index for loblolly pine is 90. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Maintaining the plant cover helps to control erosion.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, and crimson clover. The main limitation is the low fertility. The hazard of erosion is moderate. Seedbeds should be prepared on the contour or across the slope if possible. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. It is limited mainly by the low fertility and the potentially toxic level of exchangeable aluminum in the root zone. The hazard of erosion is severe if row crops are grown. The soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Returning all crop residue to the soil and including grasses, legumes, or grass-legume mixtures in the cropping sequence help to maintain fertility and tilth and control erosion. Minimum tillage, terraces, diversions, and grassed waterways help to control erosion. Crops respond well to additions of lime and fertilizer, which improve fertility and reduce the level of exchangeable aluminum.

This soil is moderately well suited to urban development. It has slight or moderate limitations if used as a site for buildings and moderate limitations if used as a site for local roads and streets or most sanitary facilities. The main limitations are the moderate permeability, the clayey texture of the subsoil, and low strength, which affects local roads and streets. The moderate permeability restricts the absorption of effluent in septic tank absorption fields. The restricted permeability can be overcome by increasing the size of the absorption field. Preserving the existing plant cover during construction helps to control erosion.

This soil is well suited to recreational development. Few limitations affect most recreational uses. The slope is a moderate limitation on sites for playgrounds. Runoff and erosion can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is IIIe, the pasture group is 8D, and the woodland ordination symbol is 9A.

Mc—Metcalf silt loam. This nearly level, somewhat poorly drained soil is on the broad tops of ridges in the uplands. Individual areas range from about 25 to 200 acres in size. Slopes range from 0 to 2 percent.

Typically, the surface layer is dark brown, strongly acid silt loam about 6 inches thick. The upper 18 inches of the subsoil is yellowish brown, mottled, strongly acid loam and silt loam. The next 3 inches is light brownish gray, mottled, strongly acid loam and silt loam. The lower part to a depth of about 60 inches is gray clay and light brownish gray silty clay. It is mottled and very strongly acid.

Included with this soil in mapping are a few small areas of Bowie, Eastwood, and Keithville soils. Bowie soils are on the slightly more convex slopes at the slightly higher elevations. They are loamy throughout. Eastwood soils are on the more convex slopes. Their subsoil is clayey in the upper part. Keithville soils are at the slightly higher elevations. They do not have wide tongues of grayish silt loam and silt in the subsoil. Included soils make up about 15 percent of the map unit.

The Metcalf soil is characterized by low fertility. Water and air move through the subsoil at a very slow rate. Water runs off the surface at a slow rate. The soil dries slowly after rains. A seasonal high water table is 1 to 2 feet below the surface during the period December through April. The shrink-swell potential is high in the lower part of the subsoil.

Most areas are used as woodland. Some are used for pasture, crops, or homesite development. The main crops are soybeans, corn, and grain sorghum. Also, garden crops are grown in places.

This soil is well suited to woodland. The potential production of pine timber is high. Based on a 50-year site curve, the mean site index for loblolly pine is 92. The main concern in managing woodland is a moderate equipment limitation caused by the wetness. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling. Conventional methods of harvesting timber generally are suitable, but surface compaction can occur if heavy equipment is used when the soil is wet. Planting and harvesting only during dry periods can minimize compaction and the formation of ruts.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, bahiagrass, vetch, and winterpea. The main limitations are the wetness and the low fertility. Unless surface drainage is improved, the wetness can limit the period of grazing. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. It is limited mainly by the wetness, the low fertility, and the potentially toxic level of exchangeable aluminum in the root zone. The wetness can delay planting and harvesting in some years. Land grading and smoothing can improve surface drainage and permit more efficient use of farm equipment. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material improve fertility and help to maintain tilth and the content of organic matter. Crops respond well to additions of lime and fertilizer, which improve fertility and reduce the level of exchangeable aluminum.

This soil is moderately well suited to urban development. It has moderate or severe limitations if used as a site for buildings, local roads and streets, or most sanitary facilities. The main limitations are the wetness, the very slow permeability, the high shrink-swell potential in the subsoil, and low strength, which affects local roads and streets. The road base can be strengthened by adding fill material. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the very slow permeability. Self-contained disposal units or sewage lagoons can be used. The adverse effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling with material that has a low shrink-swell potential.

This soil is moderately well suited to recreational development. It is limited mainly by the wetness and the very slow permeability. A good drainage system is needed.

The capability subclass is IIw, the pasture group is 8F, and the woodland ordination symbol is 10W.

Me—Meth fine sandy loam, 3 to 8 percent slopes. This well drained, moderately sloping soil is on convex ridgetops and the upper side slopes in the uplands.

Individual areas range from about 10 to 75 acres in size.

Typically, the surface layer is dark yellowish brown, strongly acid fine sandy loam about 8 inches thick. The subsurface layer is brown, medium acid fine sandy loam about 5 inches thick. The upper part of the subsoil is red, medium acid sandy clay loam. The next part is red, medium acid sandy clay. The lower part to a depth of about 62 inches is red, slightly acid sandy clay loam.

Included with this soil in mapping are a few small areas of Bowie and Eastwood soils. These soils are in landscape positions similar to those of the Meth soil. Bowie soils have a brownish, loamy subsoil that contains plinthite. Eastwood soils have a clay mineral composition that differs from that of the Meth soil and have a higher shrink-swell potential. Included soils make up about 15 percent of the map unit.

The Meth soil is characterized by low fertility. Water and air move through this soil at a moderately slow rate. Water runs off the surface at a medium rate. The shrink-swell potential is moderate in the subsoil.

Most areas are used as woodland or pasture. A few are used for homesite development or crops. The main crops are oats, wheat, soybeans, corn, and grain sorghum.

This soil is well suited to woodland. The potential production of loblolly pine is moderately high. Based on a 50-year site curve, the mean site index for loblolly pine is 80. Few limitations affect woodland management. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Rills and gullies can form on yarding paths, skid trails, and firebreaks unless the surface is protected by adequate water bars, a plant cover, or both.

This soil is moderately well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, and crimson clover. The main management concerns are the low fertility and the hazard of erosion, which is severe in areas where the slope is more than 5 percent. Seedbeds should be prepared on the contour or across the slope if possible. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is somewhat poorly suited to cultivated crops. It is limited mainly by the low fertility and the slope. Erosion is a severe hazard in areas where the slope is more than 5 percent. The soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Proper management of crop residue, contour farming, stripcropping, and terraces help to control erosion. Most crops respond well to additions of lime and fertilizer.

This soil is moderately well suited to urban development. It has moderate limitations if used as a site for buildings, severe limitations if used as a site for local roads and streets, and slight to severe limitations if used as a site for most sanitary facilities. The main limitations are the moderate shrink-swell potential, the moderately slow permeability, and low strength, which affects local roads and streets. Preserving the existing plant cover during construction helps to control erosion. The design of roads and streets can offset the limited load-supporting capacity of the soil. The moderately slow permeability in the subsoil restricts the absorption of effluent in septic tank absorption fields. The restricted permeability can be overcome by increasing the size of the absorption field. Properly designing foundations helps to prevent the structural damage caused by shrinking and swelling.

This soil is moderately well suited to recreational development. The main limitations are the moderately slow permeability and the slope. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is IVe, the pasture group is 8D, and the woodland ordination symbol is 8A.

Mo—Moreland clay. This level, somewhat poorly drained soil is in low positions on natural levees along the Red River. It is subject to rare flooding, which occurs during unusually wet periods. Individual areas range from about 50 to 300 acres in size. Slopes are dominantly less than 1 percent.

Typically, the surface layer is dark brown, neutral clay about 5 inches thick. The subsurface layer is dark reddish brown, mildly alkaline clay about 11 inches thick. The subsoil to a depth of about 60 inches is dark reddish brown and reddish brown, mottled, moderately alkaline clay.

Included with this soil in mapping are a few small areas of Armistead and Buxin soils. Armistead soils are at the slightly higher elevations. They are loamy in the subsoil and in the underlying material. Buxin soils are in landscape positions similar to those of the Moreland soil. They have grayish buried layers at a depth of 20 to 40 inches. Included soils make up about 10 percent of the map unit.

The Moreland soil is characterized by high fertility. Water and air move through this soil at a very slow rate. Water runs off the surface at a very slow rate and stands in low areas for short periods after heavy rains. The surface layer is very sticky when wet and dries

Figure 3.—Wheat in an area of Moreland clay. The trees in the background are on Forbing silt loam, 3 to 8 percent slopes.

slowly. A seasonal high water table fluctuates between a depth of 1 foot and the surface during the period December through April. An adequate supply of water is available to plants in most years. The shrink-swell potential is high or very high in the subsoil.

Most areas are used as cropland or pasture. A few are used for woodland or homesite development. The main crops are corn, soybeans, wheat (fig. 3), and grain sorghum.

This soil is moderately well suited to cultivated crops. It is limited mainly by the wetness and poor tilth. Maintaining good tilth is difficult. The soil can be worked only within a narrow range in moisture content. Proper row arrangement, field ditches, and vegetated outlets are needed to remove excess surface water. Land grading and smoothing can improve surface drainage and permit more efficient use of farm equipment. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material improve tilth and help to maintain fertility and the content of organic matter.

This soil is moderately well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, Dallisgrass, ryegrass, tall fescue, and winterpea. The main limitations are the wetness and poor tilth. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and damage to the plant community. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is moderately well suited to woodland. The trees that can be planted for commercial production are eastern cottonwood and American sycamore. The potential for hardwoods is high. Because this clayey soil is very sticky when wet, most planting and harvesting equipment can be used only during dry periods.

This soil is poorly suited to urban development. It has severe limitations if used as a site for buildings, local roads and streets, or most sanitary facilities. The main management concerns are the flooding, the wetness, the very slow permeability, the very high shrink-swell potential, and low strength, which affects local roads and streets. Drainage measures and major flood-control structures are needed. Replacing or strengthening the base material of roads helps to overcome the limited load-supporting capacity of the soil. Roads and streets can be built above the level of flooding. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the very slow permeability. Self-contained sewage disposal units or sewage lagoons can be used.

This soil is poorly suited to recreational development. The main management concerns are the flooding, the wetness, the very slow permeability, and the clayey texture of the surface layer. Areas used as sites for playgrounds can be improved by adding several inches of loamy fill material. Excess water can be removed by establishing shallow ditches and properly grading the area. Major flood-control structures are needed.

The capability subclass is IIIw, the pasture group is 1A, and the woodland ordination symbol is 3W.

Pe—Perry clay, occasionally flooded. This level, poorly drained soil is in low areas on natural levees and in depressions on alluvial plains along the Red River. It is occasionally flooded for brief to very long periods from December through June. Individual areas range from about 15 to 600 acres in size. Slopes are dominantly less than 1 percent.

Typically, the surface layer is very dark grayish brown, slightly acid clay about 6 inches thick. The subsoil is about 39 inches thick. It is dark gray, mottled, slightly acid and neutral clay in the upper part and reddish brown, mottled, mildly alkaline clay in the lower part. The underlying material to a depth of about 60 inches is reddish brown, moderately alkaline clay.

Included with this soil in mapping are a few small areas of Buxin, Moreland, and Yorktown soils. Buxin and Moreland soils are in landscape positions similar to those of the Perry soil. They are reddish in the upper part of the subsoil. Yorktown soils are on the lower parts of the landscape. They do not dry and crack so deeply as the Perry soil. Included soils make up about 15 percent of the map unit.

The Perry soil is characterized by high fertility. Water and air move through this soil at a very slow rate. Water runs off the surface at a very slow rate. A seasonal high water table fluctuates between the surface and a depth of 2 feet during the period December through June. An adequate supply of water is available to plants in most years. The shrink-swell potential is very high.

Most areas are used as woodland. Some are used as pasture or cropland. The main crops are soybeans and grain sorghum.

This soil is moderately well suited to woodland. The potential production of eastern cottonwood and sweetgum is high. Based on a 30-year site curve, the mean site index for eastern cottonwood is 90. The wetness caused by flooding and the high water table and the clayey texture of the surface layer limit the use of equipment. The seedling survival rate is low or moderate because of the wetness. Water-tolerant species grow best. Bedding of rows and a surface drainage system help to overcome the wetness. Planting and harvesting only during the drier periods can minimize compaction and the formation of ruts.

This soil is moderately well suited to pasture. Suitable pasture plants are common bermudagrass, improved bermudagrass, Dallisgrass, tall fescue, and white clover. The main management concerns are the flooding, the wetness, and the clayey texture of the surface layer. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and damage to the plant community. Compaction reduces the productivity of the soil. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. During periods of flooding, cattle can to be moved to the adjacent protected areas or to pastures at the higher elevations.

This soil is poorly suited to cultivated crops. It is limited mainly by the flooding, the wetness, and the clayey texture of the surface layer. The flooding and the wetness delay planting and harvesting in most years. The soil is sticky when wet and hard when dry. It becomes cloddy if tilled when too wet or too dry. Land grading and smoothing can improve surface drainage and permit more efficient use of farm equipment. Returning crop residue to the soil or regularly adding other organic material improves fertility and increases the rate of water intake.

This soil is poorly suited to urban development. It generally is not suitable as a site for homes because of the hazard of flooding. Also, the soil has severe limitations if used as a site for buildings, local roads and streets, or most sanitary facilities. The main management concerns are the flooding, the wetness, the very slow permeability, the very high shrink-swell potential, and low strength, which affects local roads and streets. Major flood-control structures and extensive local drainage systems are needed. Roads and streets can be built above the level of flooding. Properly designing the roads and streets can offset the limited load-supporting capacity of the soil.

This soil is poorly suited to recreational development. The main management concerns are the flooding, the wetness, and the clayey texture of the surface layer. A drainage system and protection from flooding are needed.

The capability subclass is IVw, the pasture group is 1A, and the woodland ordination symbol is 7W.

Rt—Ruston fine sandy loam, 1 to 3 percent slopes. This very gently sloping, well drained soil is on the convex tops of ridges in the uplands. Individual areas range from about 10 to 150 acres in size.

Typically, the surface layer is brown, medium acid fine sandy loam about 5 inches thick. The subsurface layer is yellowish brown, medium acid fine sandy loam about 11 inches thick. The upper part of the subsoil is yellowish red, strongly acid sandy clay loam. The next part is yellowish red and light yellowish brown, strongly acid fine sandy loam. The lower part to a depth of about 73 inches is red and yellowish red, very strongly acid sandy clay loam.

Included with this soil in mapping are a few small areas of Bowie and Larue soils. Bowie soils are on the less convex slopes. They have a brownish subsoil that contains plinthite. Larue soils are in landscape positions similar to those of the Ruston soil. They have a thick surface layer and subsurface layer of sandy material. Included soils make up about 15 percent of the map unit.

The Ruston soil is characterized by low fertility and a moderately high level of exchangeable aluminum, which is potentially toxic to some crops. Water and air move through the subsoil at a moderate rate. Water runs off the surface at a medium rate. The soil dries quickly after rains. The shrink-swell potential is low.

Most areas are used as woodland. A few are used for pasture, homesite development, or crops. The main crops are corn, soybeans, and grain sorghum. Also, garden crops are grown in places.

This soil is well suited to woodland. Few limitations affect this use. The trees suitable for planting are loblolly pine and longleaf pine. The potential production of pine timber is high. Based on a 50-year site curve, the mean site index for loblolly pine is 84. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, and crimson clover. The main limitation is the low fertility. The hazard of erosion is moderate. Preparing the seedbed on the contour or across the slope helps to control runoff and erosion. Proper stocking rates and pasture rotation help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. It is limited mainly by the low fertility, the slope, and the potentially toxic level of aluminum in the root zone. The hazard of erosion is moderate if row crops are grown. The soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Minimizing tillage, returning all crop residue to the soil, and including grasses, legumes, or grass-legume mixtures in the cropping sequence help to maintain fertility and tilth and control erosion. All tillage should be on the contour or across the slope. Crops respond well to additions of lime and fertilizer, which improve fertility and reduce the level of exchangeable aluminum.

This soil is well suited to urban development. It has slight limitations if used as a site for buildings and moderate limitations if used as a site for local roads and streets or most sanitary facilities. The main limitations are the moderate permeability and low strength, which affects local roads and streets. Preserving the existing plant cover during construction helps to control erosion. Low strength can be overcome by strengthening the base of roads and streets. The moderate permeability can be overcome by increasing the size of septic tank absorption fields. Seepage is a hazard on sites for sewage lagoons. It can be controlled by lining the walls and bottom of the lagoons with impervious material.

This soil is well suited to recreational development. Few limitations affect this use. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is IIe, the pasture group is 8B, and the woodland ordination symbol is 8A.

Ru—Ruston fine sandy loam, 3 to 8 percent slopes. This moderately sloping, well drained soil is on the upper side slopes and on ridgetops. It has convex slopes. Individual areas range from about 10 to 150 acres in size.

Typically, the surface layer is dark grayish brown, strongly acid fine sandy loam about 4 inches thick. The subsurface layer is yellowish brown, strongly acid fine sandy loam about 10 inches thick. The upper part of the subsoil is red, strongly acid sandy clay loam. The next part is red, strongly acid sandy clay loam and light yellowish brown fine sandy loam. The lower part to a depth of about 60 inches is red and brownish yellow, mottled, strongly acid sandy clay loam.

Included with this soil in mapping are small areas of Bowie and Larue soils. Bowie soils are on the less convex slopes. They have a brownish subsoil that contains plinthite. Larue soils are in landscape positions similar to those of the Ruston soil. They have a thick surface layer and subsurface layer of sandy material. Included soils make up about 15 percent of the map unit.

The Ruston soil is characterized by low fertility and a moderately high level of exchangeable aluminum, which is potentially toxic to some crops. Water and air move through the subsoil at a moderate rate. Water runs off the surface at a medium or rapid rate. The soil dries quickly after rains. The shrink-swell potential is low.

Most areas are used as woodland. A few are used for pasture, crops, or homesite development. The main crops are corn, soybeans, and grain sorghum. Also, garden crops are grown in places.

This soil is well suited to woodland. The potential production of pine timber is high. Based on a 50-year site curve, the mean site index for loblolly pine is 84. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Rills and gullies can form on yarding paths, skid trails, and firebreaks unless the surface is protected by adequate water bars, a plant cover, or both.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, and crimson clover. The main management concerns are the low fertility and the slope. Preparing a seedbed on the contour or across the slope helps to control erosion. Proper stocking rates and pasture rotation help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. It is limited mainly by the low fertility, the slope, and the potentially toxic level of aluminum in the root zone. The hazard of erosion is severe. The soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Minimizing tillage, returning all crop residue to the soil, and including grasses, legumes, or grass-legume mixtures in the cropping sequence help to maintain fertility and tilth and control erosion. All tillage should be on the contour or across the slope. Terraces help to control runoff, reduce the risk of erosion, and conserve moisture. Waterways should be shaped and seeded to perennial grass. Crops respond well to additions of lime and fertilizer, which improve fertility and reduce the level of exchangeable aluminum.

This soil is moderately well suited to urban development. It has slight or moderate limitations if used as a site for buildings and moderate limitations if used as a site for local roads and streets or most sanitary facilities. The main limitations are the moderate permeability, the slope, and low strength, which affects local roads and streets. Preserving the existing plant cover during construction and revegetating disturbed areas as soon as possible help to control erosion. The slope limits the installation of septic tank absorption fields. The effluent from the absorption fields can surface in downslope areas and create a health hazard. Installing the absorption lines on the contour helps to control seepage of the effluent. Enlarging the absorption field helps to overcome the restricted permeability.

This soil is moderately well suited to recreational development. The slope is the main limitation. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is IIIe, the pasture group is 8B, and the woodland ordination symbol is 8A.

Sa—Sacul fine sandy loam, 1 to 5 percent slopes. This moderately well drained, gently sloping soil is mainly on the broad tops of ridges in the uplands. In areas of low relief, it also is on side slopes. Individual areas range from 20 to 350 acres in size.

Typically, the surface layer is dark grayish brown, strongly acid fine sandy loam about 3 inches thick. The subsurface layer is yellowish brown, strongly acid fine sandy loam about 6 inches thick. The subsoil is about 41 inches thick. The upper part is yellowish red, strongly acid clay. The lower part is mottled red and light gray, very strongly acid clay. The underlying material to a depth of about 60 inches is mottled yellowish red, strong brown, and light brownish gray, very strongly acid sandy clay loam. The content of small ironstone fragments varies throughout the soil.

Included with this soil in mapping are a few small areas of Kirvin, Larue, Mahan, and Ruston soils. These soils are in landscape positions similar to those of the Sacul soil. Kirvin and Mahan soils do not have grayish mottles in the upper part of the subsoil. Larue soils have a thick surface layer and subsurface layer of sandy material. Ruston soils are loamy throughout. Included soils make up about 10 percent of the map unit.

The Sacul soil is characterized by low fertility and a high level of exchangeable aluminum, which is potentially toxic to most crops. Water and air move through this soil at a slow rate. Water runs off the surface at a medium or rapid rate. A seasonal high water table is 2 to 4 feet below the surface for short periods from December through April. Plants are adversely affected by a lack of water during dry periods in the summer and fall of some years. The shrink-swell potential is high in the subsoil.

Most areas are used as woodland. A few are used for pasture, crops, or homesite development. The main crops are cotton, corn, wheat, and soybeans.

This soil is well suited to woodland. The potential production of most pine trees is moderately high. Based on a 50-year site curve, the mean site index for loblolly pine is 80. The main limitation affecting timber production and harvesting is poor trafficability when the soil is wet. Compaction can reduce the productivity of the soil. Planting and harvesting only during dry periods can minimize compaction and the formation of ruts. Carefully managing reforestation after harvest helps to control competition from undesirable understory plants.

This soil is well suited to pasture. The chief suitable pasture plants are common bermudagrass, improved bermudagrass, bahiagrass, ryegrass, and crimson clover. The main management concerns are the low fertility and a moderate hazard of erosion. Fertilizer and lime are needed if optimum forage production is to be achieved. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is moderately well suited to cultivated crops. The hazard of erosion, the low fertility, and the potentially toxic level of exchangeable aluminum in the root zone are the main management concerns. The soil is friable and can be easily kept in good tilth. It can be worked throughout a wide range in moisture content. Leaving crop residue on or near the surface conserves moisture, maintains tilth, and helps to control erosion. The risk of sheet and rill erosion on the steeper slopes can be reduced by gradient terracing and farming on the contour. Most crops respond well to additions of lime and fertilizer, which improve fertility and reduce the level of exchangeable aluminum.

This soil is poorly suited to urban development. The main management concerns are the high shrink-swell potential, the wetness, the slow permeability, the hazard of erosion, and low strength, which affects local roads and streets. Erosion is a hazard in the steeper areas. Only the part of the site used for construction should be disturbed. Septic tank absorption fields do not function properly during rainy periods because of the slow permeability and the seasonal high water table. The restricted permeability can be overcome by increasing the size of the absorption field. Roads and building foundations can be designed so that they can withstand the shrinking and swelling of the soil. The design of roads and streets can offset the limited load-supporting capacity of the soil.

This soil is moderately well suited to recreational development. It is limited mainly by the hazard of erosion, poor trafficability during wet periods, and the slow permeability. Areas used as sites for playgrounds can be improved by adding several inches of loamy fill material, which can increase the depth to the clayey subsoil. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is IIIe, the pasture group is 8D, and the woodland ordination symbol is 8C.

Sc—Sacul fine sandy loam, 5 to 12 percent slopes. This moderately well drained, strongly sloping soil is on side slopes bordering drainageways in the uplands. Individual areas range from 15 to 250 acres in size.

Typically, the surface layer is dark grayish brown, slightly acid fine sandy loam about 4 inches thick. The subsurface layer is yellowish brown, slightly acid fine sandy loam about 5 inches thick. The subsoil is about 51 inches thick. The upper part is red, very strongly acid clay. The lower part is mottled red and light brownish gray, very strongly acid and strongly acid sandy clay and sandy clay loam. The underlying material to a depth of about 70 inches is grayish brown and light brownish gray, very strongly acid sandy loam. The content of small ironstone fragments varies throughout the soil.

Included with this soil in mapping are a few small areas of Kirvin and Ruston soils. These soils are in landscape positions similar to those of the Sacul soil. Kirvin soils do not have grayish mottles in the upper part of the subsoil. Ruston soils are loamy throughout. Included soils make up about 15 percent of the map unit.

The Sacul soil is characterized by low fertility and a high level of exchangeable aluminum, which is potentially toxic to most crops. Water and air move through this soil at a slow rate. Water runs off the surface at a rapid rate. A seasonal high water table is 2 to 4 feet below the surface for short periods from December through April. The shrink-swell potential is high.

Most areas are used as woodland. A few are used as pasture.

This soil is moderately well suited to woodland. The potential production of pine timber is moderately high. Based on a 50-year site curve, the mean site index for loblolly pine is 80. The main limitations affecting timber production and harvesting are the formation of ruts, compaction, and competition from understory plants. Carefully managing reforestation helps to control competition from undesirable understory plants. Planting and harvesting only during the drier periods can minimize compaction and the formation of ruts. Measures that reduce the risk of erosion are needed.

This soil is moderately well suited to pasture. The chief suitable pasture plants are common bermudagrass, bahiagrass, ryegrass, and crimson clover. The main management concerns are the low fertility and a severe hazard of erosion. Seedbeds should be prepared on the contour or across the slope. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime generally are needed if optimum forage production is to be achieved.

This soil is poorly suited to cultivated crops. The slope, the low fertility, and the potentially toxic level of exchangeable aluminum in the root zone are the main limitations. The hazard of erosion is severe. Terraces help to control runoff and erosion and conserve moisture. Crops respond well to additions of lime and fertilizer, which improve fertility and reduce the level of exchangeable aluminum.

This soil is poorly suited to urban development. The main limitations are the high shrink-swell potential, the wetness, the slope, the slow permeability, and low strength, which affects local roads and streets. Erosion is a severe hazard. Only the part of the site that is used for construction should be disturbed. Septic tank absorption fields do not function properly during rainy periods because of the slow permeability and the seasonal high water table. Also, seepage of the effluent is a hazard in downslope areas because of the slope. Self-contained sewage disposal units can be used. The design of roads and streets can offset the limited load-supporting capacity of the soil. Properly designing foundations helps to prevent the structural damage caused by shrinking and swelling.

This soil is moderately well suited to intensive recreational uses. It is limited mainly by the hazard of erosion, poor trafficability during wet periods, and the slow permeability. Areas used as sites for playgrounds can be improved by adding several inches of loamy fill material, which can increase the depth to the clayey subsoil. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is VIe, the pasture group is 8E, and the woodland ordination symbol is 8C.

Su—Sacul fine sandy loam, 12 to 30 percent slopes. This moderately steep and steep, moderately well drained soil is on side slopes bordering drainageways in the uplands. Individual areas range from 15 to 200 acres in size.

Typically, the surface layer is dark brown, strongly acid fine sandy loam about 4 inches thick. The subsurface layer is brown, strongly acid fine sandy loam about 8 inches thick. The subsoil is about 48 inches thick. The upper part is red, very strongly acid clay. The next part is mottled red and gray, very strongly acid clay. The lower part is mottled light brownish gray, reddish yellow, and yellowish red, very strongly acid clay loam. The underlying material to a depth of about 70 inches is stratified light brownish gray, strong brown, and yellowish red, very strongly acid clay loam. The content of small ironstone fragments varies throughout the soil.

Included with this soil in mapping are a few small areas of Bowie and Kirvin soils. These soils are on ridgetops and the upper side slopes. Bowie soils are loamy throughout. Kirvin soils do not have grayish mottles in the upper part of the subsoil. Included soils make up about 15 percent of the map unit.

The Sacul soil is characterized by low fertility and a high level of exchangeable aluminum, which is potentially toxic to most crops. Water and air move through this soil at a slow rate. Water runs off the surface at a rapid rate. A seasonal high water table is 2 to 4 feet below the surface for short periods from December through April. Plants are adversely affected by a lack of water during dry periods in the summer and fall of some years. The shrink-swell potential is high in the subsoil.

Most areas are used as woodland. Some are used as pasture.

This soil is moderately well suited to woodland. The potential production of loblolly pine timber is moderately high. Based on a 50-year site curve, the mean site index for loblolly pine is 80. Management that minimizes the risk of erosion is essential when timber is harvested. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Proper site preparation controls initial plant competition, and spraying controls subsequent growth. Conventional methods of harvesting can be used in the more gently sloping areas, but they may be difficult to use in the steeper areas.

This soil is poorly suited to pasture. The chief suitable pasture plants are common bermudagrass, bahiagrass, ryegrass, and crimson clover. The main management concerns are the low fertility and a severe hazard of erosion. Seedbeds should be prepared on the contour or across the slope if possible. The use of equipment is limited by the slope. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil generally is not suited to cultivated crops. The slope is too steep and the hazard of erosion too severe for most cultivated crops. Small areas on the less sloping parts of the landscape can be used for close-growing crops if special erosion-control measures are applied.

This soil is poorly suited to urban development. It has severe limitations if used as a site for buildings, local roads and streets, or most sanitary facilities. The main limitations are the wetness, the slow permeability, the slope, the high shrink-swell potential, and low strength, which affects local roads and streets. The design of roads and streets can offset the limited load-supporting capacity of the subsoil. Preserving the existing plant cover during construction helps to control erosion. The hazard of erosion is increased if the surface is exposed during site development. The slope limits the installation of septic tank absorption fields. The soil is better suited to self-contained sewage disposal units than to septic tank systems. The less sloping areas should be selected as building sites. Specially designing the foundation of buildings helps to overcome the high shrink-swell potential.

This soil is poorly suited to recreational development. The main limitation is the slope. Recreational development is limited mainly to a few paths and trails, which should extend across the slope. Erosion and sedimentation can be controlled and the beauty of the area enhanced by maintaining an adequate plant cover.

The capability subclass is VIIe, the pasture group is 8E, and the woodland ordination symbol is 8C.

Wr—Wrightsville silt loam. This level, poorly drained soil is on broad flats in the uplands. It also is on low stream terraces. It is subject to rare flooding, which occurs during unusually wet periods. Individual areas range from about 10 to 200 acres in size. Slopes are dominantly less than 1 percent.

Typically, the surface layer is grayish brown, extremely acid silt loam about 1 inch thick. The subsurface layer is light gray, mottled, very strongly acid silt loam about 9 inches thick. The subsoil is about 42 inches thick. The upper part is light brownish gray, mottled silty clay loam and light gray silt loam. It is very strongly acid. The next part is grayish brown, mottled, very strongly acid silty clay. The lower part is grayish brown, mottled, strongly acid silty clay loam. The underlying material to a depth of about 61 inches is grayish brown, mottled, strongly acid silty clay loam.

Included with this soil in mapping are a few small areas of Gore, Guyton, and Kolin soils. Gore and Kolin soils are on the more convex slopes. Kolin soils have a subsoil that is brownish and loamy in the upper part, and Gore soils have one that is reddish in the upper part. Guyton soils are in drainageways and in landscape positions similar to those of the Wrightsville soil. They are loamy throughout. Included soils make up about 10 percent of the map unit.

The Wrightsville soil is characterized by low fertility. Water and air move through the subsoil at a very slow rate. Water runs off the surface at a very slow rate. The surface layer remains wet for long periods after heavy rains. A seasonal high water table fluctuates between a depth of 1 foot and the surface during the period December through April. The wetness in spring restricts the root development of some plants. The shrink-swell potential is high in the subsoil.

Most areas are used as woodland. A few are used for pasture, crops, or homesite development. The main crops are soybeans and grain sorghum. Also, garden crops are grown in places.

This soil is moderately well suited to woodland. Water-tolerant tree species grow best. The trees suitable for planting are loblolly pine, sweetgum, water oak, and willow oak. The potential production of pine and hardwoods is moderately high. Based on a 50-year site curve, the mean site index for loblolly pine is 80. The equipment limitation is a management concern unless a drainage system is installed. If site preparation is not adequate, competition from undesirable plants can prevent or delay the natural or artificial reestablishment of trees. Competing vegetation can be controlled by proper site preparation and by spraying, cutting, or girdling. Conventional harvesting methods generally can be used, but they may be hindered during rainy periods, generally from December through April. Using wheeled and tracked equipment only during dry periods minimizes compaction and the formation of ruts, which reduce the productivity of the soil.

This soil is moderately well suited to pasture. The chief suitable pasture plants are common bermudagrass, bahiagrass, tall fescue, white clover, and winterpea. The main management concerns are the low fertility and the wetness. The wetness limits the choice of plants and the period of grazing. It also limits the use of equipment. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Fertilizer and lime are needed if the optimum growth of grasses and legumes is to be achieved.

This soil is moderately well suited to cultivated crops. It is limited mainly by the wetness, the low fertility, and the potentially toxic level of exchangeable aluminum in the root zone. Maintaining good tilth is difficult because the soil remains wet for long periods. The wetness delays planting in most years. Land grading and smoothing can improve surface drainage and permit more efficient use of farm equipment. Minimizing tillage and returning all crop residue to the soil or regularly adding other organic material improve fertility and help to maintain tilth and the content of organic matter. Crops respond well to additions of lime and fertilizer, which improve fertility and reduce the level of exchangeable aluminum.

This soil is poorly suited to urban development. It has severe limitations if used as a site for buildings, local roads and streets, or most sanitary facilities. The main

Figure 4.—An area of Yorktown clay, frequently flooded. This soil is ponded for very long periods.

management concerns are the flooding, the wetness, the very slow permeability, the high shrink-swell potential, and low strength, which affects local roads and streets. A drainage system is needed if roads and building foundations are constructed. The design of roads and streets can offset the limited load-supporting capacity of the soil. The design of buildings and roads can offset the high shrink-swell potential. Septic tank absorption fields do not function properly during rainy periods because of the wetness and the very slow permeability. Self-contained sewage disposal units or sewage lagoons can be used. Major flood-control structures, such as levees and diversions, are needed.

This soil is poorly suited to recreational development. The main management concerns are the wetness, the flooding, and the very slow permeability. A drainage system or other water-control systems are needed to remove excess water.

The capability subclass is IIIw, the pasture group is 8G, and the woodland ordination symbol is 8W.

Yo—Yorktown clay, frequently flooded. This level, very poorly drained soil is in low depressional areas. It also is in backswamps on alluvial plains along the Red River. It is frequently flooded for very long periods during any part of the year. Floodwater seldom exceeds a depth of 2 feet. Individual areas range from about 15 to 600 acres in size. Slopes are less than 1 percent.

Typically, a mat of partially decomposed twigs, leaves, and roots is at the surface. The surface layer is dark gray, mottled, medium acid clay about 7 inches thick. The part of the subsoil within a depth of 43 inches is dark gray and gray, mottled clay. The lower part of the subsoil to a depth of about 65 inches is dark reddish brown, mottled clay. The subsoil is medium acid in the upper part, neutral in the next part, and mildly alkaline in the lower part.

Included with this soil in mapping are a few small areas of Buxin and Perry soils. These soils are higher on the landscape than the Yorktown soil. They typically dry and crack to a depth of 20 inches or more each year. They make up about 15 percent of the map unit.

The Yorktown soil is characterized by high fertility. Water and air move through this soil at a very slow rate. Water runs off the surface at a very slow rate and ponds for very long periods (fig. 4). During periods when the soil is not flooded, the seasonal high water table is above or near the surface. The soil is seldom dry enough to crack. The shrink-swell potential is very high.

Most areas are used as woodland and wildlife habitat. The commonly occurring native trees are baldcypress, black willow, green ash, water hickory, and water tupelo. Because of the ponding and the flooding, this soil generally is not suited to cropland or pasture. It generally is not managed for commercial timber production. It provides good natural habitat for many wetland and woodland wildlife species.

This soil generally is not suited to urban or intensive recreational uses. The flooding and the wetness are too severe for these uses.

The capability subclass is VIIw, and the woodland ordination symbol is 3W. The soil is not assigned to a pasture group.

Prime Farmland

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

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 8 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

The map units in the survey area that are considered prime farmland are listed at the end of this section. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 5. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table qualify for prime farmland only in areas where this limitation has been overcome by drainage measures. The need for these measures is indicated after the map unit name on the following list. Onsite evaluation is needed to determine whether or not this limitation has been overcome by corrective measures.

The map units in the parish that are considered prime farmland are as follows:

Ar	Armistead clay
Ba	Beauregard silt loam, 1 to 3 percent slopes
Bo	Bowie fine sandy loam, 1 to 5 percent slopes
Bx	Buxin clay (where adequately drained)
Ca	Cahaba fine sandy loam, 1 to 3 percent slopes
Cs	Caspiana silt loam
Ct	Caspiana silty clay loam
Ga	Gallion silt loam
Gn	Gallion silty clay loam
Gu	Guyton silt loam (where adequately drained)
Ke	Keithville very fine sandy loam, 2 to 5 percent slopes
Ko	Kolin silt loam, 1 to 5 percent slopes
Mc	Metcalf silt loam
Mo	Moreland clay (where adequately drained)
Rt	Ruston fine sandy loam, 1 to 3 percent slopes
Ru	Ruston fine sandy loam, 3 to 8 percent slopes
Sa	Sacul fine sandy loam, 1 to 5 percent slopes
Wr	Wrightsville silt loam (where adequately drained)

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 avoid soil-related failures in land uses.

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

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

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

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where 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

John Powell, conservation agronomist, Soil Conservation Service, helped prepare this section.

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 Soil 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 "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Pasture

About 98,000 acres in De Soto Parish was used as pasture in 1980. Perennial grasses, legumes, or mixtures of these are grown for pasture and hay. The mixtures generally consist of either a summer or a winter perennial grass and a suitable legume. Also, many farmers seed small grain or ryegrass in the fall for winter and spring forage (fig. 5). Excess grass in summer is harvested as hay for the winter.

Common and improved bermudagrass and Pensacola bahiagrass are the most commonly grown summer perennials. Improved bermudagrass and Pensacola bahiagrass produce good-quality forage. All of these grasses respond well to applications of fertilizer, particularly nitrogen.

White clover, crimson clover, vetch, and winterpea are the most commonly grown legumes. All of these respond well to applications of lime, particularly on acid soils.

The main objectives in managing tame or improved pasture are to maintain a vigorous stand of palatable forage for livestock feed, to improve the soil, and to control water erosion. Proper grazing practices, applications of fertilizer, clipping, and weed control help to meet these objectives.

Proper grazing practices include deferring grazing until the plants have a good start in spring, never allowing the pasture to be grazed too closely, rotation grazing, timely grazing, and periodically resting the pasture. Applications of fertilizer help to maintain an

Figure 5.—An area of Bowie fine sandy loam, 1 to 5 percent slopes, where cropland is planted to wheat in the fall to provide supplemental forage to cattle in the winter.

adequate supply of plant nutrients. Clipping helps to distribute grazing evenly and stimulates even regrowth. Where the stand is thin, control of weeds by mowing or spraying results in more moisture and more plant nutrients for desirable pasture plants.

Some farmers obtain additional forage by allowing their livestock to graze the native understory plants in areas of woodland. Forage production varies, depending on the woodland site, the condition of the native forage, and the density of the timber stand. Although most woodland is managed mainly for timber, a substantial amount of forage can be obtained from these areas under good management. Stocking rates and grazing periods should be carefully managed for optimum forage production and a cover of understory plants that prevents excessive erosion.

The soils in De Soto Parish are assigned to 11 pasture groups. Only those soils suitable for tame pasture are assigned to a group. In the following paragraphs, important soil characteristics and suitable pasture plants are identified for each group. Management needs that are specific to each group also are given. The numbers and letters used to identify the pasture groups are not in consecutive order because not all of the groups in the statewide system are used in De Soto Parish. The soils are assigned to pasture groups in table 6 and in the descriptions in the section "Detailed Soil Map Units." Suitable pasture plants and management measures also are identified in each of the map unit descriptions.

Pasture group 1A. This group consists of level, somewhat poorly drained and poorly drained, clayey soils on the flood plains along the Red River. These soils are characterized by high fertility. Runoff is slow, and water stands in low areas for short to long periods. The soils are subject to rare or occasional flooding and have a seasonal high water table, which can retard plant growth. The clayey surface layer is sticky when wet and hard when dry, and it becomes cloddy if farmed when too wet or too dry.

If drainage is adequate, these soils are suited to all of the climatically adapted grasses and legumes. The species that can use the extra moisture should be selected for planting. Examples are warm-season perennials, such as common bermudagrass, improved bermudagrass, tall fescue, and Johnsongrass, and cool-season legumes, such as white clover, vetch, winterpea, and red clover.

Nitrogen fertilizer is needed for optimum forage production in areas where only grasses are grown. The soils have adequate levels of phosphorus, calcium, and potassium and do not require extensive applications of fertilizer or lime. A drainage system can improve the pasture. Surface compaction can reduce the productivity of the soils. Restricted grazing during wet periods helps to prevent compaction.

Pasture group 2B. This group consists of level, well drained, moderately well drained, and poorly drained, loamy soils on the narrow flood plains along streams that drain the uplands. These soils are subject to frequent and damaging overflow. A seasonal high water table is an additional limitation in some of the soils.

Suitable pasture plants are common bermudagrass, winterpea, and vetch. In low areas, where water stands for long periods, common bermudagrass is the only pasture grass that can be grown.

Natural fertility is low, and lime and fertilizer are needed. Applying large amounts of fertilizer generally is not practical, however, because of the frequent overflow, which causes siltation and scouring of the soils. Restricted grazing during wet periods is needed to prevent compaction. During periods of flooding, the cattle should be moved to the adjacent protected areas or to pastures at the higher elevations.

Native grasses, such as switchcane, wildrye, bluestems, carpetgrass, bermudagrass, and lespedeza, can provide forage. Where the rotation grazing system includes rest periods of less than 8 weeks, carpetgrass and bermudagrass generally dominate the site. Where the soils are managed as native grass pasture, 4 to 6 acres generally is needed to provide enough forage for one animal unit throughout the year. Periodic brush control is needed to keep the pasture from reverting to woodland.

Pasture group 2C. This group consists of level, well drained, loamy soils that are characterized by high fertility. They are in high and intermediate positions on the natural levees along tributaries of the Red River. Few limitations affect the use of these soils for pasture.

These soils are suited to all of the climatically adapted grasses and legumes. Common bermudagrass, improved bermudagrass, bahiagrass, and Johnsongrass are suitable warm-season grasses. White clover generally is the best suited legume. Winterpea, vetch, and red clover also can be grown. Tall fescue can be grown, but it requires annual applications of nitrogen fertilizer and should not be grazed in the summer.

In areas where only grasses are grown, nitrogen fertilizer is needed for optimum forage production. Lime generally is not needed. Where large amounts of acid-forming nitrogen fertilizer are applied annually, periodic soil tests are needed to determine lime and fertilizer requirements. Restricted grazing during wet periods helps to prevent surface compaction, which can reduce the productivity of the soils.

Pasture group 2D. This group consists of level, well drained, loamy soils that are characterized by medium natural fertility. These soils are in high and intermediate positions on natural levees along tributary channels on the flood plains along the Red River. The medium fertility is the only limitation affecting pasture.

These soils are suited to all of the climatically adapted grasses and legumes. Improved bermudagrass, common bermudagrass, bahiagrass, and Johnsongrass are suitable warm-season perennials. White clover is one of the best suited cool-season legumes. Winterpea, vetch, and red clover also grow well. Tall fescue can be grown, but it requires annual applications of nitrogen fertilizer and should not be grazed in the summer.

Additions of nitrogen, phosphorus, and potassium fertilizer are needed for optimum forage production. Legumes require higher levels of phosphorus and potassium than grasses. Lime may be needed for legumes, such as white clover. Winterpea and vetch can tolerate medium acid soil conditions. Lime should be applied often enough, however, to maintain the pH at 5.2 or higher. Proper stocking rates and restricted grazing during wet periods help to keep the pasture in good condition.

Native grasses, such as pinehill bluestem, slender bluestem, threeawns, broomsedge, carpetgrass, and bermudagrass, can provide forage. Where the rotation grazing system includes rest periods of less than 8 weeks, bermudagrass and carpetgrass generally dominate the site. Where the soils are managed as native grass pasture, 6 to 8 acres generally is needed to provide enough forage for one animal unit throughout the year. Periodic brush control is needed to keep the pasture from reverting to woodland.

Pasture group 8B. This group consists of well drained and moderately well drained soils that have a loamy surface layer and a loamy subsoil or a clayey and loamy subsoil. They are on uplands and stream terraces. Slopes range from 0 to 8 percent. These soils are characterized by low fertility. Runoff is medium, and the hazard of erosion is moderate or severe.

These soils have a moderate productivity potential for bahiagrass, common bermudagrass, improved bermudagrass, ball clover, crimson clover, and arrowleaf clover. Lime and fertilizer are needed. Legumes require higher phosphorus and potassium levels than grasses. Lime should be applied often enough to maintain the pH at 5.2 or higher.

Preparing a seedbed on the contour or across the slope helps to prevent excessive erosion. Where grass-legume mixtures are grown, grazing the grasses closely in early fall allows the legumes to germinate. Cattle should be removed as the legumes begin to produce seed.

Native grasses, such as pinehill bluestem, slender bluestem, threeawns, broomsedge, carpetgrass, and common bermudagrass, can provide forage. Where grazed in a rotation system that includes rest periods of less than 8 weeks, bermudagrass and carpetgrass generally dominate the site. Because native grass production generally is low, 8 to 10 acres is needed to provide enough forage for an animal unit throughout the year. Periodic brush control is needed to provide maximum forage production and to keep the pasture from reverting to woodland.

Pasture group 8D. This group consists of well drained and moderately well drained soils that have a loamy surface layer and a clayey subsoil or a clayey and loamy subsoil. These soils are on uplands. Slopes range from 1 to 8 percent. Runoff is medium, and the hazard of erosion is moderate or severe. The soils are characterized by low natural fertility.

Bahiagrass (fig. 6), common bermudagrass, improved bermudagrass, ball clover, arrowleaf clover, crimson clover, singletary peas, and vetch are suitable pasture grasses and legumes. Tall fescue can be grown if nitrogen is applied annually and the pasture is not grazed in the summer.

Fertilizer and lime are needed for optimum forage production. Legumes require higher levels of phosphorus and potassium than grasses. Lime is needed, especially for white clover. Winterpea and vetch can tolerate medium acid soil conditions, but lime should be applied often enough to maintain the pH at 5.2 or higher. Preparing a seedbed on the contour or across the slope helps to control erosion during the period of pasture establishment.

Native grasses, such as pinehill bluestem, slender bluestem, threeawns, and carpetgrass, can provide forage. Where the rotation grazing system includes rest periods of less than 8 weeks, carpetgrass generally dominates the site. About 8 to 10 acres of native grass pasture is needed to provide enough forage for one animal unit throughout the year. Periodic brush control is needed to keep the pasture from reverting to woodland.

Pasture group 8E. This group consists of well drained and moderately well drained soils that have a loamy surface layer and a clayey and loamy subsoil. Slopes range from 5 to 30 percent. Runoff is rapid, and the hazard of erosion is severe. In places steep slopes limit the use of equipment. These soils are characterized by low natural fertility.

Suitable pasture plants are bahiagrass, common bermudagrass, ball clover, and crimson clover. Bunch-type grasses should not be planted because of the severe hazard of erosion.

Additions of fertilizer and lime are needed. Legumes require higher levels of phosphorus and potassium than grasses. Also, they require applications of lime. The lime should be applied often enough to maintain the pH at 5.2 or higher. Special care is needed to control erosion during seedbed preparation and pasture establishment. Planting strips on the contour and in alternate years helps to control erosion. Careful management of grazing is needed to maintain an adequate plant cover and thus control runoff and erosion. Where grass-legume mixtures are grown, the grass should be grazed closely in the fall. Cattle should be removed when the legumes begin to produce seed.

Native grasses, such as pinehill bluestem, slender bluestem, threeawns, and carpetgrass, can provide forage. Where the rotation grazing system includes rest periods of less than 8 weeks, carpetgrass generally dominates the site. About 14 to 18 acres of native grass pasture is needed to provide enough forage for one animal unit throughout the year. Periodic brush control is needed to keep the pasture from reverting to woodland. Careful management of grazing is needed to maintain an adequate plant cover and thus control erosion.

Pasture group 8F. This group consists of moderately well drained and somewhat poorly drained soils that have a loamy surface layer and a loamy subsoil or a loamy and clayey subsoil. These soils are on uplands. Slopes range from 0 to 3 percent. A seasonal high water table and low fertility are the main limitations affecting pasture.

Suitable pasture grasses are bahiagrass and common bermudagrass. Suitable cool-season legumes are white clover, winterpea, and vetch. Tall fescue also grows well because of the additional moisture, but it should not be grazed in the summer.

Lime and complete applications of fertilizer are needed because of the low natural fertility and the acidity of the soils. Legumes require higher levels of phosphorus and potassium than grasses. Lime is needed for legumes, especially white clover. Winterpea and vetch can tolerate medium acid soil conditions, but

Figure 6.—Bahiagrass in an area of Kirvin fine sandy loam, 1 to 5 percent slopes. The farm pond, which provides water for grazing cattle, is in an area of Sacul fine sandy loam, 5 to 12 percent slopes.

the productivity is improved if lime is applied often enough to maintain the pH at 5.2 or higher. A drainage system can improve the pasture, especially in low areas. Removing cattle from the pasture during wet periods helps to prevent surface compaction, which reduces the productivity of the soils.

Native grasses, such as little bluestem, indiangrass, slender bluestem, threeawns, broomsedge, and carpetgrass, can provide forage. Where a rotation grazing system includes rest periods of less than 8 weeks, carpetgrass generally dominates the site. About 4 to 6 acres of native grass pasture is needed to provide enough forage for one animal unit throughout the year. Periodic brush control is needed to keep the pasture from reverting to woodland.

Pasture group 8G. This group consists of level, poorly drained, loamy soils on uplands and stream terraces. These soils are subject to rare flooding. Runoff is slow. The soils have a seasonal high water table, which can retard the growth of plants. Natural fertility is low.

Suitable pasture plants are bahiagrass, common bermudagrass, white clover, vetch, and winterpea. White clover generally produces more forage than vetch and winterpea, but it requires higher levels of calcium and phosphorus. Tall fescue can be grown, but it should not be grazed in summer.

Lime and fertilizer are needed because of the low natural fertility and the acidity of the soils. Lime should be applied often enough to maintain the pH at 5.2 or higher. Removing cattle from the pasture during wet periods helps to prevent surface compaction, which reduces the productivity of the soils. Where grass-legume mixtures are grown, the cattle should be removed as the legumes begin to produce seed. A drainage system generally can improve the pasture.

Native grasses, such as pinehill bluestem, switchgrass, plumegrass, sedges, and carpetgrass, can provide forage. Where a rotation grazing system includes rest periods of less than 8 weeks, carpetgrass generally dominates the site. About 4 or 5 acres of native grass pasture is needed to provide enough forage for one animal unit throughout the year. Periodic brush control is needed to keep the pasture from reverting to woodland.

Pasture group 8I. Bonn silt loam is the only soil in the parish assigned to this group. It is a level, poorly drained soil that has a high content of sodium salts in the subsoil. It is subject to rare flooding. Runoff is slow, and a seasonal high water table can retard the growth of plants. The soil is characterized by low natural fertility. It generally is in poor physical condition and is very slowly permeable because of the sodium in the subsoil.

Common bermudagrass is the best suited warm-season grass. Bahiagrass can be grown, but the amount of forage is reduced by the sodium in the soil. Suitable cool-season legumes are white clover, winterpea, and vetch.

Fertilizer is needed for optimum forage production. Lime generally is not needed, but mixing lime with the subsoil can reduce the adverse affects of the sodium. A drainage system can improve the pasture. Land grading or constructing shallow ditches can remove excess surface water.

Native grasses, such as pinehill bluestem, paspalums, threeawns, and carpetgrass, can provide forage. Where a rotation grazing system includes rest periods of less than 8 weeks, carpetgrass generally dominates the site. Where the soil is managed as native grass pasture, production is low and 8 to 10 acres is needed to provide enough forage for one animal unit throughout the year. Periodic brush control is needed to keep the pasture from reverting to woodland.

Pasture group 9A. This group consists of somewhat excessively drained and well drained, sandy soils on uplands and stream terraces. These soils dry quickly and are droughty. They are characterized by low or very low natural fertility. Slopes range from 1 to 12 percent. Erosion is a hazard on the more sloping soils.

Improved bermudagrass and weeping lovegrass are the best suited pasture grasses. Bahiagrass can be grown, but establishing the pasture is difficult and forage production is low because of the droughtiness. Crimson clover is the best suited cool-season legume.

Additions of fertilizer are needed for most pasture plants. Lime is needed for most legumes. Because of rapid permeability and a low nutrient-holding capacity, lime and fertilizer should be applied more frequently and in smaller amounts to the soils in this group than to other soils. Seeding grasses and legumes in narrow strips and on the contour helps to control erosion on the steeper slopes.

Native grasses, such as pinehill bluestem, splitleaf bluestem, slender bluestem, threeawns, broomsedge, carpetgrass, and bermudagrass, can provide adequate forage for livestock. Where a grazing rotation system includes rest periods of less than 8 weeks, bermudagrass dominates the site. Because forage production generally is low, 10 to 12 acres of native grass pasture is needed to provide enough forage for one animal unit throughout the year. Periodic brush control is needed to maintain forage production and to keep the pasture from reverting to woodland.

Crops

About 137,000 acres in De Soto Parish was used for crops and pasture in 1980. About 39,000 acres was used for cultivated crops, mainly soybeans, corn, and small grain.

Differences in the suitability of soils for crops and in the management needed in areas of cropland result from differences in soil characteristics, such as the fertility level, erodibility, content of organic matter, availability of water to plants, drainage, and the hazard of flooding. Cropping and tillage systems also are important parts of management. Each farm has a unique soil pattern; therefore, each has unique management problems. Some principles of farm management apply to specific soils and certain crops. This section describes the general principles of management that can be applied widely to the soils in De Soto Parish.

Fertilization and liming.—The soils in the parish range from extremely acid to neutral in the surface layer. Most of the soils that are used for crops are low in content of organic matter and available nitrogen.

The soils on bottom land, such as Moreland and Buxin soils, generally require only nitrogen fertilizer for nonleguminous crops. Some of these soils may become deficient in potassium after many years of continuous row cropping. Some of the soils on bottom land, such as Gallion and Caspiana soils, may require lime and complete applications of fertilizer for nonleguminous crops. The soils in the uplands generally require lime and complete applications of fertilizer for crops.

The amount of fertilizer needed on cropland depends on the kind of crop, on the past cropping history, on the desired level of yields, and on the kind of soil. It should be determined according to the results of soil tests. Information and instructions on collecting and testing soil samples can be obtained from the Cooperative Extension Service.

Organic matter content.—Organic matter is an important source of nitrogen for crop growth. It also increases the rate of water intake, minimizes surface crusting, and improves tilth. Most of the soils in the parish that are used for crops, especially those that have a surface layer of silt loam or very fine sandy loam, are low in content of organic matter. The content can be increased or maintained by growing crops that have an extensive root system and an abundance of foliage, by leaving plant residue on the surface, by growing perennial grasses and legumes in rotation with other crops, and by adding barnyard manure.

Soil tillage.—Soils should be tilled only when seedbed preparation and weed control are needed. Excessive tillage destroys soil structure. The clayey soils in the parish become cloddy if cultivated when too wet or too dry. A compacted layer, generally known as a traffic pan or plowpan, sometimes forms directly below the plow layer in loamy soils. It can be broken up by subsoiling or chiseling. The formation of this compacted layer can be prevented by deferring plowing when the soil is wet or by varying the depth of plowing. Tillage implements that stir the surface but leave crop residue in place protect the soil from beating rains and thus help to control erosion and runoff. The crop residue increases the rate of water infiltration and minimizes surface crusting.

Drainage and flood control.—On most of the soils on bottom land in the parish and on the level soils in the uplands, a surface drainage is needed to improve the suitability for crops. The soils in high positions on natural levees and the sloping soils in the uplands are drained by a gravity system consisting of row drains and field drains. The clayey soils in low positions on the natural levees are drained by a gravity system consisting of a series of mains, or principal pipelines, and laterals, or smaller drains that branch out from the mains. The success of the system depends on the availability of adequate outlets. Another method used to improve drainage is land grading, or precisely leveling the fields to a uniform grade. Land grading improves surface drainage, eliminates cross ditches, and makes longer rows possible.

Large areas in the parish are protected from flooding by levees along the Red River. Some areas, however, are not protected from backwater flooding or are flooded by runoff from higher areas.

Cropping system.—A good cropping system includes a legume, which provides nitrogen; a cultivated crop, which aids in weed control; a deep-rooted crop, which utilizes the plant nutrients in the substratum and helps to maintain the permeability of the substratum; and a close-growing crop, which helps to maintain the content of organic matter. The sequence of crops should keep the soil covered as much of the year as possible.

In De Soto Parish, a variety of cropping systems is used, depending on the main crop grown. In some areas soybeans are grown year after year or in rotation with grain sorghum and corn. Cover crops of grasses or legumes are commonly grown during the fall and winter. Double cropping of wheat and soybeans is becoming more common in some areas. In other areas watermelons, cabbage, Irish potatoes, or shallots commonly are grown in rotation with soybeans.

Control of erosion.—Erosion is the major hazard on many soils in De Soto Parish. It is an especially serious hazard on the soils in the uplands. Many areas of the sloping Bowie, Ruston, Keithville, and Eastwood soils are highly susceptible to erosion unless they are protected by a plant cover for extended periods. If the surface layer is lost through erosion, most of the available plant nutrients and most of the organic matter also are lost. Soils that have a clayey subsoil, such as Eastwood and Sacul soils, especially require protection against erosion. Erosion also results in the sedimentation of drainage systems and the pollution of streams by sediments, nutrients, and pesticides.

Cropping systems in which a plant cover is maintained on the soil for extended periods help to control erosion. Cover crops of grasses or legumes help to control erosion, increase the content of organic matter and nitrogen in the soils, and improve tilth. Terraces, diversions, grassed waterways, conservation tillage, and contour farming help to control erosion on cropland and pasture. Pipe drop structures in drainageways can help to prevent gullying.

Additional information about erosion control, cropping systems, and drainage practices can be obtained from the local offices of the Soil Conservation Service, the Cooperative Extension Service, or the Louisiana Agricultural Experiment Station.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification and pasture group 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 parishes and results of field trials and demonstrations are also considered.

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

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

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil 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 rangeland, for woodland, and for engineering purposes.

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

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

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

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

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in table 6.

Woodland Management and Productivity

J. Alan Holditch, area forester, Soil Conservation Service, helped prepare this section.

Soil directly influences the growth, management, harvesting, and multiple use of forests. It is the medium in which a tree is anchored and from which it draws its nutrients and moisture. Soil characteristics, such as chemical composition, texture, structure, depth, and slope position, affect tree growth, seedling survival, species suitability, and the equipment limitation.

The ability of a soil to supply moisture and nutrients to trees is strongly related to soil texture, structure, and depth. Generally, sandy soils, such as Flo soils, are less fertile and have a lower available water capacity than clayey soils. Aeration, however, is often impeded in the clayey soils, particularly under wet conditions. The slope position strongly influences species composition and the growth rates.

These soil characteristics, in combination, largely determine the species composition of forest stands and influence management and use decisions. Sweetgum, for example, can survive on many soils and sites, but it grows best on the rich, moist, alluvial, loamy soils on bottom land. The use of heavy logging and site-preparation equipment is more restricted on clayey soils than on better drained, sandy or loamy soils.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, a high content of rock fragments in the soil. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment or season of use is not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *productivity class.* Yields are predicted at the point where the mean annual increment culminates. The productivity of the soils in this survey area generally is based on 30 years for eastern cottonwood, 35 years for American sycamore, and 50 years for all other species *(5, 6, 7, 24)*.

The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *productivity class*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced on a fully stocked, even-aged, unmanaged stand. Cubic meters per hectare can be converted to cubic feet per acre by multiplying by 14.3. It can be converted to board feet by multiplying by a factor of about 71. For example, a productivity class of 8 means that the soil can be expected to produce, at the point where the mean annual increment culminates, 114 cubic feet per acre per year and about 568 board feet per acre per year.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

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

Woodland Resources

Forests and the forest industry have played a major role in shaping the history of De Soto Parish. The parish was once entirely forested. From the early 1900's through about 1950, more than 100,000 acres was cleared for agricultural crops and pasture. During the 1950's, many of these acres were converted back to southern pine forests. Currently, the uplands are almost entirely forested. Only scattered areas are used for crops, pasture, small villages, or homesteads. The woodland in the parish is managed primarily for pine, although some small areas of bottom land along streams produce limited quantities of hardwoods.

De Soto Parish has about 377,100 acres of commercial woodland. The acreage of commercial woodland decreased by about 12 percent between 1964 and 1974 and increased by 10 percent between 1974 and 1980. From 1980 to 1984, it decreased by 9 percent to its current level. The current acreage is likely to remain stable in the future. About 70,700 acres of the woodland is owned by the forest industry, and 306,400 acres is privately owned.

The parish is in two major land resource areas (MLRA)—the Western Coastal Plain and the Southern Mississippi Valley Alluvium. The dominant trees on the Western Coastal Plain are loblolly pine, shortleaf pine, sweetgum, red oak, and white oak. Those in the Southern Mississippi Valley Alluvium MLRA are ash, cottonwood, elm, and sycamore on well drained soils and ash, elm, oak, gum, cypress, pecan, and hackberry on poorly drained soils.

Commercial forests can be divided into forest types on the basis of tree species, site quality, or age *(25)*. As used in this survey, forest types are stands of trees of similar character, made up of the same species, and growing under the same ecological and biological conditions. The forest types are named for the dominant trees.

The *loblolly-shortleaf pine* forest type makes up about 159,100 acres of the woodland in the parish. Loblolly pine is dominant in most areas, except for the drier sites (fig. 7). Scattered hardwoods, such as sweetgum, blackgum, southern red oak, post oak, white oak, mockernut hickory, and pignut hickory, may be mixed with the pines on well drained soils. On the more moist sites, sweetgum, red maple, water oak, and willow oak may be mixed with the pines. American beech and ash are associated with this forest type along stream bottoms.

The *oak-pine* forest type makes up about 94,300 of the woodland in the parish. About 50 to 75 percent of the stocking is hardwoods, generally upland oaks, and 25 to 50 percent is softwoods other than cypress. The species composition is the result mainly of the kinds of soil, slope, and aspect. On the higher, drier sites, the hardwoods tend to be upland oaks, such as post oak, southern red oak, and blackjack oak. On the more moist sites, they are white oak, southern red oak, and black oak. Blackgum, winged elm, red maple, and various hickories are associated with the oak-pine type on both the drier and the more moist sites.

The *oak-hickory* forest type makes up about 82,500 acres of the woodland in the parish. Most of the stocking is upland oaks or hickory, singly or in combination. Where pines make up 25 to 50 percent of the stocking, the stand is classified as the oak-pine type. The most common associated trees are elm and maple.

The *oak-gum-cypress* forest type makes up about 41,200 acres of the woodland in the parish. This type occurs as bottom land forests of blackgum, sweetgum, oak, and baldcypress. Associated trees include black willow, ash, hackberry, maple, and elm.

About 229,800 acres of the woodland in the parish is used for sawtimber, 70,700 acres is used for poletimber or pulpwood, 64,800 acres supports seedlings and saplings, and 11,800 acres is classified as nonstocked. Nonstocked woodland is less than 16.7 percent stocked.

The volume of sawtimber in the parish is 1,647,600 board feet of softwoods and 418,200 board feet of hardwoods. The volume of growing stock, such as poletimber, pulpwood, and fenceposts, is 373.4 million cubic feet of softwoods and 153.6 million cubic feet of hardwoods. The volume of marketable timber is about 78 percent pines and 22 percent hardwoods.

The productivity of woodland can be measured by the cubic feet of wood produced per acre per year. In De Soto Parish, about 70,700 acres of the woodland

Figure 7.—Loblolly pine forest in an area of Eastwood fine sandy loam, 1 to 5 percent slopes.

produces 165 or more cubic feet of wood per acre. About 176,800 acres produces 120 to 165 cubic feet per acre, 123,700 acres produces 85 to 120 cubic feet per acre, and 5,900 acres produces 50 to 85 cubic feet per acre.

In 1984, the total amount of pine and hardwood timber cut in the parish was 158,613 standard cords of pulpwood (103,057 cords of pine and 55,556 cords of hardwood) and 30,542,309 board feet of sawtimber (Doyle scale), of which 26,036,890 board feet was pine and 4,505,419 board feet was hardwood.

Timber production is an important part of the economy in the parish. Most of the upland pine sites are in privately owned tracts. These tracts are producing well below their potential. Most can be improved by thinning out mature trees and undesirable species. Protection from grazing, fire, insects, and diseases and tree planting and timber stand improvement are needed. The upland pine sites owned by forest industries are generally well managed.

The Soil Conservation Service, the Louisiana Office of Forestry, and the Louisiana Cooperative Extension Service can help to determine specific management needs.

Environmental Impact

The values associated with woodland include wildlife habitat, recreation, natural beauty, and conservation of soil and water. The commercial woodland in De Soto Parish provides food and shelter for wildlife and offers many opportunities for recreation. Several hunting and fishing clubs in the parish either lease or otherwise use the woodland. The woodland provides watershed protection, helps to control erosion and sedimentation, and enhances the quality and value of water resources.

Trees can be planted to screen distracting views of dumps and other unsightly areas, muffle the sound of traffic, reduce the velocity of winds, and enhance the beauty of the landscape. Trees and forests help to filter out airborne dust and other impurities, convert carbon dioxide into life-giving oxygen, and provide shade.

Production of Forage on Woodland

The kind and amount of understory vegetation that can be produced in an area are related to the soils, the climate, and the extent of the overstory. Grazing is not recommended in areas of hardwoods. In many areas of pine woodland, however, grazing by cattle or horses can be a compatible secondary use. The native vegetation can be grazed, or improved pasture grasses can be interseeded in the wooded areas. Grasses, legumes, forbs, and many woody browse species in the understory can be grazed, but the grazing should be managed so that it supplements the woodland enterprise without damaging the wood crop. In most areas of pine woodland, grazing is beneficial to the woodland program because it reduces the extent of heavy "rough," thus reducing the hazard of wildfires. Also, grazing helps to remove undesirable woody plants.

The success of a combined woodland and livestock program depends primarily on the intensity and time of grazing. The proper intensity of grazing helps to maintain a protective plant cover and maintains or improves the quantity and quality of trees and forage vegetation.

Forage production varies, depending on the type of woodland and the amount of sunlight that reaches the understory vegetation during the growing season. Soils that have about the same potential for producing trees also have similar potential for producing about the same kind and amount of understory vegetation. The plant community on these soils can reproduce itself as long as the environment does not change.

Research has established that there is a close correlation between the total potential yield of grasses, legumes, and forbs and the amount of sunlight reaching the ground at midday in the forest. Herbage production declines as the forest canopy becomes denser.

One of the main management objectives is to keep the woodland forage in excellent or good condition. If this objective is met, water is conserved, yields are improved, and the soils are protected.

Recreation

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

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

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

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm and is not dusty when dry. Strong slopes can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes that increase the cost of shaping sites or of building access roads and parking areas.

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

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

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

Wildlife Habitat

Billy R. Craft, biologist, Soil Conservation Service, helped prepare this section.

De Soto Parish has a large and varied population of fish and wildlife. The habitat types include open agricultural land, upland pine forests, cypress sloughs, and hardwood forests on bottom land, each of which supports populations of game and nongame wildlife.

The parish has about 98,000 acres of pasture. The main perennial pasture grasses are common bermudagrass, bahiagrass, and improved bermudagrass. Ryegrass and small grain are planted for winter pasture. The pastured areas provide food and cover for mourning dove, bobwhite quail, rabbits, and other small game that commonly inhabit open areas.

The parish has about 39,000 acres of cropland. Soybeans, grain sorghum, and wheat and other small grain are the primary crops. Small, irregular fields or meadows that are near wooded areas provide the best habitat for most openland wildlife (fig. 8). The larger fields are less desirable because of cover limitations.

Upland pine forests make up about 159,100 acres in the parish. They are managed primarily for loblolly pine. Periodic thinning and prescribed burning improve the habitat for wildlife, especially white-tailed deer, bobwhite quail, and turkey. Clearcuts should be kept relatively small.

About 94,300 acres of mixed pine and hardwoods is in the uplands. The most common trees are loblolly pine, shortleaf pine, white oak, southern red oak, overcup oak, sweetgum, elm, persimmon, water oak, and several species of hickory. These areas generally support higher populations of woodland wildlife than the areas of pure pine.

Hardwood forests along Clement Creek and other creeks that cross the uplands make up about 41,200 acres in the parish. The most common trees are beech, magnolia, cherrybark oak, red oak, white oak, swamp chestnut oak, water oak, shagbark hickory, and elm. These forests provide excellent habitat for squirrels, deer, and wild turkeys, which are popular game species. The population of wild turkey should increase because of better protection, restocking efforts, and the interest of hunting clubs in this game bird.

Several cypress sloughs are on the alluvial plains along the Red River. They provide good habitat for wetland wildlife. Most of the sloughs provide nesting, brood rearing, and roosting habitat for wood ducks. Many amphibians and reptiles use the cypress sloughs as their primary habitat.

A few small tracts of hardwoods remain on the alluvial plains in the parish. The most common trees are Nuttall oak, overcup oak, green ash, water oak, persimmon, sugarberry, honeylocust, and elm. These tracts can provide the best woodland habitat in the parish.

The many private ponds, lakes, and creeks in the parish support low to high populations of fish. Toledo Bend Reservoir, a manmade lake, offers some of the best fishing in the parish. The most common fish are largemouth bass, white bass, striped bass, white crappie, black crappie, bluegill, warmouth, bowfin, buffalo, gar, carp, shad, pickerel, and several species of shiners and minnows. The parish has about 600 farm ponds. Most of these have been stocked with bluegill, redear sunfish, and largemouth bass. Some have been stocked with channel catfish.

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

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

Figure 8.—An area of Bonn silt loam where a small meadow is near woodland. This area provides good habitat for openland wildlife.

the intensity of management needed for each element of the habitat.

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

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

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

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

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, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, paspalum, woolly croton, and uniola.

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, sugarberry, persimmon, sweetgum, hawthorn, dogwood, hickory, greenbrier, blackberry, and huckleberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are tree huckleberry, redbay, and mayhaw.

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, cedar, and baldcypress.

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, waxmyrtle, American elder, sumac, and elderberry.

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, and slope. Examples of wetland plants are smartweed, wild millet, wildrice, 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 wetness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

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

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, 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, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: 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 need to 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, 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 kind 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 recreation uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

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

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

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings 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 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 the 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 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, shrink-swell potential, and organic layers can cause the movement of footings. A high water table 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. A high water table, flooding, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

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

Sanitary Facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. 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, and flooding affect absorption of the effluent.

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 are less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

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

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, flooding, and content of organic matter.

Excessive seepage resulting from rapid permeability of 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 can cause construction problems.

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 needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, slope, and flooding affect both types of landfill. Texture, highly organic layers, soil reaction, and content of sodium affect trench type 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 type 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 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 soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by 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 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 depth to the water table is less than 1 foot. These soils 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. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. 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.

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, and rock fragments.

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 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 or stones, 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 or stones, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils generally is preferred for topsoil because of its content of organic matter. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to 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 organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, and susceptibility to flooding. Excavating and grading and the stability of ditchbanks are affected by slope and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The performance of a system is affected by the depth of the root zone and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope and wetness affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing 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. Wetness and slope affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, 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.

Estimates of soil properties are based on field examinations 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 characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "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, SP-SM.

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.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and 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 ⅓ 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, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

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.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 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 in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils 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 permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is near 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

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 creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Soil Fertility Levels

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This section gives information concerning the environmental factors and physical and chemical properties that affect the potential of soils for crop production. It also lists the methods used to obtain the chemical analyses of the soils sampled.

Crop composition and yields are a function of many soil, plant, and environmental factors. The environmental factors include light (intensity and duration), temperature of the air and soil, precipitation (distribution and amount), and atmospheric carbon dioxide concentration.

Plant factors are species and hybrid specific. They include the rate of nutrient and water uptake and the rate of plant growth and related plant functions.

Soil factors consist of both physical and chemical properties. The physical properties include particle-size distribution, texture, structure, surface area, bulk density, water retention and flow, and aeration. The chemical properties can be separated into quantity factors, intensity factors, relative intensity factors, quantity-intensity relationship factors, and replenishment factors.

The *quantity factor* refers to the amount of an element in the soil that is readily available for uptake by plants. When the quantity factor is ascertained, the available supply of an element is removed from the soil by a suitable extractant and is analyzed.

The *intensity factor* refers to the concentration of an element species in the soil moisture. It is a measure of the availability of an element for uptake by plant roots. The availability of an element to plants differs in two soils that have identical available quantities of the element but have different intensity factors.

The *relative intensity factor* refers to the effect that the availability of one element has on the availability of another element.

The *quantity-intensity relationship factor* refers to the reactions between the soil surface and soil water that control the distribution of element species between the available supply in the soil and the soil water. A special quantity-intensity relationship is the buffer capacity of the soil for a given element. The buffer capacity is the amount of a given element that must be added to or removed from the available supply to produce a given change in the intensity factor for that element.

The *replenishment factor* refers to the rate of replenishment of the available supply and intensity factors by weathering reactions, additions of fertilizer, and transport by mass flow and diffusion.

These soil factors are interdependent. The magnitude of the factors and the interactions among them control crop response. The relative importance of each factor changes from soil to soil, crop to crop, and environment to environment. The soil factors are only part of the overall system.

The goal of soil testing is to provide information for a soil and crop management program that establishes and maintains the optimum levels and proportions of the essential elements in the soil for crop and animal nutrition and protects the environment against the buildup of potentially toxic levels of essential and nonessential elements. Current soil tests measure only one soil factor—the available supply of nutrients in the surface layer or plow layer. Where crop production is clearly limited by the available supply of one or more nutrients in the plow layer, existing soil tests generally can diagnose the deficiency and reliable recommendations to correct the problem can be made. Soil management systems generally are based on physical and chemical alteration of the plow layer. The characteristics of this layer can vary from one location to another, depending on management practices and land use.

The underlying layers are less likely to change or change very slowly as a result of alteration of the plow layer. The properties of the subsoil reflect the inherent ability of the soil to supply nutrients to plant roots and to provide a favorable environment for root growth. If soil fertility recommendations based on current soil tests are followed, major fertility deficiencies in the plow layer are normally corrected. Crop production is then limited by crop and environmental factors, the physical properties of the plow layer, and the physical and chemical properties of the subsoil.

The supply of available nutrients in the soil is an important factor affecting crop production. Information about the supply of available nutrients in the subsoil can be used as the basis for an evaluation of the natural fertility level of the soil.

Soils were sampled during the soil survey and analyzed for pH; organic carbon content; extractable phosphorus; exchangeable cations of calcium, magnesium, potassium, sodium, aluminum, and hydrogen; total acidity; and cation-exchange capacity. The results are summarized in table 17. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods *(23)*. More detailed information about chemical analyses of soils is available *(1, 4, 11, 12, 13, 15, 18, 19, 26)*.

Reaction (pH)—1:1 soil/water solution (8C1a).
Organic carbon—acid-dichromate oxidation (6A1a).
Extractable phosphorus—Bray 2 extractant (0.03 molar ammonium fluoride-0.1 molar hydrochloric acid).
Exchangeable cations—pH 7, 1 molar ammonium acetate, calcium (6N2), magnesium (6O2), potassium (6Q2), sodium (6P2).
Exchangeable aluminum and hydrogen—1 molar potassium chloride (6G2).
Total acidity—pH 8.2, barium chloride-triethanolamine (6H1a).
Sum cation-exchange capacity—sum of bases plus total acidity (5A3a).
Base saturation—sum of bases/sum cation-exchange capacity (5C3).
Exchangeable sodium percentage—exchangeable sodium/sum cation-exchange capacity.
Aluminum saturation—exchangeable aluminum/effective cation-exchange capacity.

In general, there are four major soil profile types based on soil fertility. The first type includes soils having a relatively high level of available nutrients throughout. This type reflects the relatively high fertility status of the material in which the soils formed and a relatively young age or limited weathering in the soil profile. Examples are Armistead, Buxin, and Moreland soils.

The second type includes soils in which the level of available nutrients is relatively low in the surface layer but generally increases with increasing depth. These soils have relatively fertile parent material and are older than the first type and have been subject to weathering over a longer period or to more intense weathering. Examples are Forbing and Wrightsville soils. Crops on these soils can exhibit deficiency symptoms early in the growing season if the level of available nutrients in the surface layer is low enough. If the crop roots are able to penetrate to the more fertile subsoil, the deficiency symptoms often disappear.

The third type includes soils that have an adequate or relatively high level of available nutrients in the surface layer but have a relatively low level in the subsoil. Such soils formed in material that is low in fertility or are older soils that have been subject to more intense weathering over a longer period. Kirvin soils are an example. The higher nutrient levels in the surface layer generally are a result of the addition of fertilizer to agricultural soils or biocycling in undisturbed soils.

The fourth type includes soils that have a relatively low level of available nutrients throughout. These soils formed in material that is low in fertility or are older soils that have been subject to intense weathering over a long period. Examples are Bienville and Flo soils. These soils have not accumulated nutrients in the surface layer as a result of the addition of fertilizer or biocycling.

Soil properties, such as reaction, can also show the general distribution patterns described in the previous paragraphs. These patterns are a result of the interactions of parent material, weathering (climate), time, and to a lesser extent organisms and topography.

Nitrogen.—Generally, more than 90 percent of the nitrogen in the surface layer is in the form of fixed ammonium compounds. These forms of nitrogen are unavailable for plant uptake, but they can be converted to readily available ammonium and nitrate species.

Nitrogen is generally the most limiting nutrient element affecting crop production because plants have a high demand for it. Because reliable nitrogen soil tests are not available, nitrogen fertilizer recommendations are nearly always based on the nitrogen requirement of the crop rather than on nitrogen soil test levels.

Despite the lack of adequate nitrogen soil tests, the amounts of readily available ammonium and nitrate nitrogen in soils, the amount of organic nitrogen, the rate of mineralization of organic nitrogen to available forms, and the rate of conversion of fixed ammonium nitrogen to available forms can indicate the fertility status of a soil with respect to nitrogen. Because the amounts and rates of transformation of the various forms of nitrogen in the soils of De Soto Parish are unknown, no assessment of the nitrogen fertility status of these soils can be made.

Phosphorus.—Phosphorus occurs in soils as discrete solid phase minerals, such as hydroxyapatite, variscite, and strengite; as occluded or coprecipitated phosphorus in other minerals; as retained phosphorus on mineral surfaces, such as carbonates, metal oxides, and layer silicates; and in organic compounds. Most of the phosphorus in soils is unavailable for plant uptake.

The Bray 2 extractant tends to extract more phosphorus than the more commonly used Bray 1, Mehlich I, and Olsen extractants. The Bray 2 extractant provides an estimate of the supply of phosphorus available to plants. According to the soil test interpretation guidelines used in Louisiana, the Bray 2 extractable phosphorus content of most of the soils in De Soto Parish is very low. The very low levels of available phosphorus limit crop production. The soils require continual additions of phosphorus fertilizer to build up and maintain adequate levels of available phosphorus for sustained crop production.

Flo, Gore, Kirvin, Kolin, and Wrightsville soils have very low levels of extractable phosphorus throughout. Metcalf soils have a high level of extractable phosphorus in the surface layer, most likely as a result of the recent addition of phosphorus fertilizer. Armistead, Bienville, Buxin, Caspiana, and Yorktown soils have medium to high levels of phosphorus. The content of extractable phosphorus in Forbing, Gallion, Moreland, and Perry soils increases with increasing depth. It ranges from medium to high according to soil test interpretation guidelines. The subsoil of Gallion soils can be a significant source of available phosphorus to plants as the roots extend through the profile. Additions of phosphorus fertilizer are necessary, however, to maintain crop production because subsoil nutrient reserves may be depleted.

Potassium.—Potassium occurs in three major forms in soils: exchangeable potassium associated with negatively charged sites on clay mineral surfaces, nonexchangeable potassium trapped between clay mineral interlayers, and structural potassium within the crystal lattice of minerals. The exchangeable form of potassium in soils is replaceable by other cations and generally is readily available for plant uptake. To become available to plants, the other forms of potassium must be converted to the exchangeable form via weathering reactions.

The content of exchangeable potassium in soils is an estimate of the supply of potassium available to plants. According to soil test interpretation guidelines, the available supply of potassium in most of the soils in the parish is very low, low, or medium, depending on the soil texture.

Exchangeable potassium levels are generally low throughout Bienville and Flo soils, which formed in unconsolidated sandy material, but the levels may increase slightly with increasing depth, as in the Metcalf soils, as the content of clay increases. These soils generally lack micaceous minerals, which are a source of exchangeable potassium during weathering.

The content of exchangeable potassium in Forbing, Gore, Kirvin, Meth, and Sacul soils, which formed in unconsolidated acid clays, generally remains about the same or increases with increasing depth. Increases in content of exchangeable potassium with increasing depth can be associated with an increasing content of clay.

The content of exchangeable potassium generally is high throughout Buxin soils, which formed in unconsolidated alkaline clays, and is low throughout Kolin, Meth, Ochlockonee, and Wrightsville soils. It is much higher in Armistead, Buxin, Forbing, Perry, and Yorktown soils than in most of the other soils in the parish because of a higher content of clay. According to soil test interpretation guidelines, however, it is still low to medium, depending on the soil texture. The soils that have a relatively low content of clay, such as Ochlockonee soils, generally have low levels of exchangeable potassium. The higher levels of exchangeable potassium generally are in the loamy and clayey soil layers. Higher levels also are in soils where potassium fertilizer has been applied.

Crops respond to applications of potassium fertilizer if exchangeable potassium levels are very low or low. Low levels can be gradually built up by adding potassium fertilizer if the soils contain a sufficient amount of clay to hold the potassium. Exchangeable potassium levels can be maintained by adding enough potassium fertilizer to make up for that removed by crops, the fixation of exchangeable potassium to nonexchangeable potassium, and leaching. Some soils in the parish, such as Flo soils, do not have a sufficient amount of clay in the root zone for the cation-exchange capacity to be high enough to maintain adequate quantities of available potassium for sustained crop production. These soils require more frequent additions of potassium because of leaching.

Magnesium.—Magnesium occurs in soils as exchangeable magnesium associated with negatively charged sites on clay mineral surfaces and as structural magnesium in mineral crystal lattices. Exchangeable magnesium generally is readily available for plant uptake; structural magnesium must be converted to exchangeable magnesium during mineral weathering reactions.

According to soil test interpretation guidelines, the content of exchangeable magnesium in the soils in De Soto Parish is low, medium, or high, depending on soil texture. In general, the content in the soils on uplands, such as Gore soils, increases with increasing depth. This increase is associated with an increasing content of clay in the subsoil. The content of exchangeable magnesium in Kirvin soils greatly increases from the surface layer to the subsoil. In Forbing soils the highest level of exchangeable magnesium is in the upper part of the subsoil. In the soils that formed in alluvium, the exchangeable magnesium levels generally increase with increasing depth, as in Gallion soils, or the levels remain about the same throughout the profile, as in Ochlockonee soils.

Medium exchangeable magnesium levels are adequate for crop production, especially where the plant roots can exploit the high levels that are in the subsoil. Because magnesium deficiencies in some plants are possible if levels are low, additions of magnesium fertilizer may be beneficial on some of the soils.

Calcium.—Calcium occurs in soils as exchangeable calcium associated with negatively charged sites on clay mineral surfaces and as structural calcium in mineral crystal lattices. Exchangeable calcium generally is available for plant uptake, whereas structural calcium is not.

According to soil test interpretation guidelines, the exchangeable calcium levels in the soils in De Soto Parish are low, medium, or high, depending on soil texture. Calcium deficiencies in plants are extremely rare. Calcium is normally included with the material added to soils when lime is applied to correct problems associated with acidity.

Calcium is normally the most plentiful exchangeable cation in soils. The subsoil of the Gore and Kirvin soils, however, has more exchangeable magnesium than exchangeable calcium. In the other soils in the parish, the exchangeable calcium levels are higher than or about the same as the exchangeable magnesium levels.

High levels of exchangeable calcium in the surface layer generally occur in areas where pH levels are higher in the surface layer than in the subsoil, probably as a result of applications of lime to reduce acidity. Higher levels in the subsoil than in the surface layer are generally associated with a higher content of clay or with free carbonates when pH levels are high.

Organic matter.—The organic matter content in a soil greatly influences other soil properties. High organic matter levels in mineral soils are desirable, and low levels can lead to many problems. Increasing the organic matter content can greatly improve soil structure, drainage, and other physical properties. It can also increase the moisture-holding capacity, the cation-exchange capacity, and the content of nitrogen.

Increasing the organic matter content is difficult because organic matter is continually subject to microbial degradation, especially in Louisiana, where higher temperatures increase the extent of microbial activity. The rate at which organic matter in native plant communities breaks down is balanced by the rate at which fresh material is added. Disruption of this natural process can lead to a decrease in the organic matter content of the soil. Management practices that cause erosion lead to a further decrease.

If no degradation of organic matter occurs, 10 tons of organic matter is needed to raise the organic matter content of the top 6 inches of the soil by just 1 percent. Since breakdown of organic matter does occur in the soil, large amounts must be added for several decades before a small increase in the content can be achieved. Conservation tillage and cover crops slowly increase the organic matter content over time or at least prevent further declines.

The organic matter content in most of the soils in the parish is low. It decreases sharply with increasing depth because additions of fresh organic matter are confined to the surface layer. The low levels reflect a high rate of organic matter degradation, erosion, and cultural practices that make maintenance of a higher content of organic matter difficult.

Sodium.—Sodium occurs in soils as exchangeable sodium associated with negatively charged sites on clay mineral surfaces and as structural sodium in mineral crystal lattices. Because primary sodium minerals are readily soluble and are generally not strongly retained by soils, well drained soils that are subject to a moderate or more intense degree of weathering from rainfall do not normally contain significant amounts of sodium. Soils in low rainfall environments and soils in which drainage is restricted in the subsoil contain significant amounts of sodium. High levels of exchangeable sodium are associated with undesirable physical properties, such as poor structure, slow permeability, and restricted drainage.

Although many of the soils in the parish contain more exchangeable sodium than exchangeable potassium, only the Bonn soils have excessive levels of exchangeable sodium in the root zone. Elevated levels of exchangeable sodium are in the subsoil of the Wrightsville soils.

Soil pH, exchangeable aluminum and hydrogen, and exchangeable and total acidity.—The pH of the soil solution in contact with the soil affects other soil properties. Soil pH is an intensity factor rather than a quantity factor. The lower the pH, the more acidic the soil. Soil pH controls the availability of essential and nonessential elements for plant uptake by controlling mineral solubility, ion exchange, and adsorption and desorption reactions with soil surfaces. Soil pH also affects microbial activity.

Aluminum occurs in soils as exchangeable monomeric hydrolysis species, nonexchangeable polymeric hydrolysis species, aluminum oxides, and aluminosilicate minerals. Exchangeable aluminum in soils is determined by extraction with neutral salts, such as potassium chloride and barium chloride. The exchangeable aluminum in soils is directly related to pH. If pH is less than 5.5, the soils have significant amounts of exchangeable aluminum that has a charge of plus 3. This amount of aluminum is toxic to plants. The toxic effects of aluminum on plants can be alleviated by adding lime to convert exchangeable aluminum to nonexchangeable polymeric hydrolysis species. High levels of organic matter can also alleviate aluminum toxicity.

Sources of exchangeable hydrogen in soils include hydrolysis of exchangeable and nonexchangeable aluminum and pH-dependent exchange sites on metal oxides, certain layer silicates, and organic matter. Exchangeable hydrogen as determined by extraction with such neutral salts as potassium chloride is normally not a major component of soil acidity because it is not readily replaceable by other cations unless accompanied by a neutralization reaction. Most of the neutral salt exchangeable hydrogen in soils apparently comes from aluminum hydrolysis.

Acidity from hydrolysis of neutral salt exchangeable aluminum plus neutral salt exchangeable hydrogen from pH-dependent exchange sites makes up the exchangeable acidity in soils. Exchangeable acidity is determined by the pH of the soil. Titratable acidity is the amount of acidity neutralized to a selected pH, generally 7 or 8.2, and constitutes the total potential acidity of a soil determined up to a given pH. All sources of soil acidity, including hydrolysis of monomeric and polymeric aluminum species and hydrogen from pH-dependent exchange sites on metal oxides, layer silicates, and organic matter, contribute to the total potential acidity. Total potential acidity in soils is ascertained by titration with bases or incubation with lime; extraction with a buffered extractant followed by titration of the buffered extractant (pH 8.2, barium chloride-triethanolamine method); or equilibration with buffers followed by estimation of acidity from changes in buffer pH.

Many of the soils of the parish have a low pH, significant quantities of exchangeable aluminum, and high levels of total acidity. Examples are Gore, Kirvin, Kolin, Metcalf, and Wrightsville soils. The exchangeable aluminum levels are high enough to limit crop production. High levels of exchangeable aluminum in the surface layer can be reduced by liming, but no economical methods are available to neutralize soil acidity below the surface layer. Exchangeable aluminum levels can be reduced by applying gypsum so that the sulfate leaches through the soil profile and removes the aluminum.

Cation-exchange capacity.—The cation-exchange capacity represents the available supply of nutrient and nonnutrient cations in the soil. It is the amount of cations on permanent and pH-dependent, negatively charged sites on soil surfaces. Permanent-charge cation-exchange sites occur because a net negative charge develops on a mineral surface from substitution of ions within the crystal lattice. A negative charge develops from ionization of surface hydroxyl groups on minerals. Organic matter also produces pH-dependent cation-exchange sites.

Methods for determining cation-exchange capacity use buffered or unbuffered salts to measure the cation-exchange capacity at a specified pH. These methods produce different results because the method that uses unbuffered salts includes only part of the pH-dependent cation-exchange capacity and the method that uses buffered salts includes all of the pH-dependent cation-exchange capacity up to the pH of the buffer (generally 7 or 8.2). Errors in the saturation, washing, and replacement steps can also cause different results.

The effective cation-exchange capacity is the sum of exchangeable bases determined by extraction with pH 7, 1 molar ammonium acetate plus the sum of neutral salt exchangeable aluminum and hydrogen (exchangeable acidity). The sum cation-exchange capacity is the sum of exchangeable bases plus the total acidity determined by extraction with pH 8.2, barium chloride-triethanolamine. The effective cation-exchange capacity generally is less than the sum cation-exchange capacity and includes only that part of the pH-dependent cation-exchange capacity that is determined by exchange of hydrogen with a neutral salt. The sum includes all of the pH-dependent cation-exchange capacity up to pH 8.2. If a soil contains no pH-dependent exchange sites or the pH of the soil is about 8.2, then the effective cation-exchange capacity and the sum cation-exchange capacity are about the same. The larger the cation-exchange capacity, the greater the capacity to store nutrient cations.

The pH-dependent charge is a significant source of the cation-exchange capacity in many of the soils in the parish. Exceptions are soils that have a low content of clay and low total acidity and soils that have a high content of clay. In these soils permanent-charge cation-exchange capacity is dominant. Because the pH-dependent cation-exchange capacity will increase with pH, the cation-exchange capacity of many of the soils in the parish can be increased by liming. Applications of lime would result in a greater storage capacity for nutrient cations, such as potassium, magnesium, and calcium.

Physical and Chemical Analyses of Selected Soils

The results of physical analysis of several typical pedons in the survey area are given in table 18 and the results of chemical analysis in table 19. The results of mineralogy analysis are given in table 20. The data are for soils sampled at carefully selected sites. Soil samples were analyzed by the Soil Survey Investigations Staff, Soil Conservation Service, and the Soil Characterization Laboratory, Louisiana Agricultural Experiment Station.

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 *(23)*.

Sand—(0.05-2.0 mm fraction) weight percentages of materials less than 2 mm (3A1).

Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all materials less than 2 mm (3A1).

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of materials less than 2 mm (3A1).

Water retained—pressure extraction, percentage of ovendry weight of less than 2 mm material; ⅓ or ⅒ (3⁄10) bar (4B1), 15 bars (4B2).

Water-retention difference—between ⅓ bar and 15 bars for less than 2 mm material (4C1).

Moist bulk density—of less than 2 mm material, saran-coated clods (4A1).

Moist bulk density—of less than 2 mm material, saran-coated clods at field moist (4A3a), air-dry (4A1b), and ovendry (4A1h).

Organic carbon—dichromate, ferric sulfate titration (6A1a).

Extractable cations—ammonium acetate pH 7.0, uncorrected; calcium (6N2), magnesium (6O2), sodium (6P2), potassium (6Q2).

Extractable acidity—barium chloride-triethanolamine I (6H1a).

Cation-exchange capacity—ammonium acetate, pH 7.0 (5A1b).

Base saturation—ammonium acetate, pH 7.0 (5C1).

Reaction (pH)—1:1 water dilution (8C1a).

Reaction (pH)—potassium chloride (8C1c).

Reaction (pH)—calcium chloride (8C1e).

Aluminum—potassium chloride extraction (6G).

Iron—dithionate-citrate extract (6C2b).

Available phosphorus—Bray 1 and 2.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(22)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 21 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 Fluvent (*Fluv*, meaning flood plain, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of 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 Udifluvents (*Ud*, meaning moist, plus *fluvent*, the suborder of the Entisols that formed in recent alluvium on flood plains).

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 Udifluvents.

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, acid, thermic Typic Udifluvents.

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. The texture of the surface layer or of the underlying material can differ 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 (21)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (22)*. 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."

Armistead Series

The Armistead series consists of somewhat poorly drained soils that formed in clayey alluvium over loamy sediments. These soils are on natural levees on the flood plains along the Red River. They are subject to rare flooding. Permeability is slow in the clayey upper part of the profile and moderately slow in the loamy lower part. Slopes are dominantly less than 1 percent.

Soils of the Armistead series are fine-silty, mixed, thermic Aquic Argiudolls.

Armistead soils commonly are near Buxin, Caspiana, Gallion, and Moreland soils. Buxin and Moreland soils are at the slightly lower elevations. They have a fine textured control section. Caspiana and Gallion soils are in the slightly higher landscape positions. They do not have a clayey surface layer. Also, Gallion soils do not have a mollic epipedon.

Typical pedon of Armistead clay; about 2.0 miles southeast of Evelyn, 0.3 mile south on Louisiana State Highway 177, about 1.8 miles east on farm road, 60 feet southeast of the road, in a pasture; SE¼SE¼ sec. 31, T. 12 N., R. 10 W.

Ap—0 to 6 inches; dark reddish brown (5YR 3/3) clay; moderate medium subangular blocky structure; firm, very sticky and plastic; common fine and medium roots; few very dark gray (5YR 3/1) worm casts; slightly acid; abrupt smooth boundary.

A1—6 to 12 inches; dark reddish brown (5YR 3/3) clay; moderate coarse prismatic structure; firm; common fine roots; medium acid; clear smooth boundary.

2A2—12 to 23 inches; dark reddish brown (5YR 3/2) silty clay loam; common medium faint dark gray (5YR 4/1) and few fine faint gray mottles; moderate medium subangular blocky structure; firm; few fine roots; reddish brown material in old root channels; strongly acid; clear wavy boundary.

2Bt1—23 to 38 inches; yellowish red (5YR 5/6) silt loam; weak coarse prismatic structure; friable; common fine pores; dark reddish brown (5YR 3/2) stains in pores and old root channels; thick continuous clay films on faces of peds; strongly acid; clear wavy boundary.

2Bt2—38 to 48 inches; yellowish red (5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; common fine pores; thick discontinuous clay films on vertical faces of peds; slightly acid; clear wavy boundary.

2BC—48 to 60 inches; yellowish red (5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few fine pores; thin patchy clay films on vertical faces of peds; strongly acid.

The thickness of the solum ranges from 40 to 70 inches.

The Ap and A horizons have hue of 2.5YR, 5YR, or 7.5YR and value and chroma of 2 or 3. Reaction ranges from medium acid to moderately alkaline. The combined thickness of these horizons ranges from 10 to 20 inches.

The 2A horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 3, and chroma of 1 to 3. It has few to many mottles in shades of gray. The texture is silt loam or silty clay loam. Reaction ranges from strongly acid to moderately alkaline.

The 2Bt and 2BC horizons have hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. The texture is silt loam or silty clay loam. Reaction ranges from strongly acid to moderately alkaline.

Some pedons have a 2C horizon. This horizon has the same range in color as the 2Bt horizon. The texture is very fine sandy loam, silt loam, loam, or silty clay loam. This horizon is calcareous in some pedons, and the number of soft accumulations of carbonate ranges from none to common.

The Armistead soils in De Soto Parish have a lower reaction in the A and 2A horizons and in some subhorizons of the 2Bt horizon than is defined as the range for the series. This difference, however, does not significantly affect the use and management of the soils.

Beauregard Series

The Beauregard series consists of moderately well drained, slowly permeable soils that formed in alluvial sediments of both Pleistocene and Tertiary age. These soils are in the uplands. Slopes range from 1 to 3 percent.

Soils of the Beauregard series are fine-silty, siliceous, thermic Plinthaquic Paleudults.

Beauregard soils commonly are near Bowie, Guyton, and Metcalf soils. Bowie soils are in the higher, more convex areas. They are fine-loamy. Guyton soils are in level and concave areas. They are grayish throughout. Metcalf soils are on broad ridgetops. They have a clayey 2B horizon that has a base saturation of more than 35 percent.

Typical pedon of Beauregard silt loam, 1 to 3 percent slopes; about 2.75 miles northeast of Logansport, 2.2 miles north on Louisiana State Highway 764, about 1.1 miles west on access road, 200 feet west of the road; NE¼SE¼ sec. 20, T. 12 N., R. 16 W.

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

E—3 to 8 inches; grayish brown (10YR 5/2) silt loam; few fine faint brown mottles; weak fine granular structure; friable; few to many fine roots; strongly acid; clear wavy boundary.

BE—8 to 19 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable; many fine pores; strongly acid; clear wavy boundary.

Bt—19 to 27 inches; light yellowish brown (10YR 6/4) silt loam; many medium distinct yellowish brown (10YR 5/6) and many medium distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; few brittle red accumulations; few fine pores; few fine roots; thin discontinuous clay films on vertical faces of peds; strongly acid; gradual smooth boundary.

Btv1—27 to 44 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; thin discontinuous clay films on vertical faces of peds; few fine pores; about 8 percent plinthite surrounded by red (2.5YR 4/8) brittle material; strongly acid; gradual smooth boundary.

Btv2—44 to 65 inches; grayish brown (10YR 5/2) silty clay loam; few medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; thin discontinuous clay films on vertical faces of peds; common red (2.5YR 4/6) nodules of plinthite; very strongly acid.

The thickness of the solum ranges from 50 to 90 inches. The depth to a horizon that has more than 5 percent plinthite ranges from 20 to 40 inches. The effective cation-exchange capacity is 50 percent or more saturated with exchangeable aluminum within 30 inches of the surface.

The A or Ap horizon has value of 3 to 5 and chroma of 1 to 3. Reaction ranges from strongly acid to slightly acid. This horizon is 2 to 5 inches thick.

The E horizon has value of 4 to 6 and chroma of 2 to 4. It is very fine sandy loam or silt loam. Reaction ranges from strongly acid to slightly acid. This horizon is 2 to 10 inches thick.

The Bt horizon has value of 4 to 6 and chroma of 3 to 6. It has few to many mottles in shades of red, brown, or gray. The texture is silt loam or silty clay loam. Reaction ranges from very strongly acid to medium acid.

The Btv horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 3. It is mottled in shades of gray, brown, or red. The texture is silt loam or silty clay loam. The content of plinthite ranges from 5 to 30 percent. Reaction ranges from very strongly acid to medium acid.

Some pedons have a C horizon. This horizon has colors in shades of red, brown, or gray. It is silt loam, silty clay loam, or silty clay.

Bienville Series

The Bienville series consists of somewhat excessively drained, moderately rapidly permeable soils that formed in sandy alluvial sediments of late Pleistocene age. These soils are on low terraces adjacent to the major streams. Slopes range from 1 to 3 percent.

Soils of the Bienville series are sandy, siliceous, thermic Psammentic Paleudalfs.

Bienville soils commonly are near Bonn, Cahaba, and Guyton soils. Bonn soils are lower on the landscape than the Bienville soils. They are fine-silty and have a natric horizon. Cahaba soils are at the higher elevations. They are fine-loamy. Guyton soils are on flats or in concave areas and drainageways. They are fine-silty.

Typical pedon of Bienville loamy fine sand, 1 to 3 percent slopes; about 3 miles southeast of Logansport, 1.75 miles south of the intersection of Louisiana State Highways 763 and 584, about 1.6 miles west on access road, 300 feet east of Toledo Bend Lake; in a pasture; SW¼SE¼ sec. 14, T. 11 N., R. 16 W.

Ap—0 to 7 inches; brown (10YR 4/3) loamy fine sand; weak fine granular structure; very friable; many fine and medium roots; medium acid; abrupt smooth boundary.

E—7 to 13 inches; pale brown (10YR 6/3) loamy fine sand; weak fine granular structure; very friable; many fine and medium roots; slightly acid; abrupt smooth boundary.

B/E—13 to 36 inches; yellowish brown (10YR 5/4) loamy fine sand (Bt); common coarse and medium distinct very pale brown (10YR 7/3) spots and streaks of uncoated fine sand (E); weak medium subangular blocky structure; very friable; common fine roots; spots and lamellae ¾ inch thick at depths of 13, 20, and 27 inches; sand grains bridged and coated with clay; slightly acid; clear wavy boundary.

Bt1—36 to 56 inches; pale brown (10YR 6/4) loamy fine sand; common spots and streaks of dark yellowish brown (10YR 4/4) material as much as 1 inch thick; weak medium subangular blocky structure; very friable; few streaks of uncoated sand; few sand grains bridged and coated with clay; slightly acid; clear wavy boundary.

Bt2—56 to 71 inches; brown (7.5YR 4/4) loamy fine sand that has common medium and coarse dark yellowish brown (10YR 4/4) spots enriched with finer textured material; pale brown (10YR 6/3) spots of uncoated sand grains; weak medium subangular blocky structure; very friable; medium acid.

The thickness of the solum ranges from 60 to 80 inches.

The A or Ap horizon has value of 4 or 5 and chroma of 2 to 4. Reaction ranges from strongly acid to slightly acid. This horizon is 4 to 12 inches thick.

The E horizon has hue of 10YR or 7.5YR, value of 4 to 7, and chroma of 3 or 4. The texture is fine sand or loamy fine sand. Reaction ranges from very strongly acid to slightly acid. This horizon is 10 to 30 inches thick.

The Bt part of the B/E horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. The E part has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 or 4. Both parts are very strongly acid to slightly acid.

The Bt horizon commonly has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 5 or 6 throughout. In some pedons, however, subhorizons of the Bt horizon have hue of 10YR or chroma of 4. In some pedons parts of this horizon consist of several lamellae. The upper 20 inches of the horizon is loamy fine sand or fine sand. The lower part is loamy fine sand, fine sand, or fine sandy loam. Reaction ranges from very strongly acid to slightly acid throughout the horizon.

Bonn Series

The Bonn series consists of poorly drained, very slowly permeable soils that have a high content of sodium throughout the subsoil. These soils formed in loamy alluvial sediments of Pleistocene age. They are on low terraces near the major drainageways. They are saturated in winter and spring and are subject to rare flooding. Slopes are dominantly less than 1 percent.

Soils of the Bonn series are fine-silty, mixed, thermic Glossic Natraqualfs.

Bonn soils commonly are near Cahaba and Guyton soils. Cahaba soils are higher on the landscape than the Bonn soils. They are fine-loamy. Guyton soils are in landscape positions similar to those of the Bonn soils. They do not have a natric horizon.

Typical pedon of Bonn silt loam; about 4.3 miles northeast of Stanley, 1.7 miles south on access road from its intersection with a parish road, 700 feet east on pipeline, 60 feet north of pipeline; SE¼NW¼ sec. 24, T. 12 N., R. 15 W.

A—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; weak medium granular structure; friable; common fine roots; common fine faint dark brown (10YR 4/3) stains around root channels; slightly acid; clear smooth boundary.

E—6 to 10 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct yellowish brown (10YR 5/6) and common medium faint grayish brown (10YR 5/2) mottles; massive; friable; few fine roots; few fine black concretions; strongly acid; clear irregular boundary.

E/B—10 to 15 inches; gray (10YR 5/1) silt loam (E); common medium distinct dark yellowish brown (10YR 4/4) mottles; weak coarse columnar structure; friable; about 30 percent of horizon is grayish brown (10YR 5/2) silty clay loam (Bt); few dark grayish clay lenses; medium acid; gradual wavy boundary.

B/E—15 to 25 inches; grayish brown (10YR 5/2) silty clay loam (Bt); common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; tongues of light brownish gray (10YR 6/2) silt loam (E) that are 1 to 2 inches wide and extend through the horizon; few dark grayish brown lenses of clay; mildly alkaline; gradual wavy boundary.

Btng—25 to 48 inches; grayish brown (10YR 5/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; few patchy clay films on vertical faces of peds; common black concretions; many pockets and tongues of light gray silty material from the E horizon; common dark gray bands of clay; moderately alkaline; clear wavy boundary.

BCg—48 to 60 inches; grayish brown (10YR 5/2) silt loam; few medium distinct yellowish brown (10YR 5/6) and few fine faint light brownish gray mottles; weak coarse subangular blocky structure; firm; common fine pores; few black concretions; few pockets of white crystals; moderately alkaline.

The thickness of the solum ranges from 40 to more than 60 inches. The exchangeable sodium saturation ranges from 15 to 50 percent in all horizons below a depth of 16 inches.

The A horizon has value of 2 to 5 and chroma of 1 to 3. Reaction ranges from very strongly acid to neutral. This horizon is 2 to 6 inches thick.

The E horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 to 7, and chroma of 1 or 2. It is silt loam or very fine sandy loam. Tongues of E material extend into the lower part of the horizon. Reaction ranges from very strongly acid to neutral. This horizon is 4 to 14 inches thick.

The upper part of the Bt horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 or 6, and chroma of 1 or 2. The lower part has the same color range as the upper part, or it has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 to 6. This horizon has few to many mottles in shades of yellow, brown, or gray. It is silt loam or silty clay loam throughout. The number of soft accumulations of carbonate ranges from none to common. Reaction ranges from medium acid to strongly alkaline.

The BCg horizon, if it occurs, has the same color and texture range as the Bt horizon. Reaction ranges from neutral to strongly alkaline.

Bowie Series

The Bowie series consists of moderately well drained, moderately slowly permeable soils that formed in loamy sediments of Pleistocene and Tertiary age. These soils are in the uplands. Slopes range from 1 to 5 percent.

Soils of the Bowie series are fine-loamy, siliceous, thermic Plinthic Paleudults.

Bowie soils commonly are near Beauregard, Eastwood, Kirvin, Metcalf, and Ruston soils. Beauregard and Metcalf soils are on the less convex slopes. They are fine-silty. Eastwood and Kirvin soils have a fine textured control section. Eastwood soils are at the slightly lower elevations. Kirvin soils are on side slopes and in landscape positions similar to those of the Bowie soils. Ruston soils are on ridgetops and side slopes that are generally more convex than those of the Bowie soils. They have a reddish subsoil.

Typical pedon of Bowie fine sandy loam, 1 to 5 percent slopes; about 3 miles east of Mansfield, 1.8 miles south of the intersection of Louisiana State Highway 522 and U.S. Highway 84, about 150 feet east of the road; NW½SE¼ sec. 18, T. 12 N., R. 12 W.

A—0 to 5 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine roots; few worm casts; strongly acid; clear smooth boundary.

E—5 to 11 inches; pale brown (10YR 6/3) fine sandy loam; very friable; many fine roots; common fine pores; few worm casts; strongly acid; clear irregular boundary.

Bt1—11 to 16 inches; yellowish brown (10YR 5/6) loam; about 10 percent, by volume, pale brown (10YR 6/3) fine sandy loam; weak medium subangular blocky structure; very friable; common fine and medium roots; common fine and medium pores; strongly acid; gradual wavy boundary.

Bt2—16 to 23 inches; yellowish brown (10YR 5/6) loam; few fine and medium distinct strong brown (7.5YR 5/6) and reddish yellow (5YR 6/8) mottles; weak medium subangular blocky structure; hard, friable; few fine and medium roots; common fine pores; thin patchy clay films on faces of peds and in pores; strongly acid; gradual wavy boundary.

Bt3—23 to 40 inches; yellowish brown (10YR 5/6) clay loam; common medium prominent red (2.5YR 4/8) and yellowish red (5YR 4/8) mottles; weak medium subangular blocky structure; very hard, friable; few fine and medium roots; common fine pores; thin continuous clay films on faces of peds; few fragments of ironstone; very strongly acid; diffuse wavy boundary.

Btv1—40 to 58 inches; yellowish brown (10YR 5/6) clay loam; about 15 percent red (2.5YR 4/8) mottles; ped surfaces with vertically oriented streaks and ped coatings of brownish gray (10YR 6/2); moderate coarse prismatic structure parting to weak medium subangular blocky; hard, friable; few fine roots in brownish gray parts of the horizon; thin discontinuous clay films on faces of peds; about 10 percent, by volume, of the matrix is brittle; about 15 percent of the volume is nodular plinthite; very strongly acid; gradual wavy boundary.

Btv2—58 to 70 inches; yellowish brown (10YR 5/6) clay loam; about 10 percent red (2.5YR 4/8) mottles; ped surfaces with vertically oriented streaks and ped coatings of brownish gray (10YR 6/2); moderate coarse prismatic structure parting to weak medium subangular blocky; hard, friable; thin discontinuous clay films on faces of peds; about 10 percent, by volume, of the matrix is brittle; about 15 percent of the volume is nodular plinthite; very strongly acid.

The solum is more than 60 inches thick. The depth to a horizon that contains 5 percent or more plinthite nodules ranges from 25 to 60 inches. Reaction ranges from very strongly acid to slightly acid in the A horizon and is very strongly acid or strongly acid in the Bt and Btv horizons. The effective cation-exchange capacity is 20 to 50 percent saturated with exchangeable aluminum within a depth of 30 inches.

The A horizon has value of 3 to 5 and chroma of 2 or 3. It is 2 to 8 inches thick.

The E horizon, if it occurs, has value of 5 to 7 and chroma of 2 to 4. It is 4 to 10 inches thick.

Some pedons have a thin transitional BE or BA horizon. This horizon has colors similar to those of the Bt horizon, or the colors are transitional between those of the A, E, and Bt horizons. The texture is fine sandy loam, loam, or sandy clay loam. Reaction is very strongly acid or strongly acid.

The Bt and Btv horizons have hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 8. They are loam, sandy clay loam, clay loam, or fine sandy loam. The content of plinthite nodules ranges from 5 to 30 percent. Mottles with chroma of 2 are common below a depth of 30 inches. The Btv horizon has vertical streaks of gray

(10YR 5/1, 6/1), light gray (10YR 7/1, 7/2), light brownish gray (10YR 6/2), or grayish brown (10YR 5/2) material. It is brittle in 10 to 40 percent of the horizontal cross section.

Buxin Series

The Buxin series consists of poorly drained, very slowly permeable soils that formed in clayey alluvium. These soils are in level or depressional areas on the alluvial plains along the Red River. They are subject to rare flooding. Slopes are less than 1 percent.

Soils of the Buxin series are fine, mixed, thermic Vertic Hapludolls.

Buxin soils commonly are near Armistead, Gallion, and Moreland soils. Armistead and Gallion soils are at the slightly higher elevations. They are fine-silty. Also, Gallion soils do not have a mollic epipedon. Moreland soils are in landscape positions similar to those of the Buxin soils. They are calcareous within a depth of 10 inches.

Typical pedon of Buxin clay; about 2.6 miles northeast of Evelyn, 3 miles north of the intersection of Louisiana State Highways 510 and 177, about 0.5 mile east on farm road, 0.3 mile north on farm road, 60 feet east of the road; NW¼NW¼ sec. 23, T. 12 N., R. 11 W.

Ap—0 to 6 inches; dark reddish brown (5YR 3/3) clay; strong medium subangular blocky structure; firm, very sticky and very plastic; many fine roots between peds; few dark brown (7.5YR 3/2) stains; neutral; clear smooth boundary.

Bw1—6 to 10 inches; dark reddish brown (5YR 3/3) clay; moderate medium angular blocky structure; firm, plastic; few fine roots; neutral; clear smooth boundary.

Bw2—10 to 22 inches; reddish brown (5YR 4/3) clay; moderate medium angular blocky structure; firm, plastic; few fine roots; mildly alkaline; abrupt smooth boundary.

Ab—22 to 30 inches; dark gray (10YR 4/1) clay; common medium distinct reddish brown (5YR 4/3) mottles; moderate medium subangular blocky structure; firm, plastic; mildly alkaline; clear smooth boundary.

Bb—30 to 44 inches; dark gray (10YR 4/1) clay; common medium distinct yellowish brown (10YR 5/6) and few fine prominent dark reddish brown (5YR 3/3) mottles; moderate fine angular blocky structure; firm, plastic; few fine roots; moderately alkaline; clear smooth boundary.

Cb—44 to 60 inches; yellowish red (5YR 4/6) clay; common medium prominent dark grayish brown (10YR 4/2) and few fine distinct brown (7.5YR 5/4) mottles; weak fine angular blocky structure; firm, plastic; few concretions of calcium carbonate; calcareous; moderately alkaline.

The thickness of the solum ranges from 30 to 60 inches. The depth to a buried horizon ranges from 20 to 36 inches. Some pedons are calcareous at a depth of 40 to 60 inches.

The Ap horizon has hue of 5YR, 7.5YR, or 2.5YR, value of 2 or 3, and chroma of 2 to 4. Reaction ranges from slightly acid to moderately alkaline. This horizon is 4 to 10 inches thick.

The part of the Bw horizon within a depth of 10 inches has the same range in color as the Ap horizon. Below a depth of 10 inches, it has hue of 5YR or 2.5YR, value of 3 or 4, and chroma of 2 to 4. The texture is clay or silty clay. Reaction ranges from slightly acid to mildly alkaline.

The Ab and Bb horizons have value of 3 or 4 and chroma of 1 or 2. They have mottles in shades of red or brown. The texture is clay or silty clay. Reaction ranges from slightly acid to moderately alkaline.

The Cb horizon has colors in shades of red, brown, or gray. It is clay, silty clay, or silty clay loam. Reaction ranges from neutral to moderately alkaline.

Cahaba Series

The Cahaba series consists of well drained, moderately permeable soils that formed in loamy alluvial sediments of Pleistocene age. These soils are on low terraces near the major streams. Slopes range from 1 to 3 percent.

Soils of the Cahaba series are fine-loamy, siliceous, thermic Typic Hapludults.

Cahaba soils commonly are near Bienville, Bonn, and Guyton soils. Bienville and Bonn soils are at the lower elevations. Bienville soils have a sandy control section. Bonn soils are grayish throughout and have a natric horizon. Guyton soils are in level areas and drainageways. They are fine-silty.

Typical pedon of Cahaba fine sandy loam, 1 to 3 percent slopes; about 1.4 miles south of Hunter on Louisiana State Highway 174, about 1.6 miles west of the intersection of an access road and Louisiana State Highway 174; SW¼SW¼ sec. 10, T. 10 N., R. 14 W.

A—0 to 6 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; medium acid; clear smooth boundary.

E—6 to 16 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; medium acid; clear smooth boundary.

Bt1—16 to 20 inches; yellowish red (5YR 5/6) loam; weak fine subangular blocky structure; friable; common fine roots; medium acid; clear smooth boundary.

Bt2—20 to 30 inches; red (2.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; common fine roots; few thin patchy clay films on faces of peds; medium acid; gradual wavy boundary.

Bt3—30 to 46 inches; red (2.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots; few thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

C—46 to 65 inches; yellowish red (5YR 5/6) sandy loam; massive; very friable; very strongly acid.

The thickness of the solum ranges from 36 to 60 inches. Reaction ranges from very strongly acid to medium acid throughout the profile.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is 4 to 8 inches thick.

The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 4 or hue of 7.5YR, value of 5, and chroma of 6 to 8. The texture is loamy sand, loamy fine sand, fine sandy loam, or loam. This horizon is 2 to 12 inches thick.

The Bt horizon has hue of 5YR, 2.5YR, or 10R, value of 4 or 5, and chroma of 6 to 8. The texture is sandy clay loam, loam, or clay loam.

Some pedons have a BC horizon. This horizon has hue of 7.5YR, 5YR, or 2.5YR, value of 4 or 5, and chroma of 6 to 8. The texture is sandy loam or fine sandy loam.

The C horizon has hue of 10YR, 7.5YR, 5YR, or 2.5YR, value of 4 or 5, and chroma of 4 to 8. The texture is loamy sand, sandy loam, or fine sandy loam.

Caspiana Series

The Caspiana series consists of well drained, moderately permeable soils that formed in loamy alluvium. These soils are on natural levees on the alluvial plains along the Red River. Slopes are less than 1 percent.

Soils of the Caspiana series are fine-silty, mixed, thermic Typic Argiudolls.

Caspiana soils commonly are near Armistead, Gallion, and Moreland soils. Armistead soils are at the slightly lower elevations. They are somewhat poorly drained. Gallion soils are in landscape positions similar to those of the Caspiana soils. They do not have a mollic epipedon. Moreland soils are in the lower landscape positions. They have a fine textured control section.

Typical pedon of Caspiana silt loam; about 1.25 miles northeast of Evelyn, 100 feet north of Louisiana State Highway 510, in a soybean field; SW¼SE¼ sec. 26, T. 12 N., R. 11 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; few fine roots; slightly acid; clear smooth boundary.

A—7 to 13 inches; dark brown (7.5YR 3/2) silt loam; weak fine granular structure; friable; few fine roots; slightly acid; clear smooth boundary.

BA—13 to 18 inches; dark brown (7.5YR 3/2) and reddish brown (5YR 4/4) silt loam; weak coarse subangular blocky structure; friable; few fine roots; neutral; gradual smooth boundary.

Bt1—18 to 26 inches; yellowish red (5YR 4/6) silty clay loam that has dark reddish brown (5YR 3/4) ped coatings; weak medium subangular blocky structure; firm; few fine roots; few fine pores; thin patchy clay films on vertical faces of peds; slightly acid; gradual smooth boundary.

Bt2—26 to 33 inches; yellowish red (5YR 5/6) silt loam; weak medium subangular blocky structure; friable; few fine roots; few fine pores; thin patchy clay films on vertical faces of some peds; few distinct dark brown stains; slightly acid; abrupt wavy boundary.

C—33 to 62 inches; yellowish red (5YR 5/6) very fine sandy loam; massive; friable; calcareous; mildly alkaline.

The thickness of the solum ranges from 30 to 60 inches. Reaction ranges from medium acid to moderately alkaline in the Ap, A, BA, and Bt horizons and from slightly acid to moderately alkaline in the C horizon. The thickness of the mollic epipedon ranges from 10 to 20 inches.

The Ap and A horizons have hue of 10YR, 7.5YR, or 5YR, value of 2 or 3, and chroma of 1 to 3. The texture is silt loam or silty clay loam. The combined thickness of these horizons ranges from 7 to 20 inches.

Where they are part of the mollic epipedon, the BA horizon and the upper part of the Bt horizon, to a depth of 10 to 20 inches, have the same range in color as the Ap and A horizons. The lower part of the Bt horizon, below the mollic epipedon, has hue of 7.5YR, 5YR, or 2.5YR, value of 4 or 5, and chroma of 3 to 6. The texture is silt loam or silty clay loam.

The C horizon has the same range in color as the lower part of the Bt horizon. The texture is very fine sandy loam, silt loam, loam, or silty clay loam. This horizon is noncalcareous in some pedons.

Eastwood Series

The Eastwood series consists of moderately well drained, very slowly permeable soils that formed in stratified, loamy and clayey sediments of Tertiary age. These soils are in the uplands. Slopes range from 1 to 12 percent.

Soils of the Eastwood series are fine, montmorillonitic, thermic Vertic Hapludalfs.

Eastwood soils commonly are near Bowie, Keithville, and Metcalf soils. Bowie and Keithville soils are on the higher ridgetops and side slopes, and Metcalf soils are on broad ridgetops. Bowie soils are fine-loamy, and Keithville and Metcalf soils are fine-silty.

Typical pedon of Eastwood fine sandy loam, 1 to 5 percent slopes; about 1.6 miles north of Keatchie, 1,320 feet west of Louisiana State Highway 789, about 100 feet west of electric power line; SW¼SE¼ sec. 9, T. 14 N., R. 15 W.

A—0 to 4 inches; grayish brown (10YR 4/2) fine sandy loam; few fine distinct dark brown (10YR 3/3) mottles; weak fine granular structure; friable; few fine roots; medium acid; clear smooth boundary.

Bt1—4 to 13 inches; red (2.5YR 4/6) silty clay; few fine faint yellowish brown mottles; moderate fine subangular blocky structure; firm, plastic; few fine roots; thin continuous clay films on vertical faces of peds; strongly acid; gradual wavy boundary.

Bt2—13 to 32 inches; red (2.5YR 4/6) clay; many medium distinct gray (10YR 6/1) and light brownish gray (10YR 6/2) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm, plastic; thin continuous clay films on vertical faces of peds; very strongly acid; gradual smooth boundary.

Bt3—32 to 46 inches; yellowish brown (10YR 5/6) clay; few fine distinct gray (10YR 5/1) and few fine prominent red (2.5YR 4/6) mottles; weak coarse subangular blocky structure; firm; thin discontinuous clay films on vertical faces of peds; very strongly acid; gradual smooth boundary.

BC—46 to 52 inches; stratified light olive gray (5Y 6/2) and yellowish brown (10YR 5/6) clay loam; few fine prominent red (2.5YR 4/6) mottles; weak medium subangular blocky structure parting to weak medium platy; firm; very strongly acid; gradual smooth boundary.

C—52 to 60 inches; stratified light olive gray (5Y 6/2) clay loam and yellowish brown (10YR 5/6) sandy clay loam; appears massive but has common bedding planes; firm; common thin accumulations of gypsum; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The effective cation-exchange capacity is 50 percent or more saturated with exchangeable aluminum within a depth of 30 inches.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. Reaction ranges from very strongly acid to medium acid. This horizon is 2 to 6 inches thick.

Some pedons have a thin E horizon. This horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 to 6. The texture is fine sandy loam, very fine sandy loam, or loam. Reaction ranges from very strongly acid to medium acid unless lime has been applied.

The upper part of the Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 6 to 8. The Bt1 horizon is not mottled or has common mottles in shades of brown or gray. The Bt2 horizon has few to many mottles in shades of brown or gray. The Bt1 and Bt2 horizons are clay or silty clay. Reaction ranges from extremely acid to strongly acid.

The lower part of the Bt horizon has matrix colors in shades of red, brown, or gray. It has few to many mottles of these colors and in shades of yellow. Some subhorizons have a mottled and multicolored matrix. The texture is clay, silty clay, silty clay loam, or clay loam. Reaction ranges from extremely acid to medium acid.

The BC horizon has matrix colors in shades of brown or gray. It has mottles of these colors and may have reddish or yellowish mottles. The texture is sandy clay loam, loam, clay loam, or silty clay loam. Reaction ranges from extremely acid to slightly acid.

The C horizon has dominant colors in shades of brown or gray. It has mottles or thin strata of these colors and may have yellowish mottles. The texture ranges from fine sandy loam to shaly silty clay loam. Reaction ranges from very strongly acid to neutral.

Elysian Series

The Elysian series consists of moderately well drained, moderately permeable soils that formed in loamy alluvial sediments of Pleistocene age. These soils are on low terraces near the Sabine River and its tributaries. Slopes range from 1 to 5 percent.

Soils of the Elysian series are coarse-loamy, siliceous, thermic Haplic Glossudalfs.

Elysian soils commonly are near Bienville, Bonn, Cahaba, and Guyton soils. Bienville soils are in landscape positions similar to those of the Elysian soils. They have a sandy control section. Bonn soils are lower on the landscape than the Elysian soils. They have a natric horizon. Cahaba soils are at the higher elevations. They are fine-loamy. Guyton soils are on flats, in depressions, and along drainageways. They are fine-silty.

Typical pedon of Elysian fine sandy loam, in an area of Elysian-Guyton complex, gently undulating; about 0.9 mile south of Hunter, on Louisiana State Highway 191, about 1.1 miles west on timber company road, 0.5 mile south of company road on fire lane, 100 feet east of fire lane; SW¼SE¼ sec. 7, T. 10 N., R. 14 W.

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

Bw—3 to 25 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable; few fine roots; strongly acid; gradual wavy boundary.

B/E1—25 to 38 inches; strong brown (7.5YR 5/6) loam (Bt); weak medium subangular blocky structure; friable; common tongues of pale brown (10YR 6/3) fine sandy loam (E); few fine roots; common medium pockets of yellowish brown (10YR 5/4) fine sandy loam; strongly acid; gradual wavy boundary.

B/E2—38 to 52 inches; yellowish brown (10YR 5/4) loam (Bt); weak medium subangular blocky structure; friable; common interfingering of light gray (10YR 6/1) and light brownish gray (10YR 6/2) fine sandy loam (E); common medium prominent strong brown (7.5YR 5/6) peds that are slightly firm and slightly brittle when moist; strongly acid; gradual wavy boundary.

B/E3—52 to 65 inches; yellowish brown (10YR 5/6) loam (Bt); weak medium subangular blocky structure; firm; common interfingering of gray (10YR 6/1) fine sandy loam (E); few medium yellowish red (5YR 5/6) and strong brown (7.5YR 5/6) peds that are firm and slightly brittle when moist; very strongly acid.

The solum is more than 60 inches thick. The effective cation-exchange capacity is 50 percent or more saturated with exchangeable aluminum within 30 inches of the surface.

The A horizon has hue of 2.5Y, 10YR, or 7.5YR, value of 4 to 6, and chroma of 2 to 4. Reaction ranges from very strongly acid to slightly acid. This horizon is 2 to 6 inches thick.

The Bw horizon has hue of 10YR, 2.5Y, or 7.5YR, value of 4 to 6, and chroma of 3 to 6. The texture is fine sandy loam or very fine sandy loam. Reaction ranges from very strongly acid to slightly acid.

The Bt part of the B/E horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It has few or common mottles in shades of brown or red. Some of the Bt material consists of strong brown or yellowish red mottles or peds that are brittle when moist and dry. The texture is loam or sandy loam. The E part of the B/E horizon is less clayey than the Bt part. It occurs as tongues in the upper part of the horizon and as interfingers or tongues in the lower part. It has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. The B/E horizon is very strongly acid to medium acid throughout.

Flo Series

The Flo series consists of somewhat excessively drained, rapidly permeable soils that formed in sandy sediments of Tertiary age. These soils are in the uplands, mainly in the eastern part of the parish. Slopes range from 1 to 12 percent.

Soils of the Flo series are sandy, siliceous, thermic Psammentic Paleudalfs.

Flo soils commonly are near Kirvin and Larue soils. The nearby soils are in landscape positions similar to those of the Flo soils. Kirvin soils have a fine textured control section. Larue soils have a subsoil of sandy loam or sandy clay loam within a depth of 40 inches.

Typical pedon of Flo loamy fine sand, 1 to 5 percent slopes; about 5.6 miles northeast of Oxford along parish road, 900 feet west of hard-surface road; SW¼NE¼ sec. 1, T. 11 N., R. 12 W.

A—0 to 6 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak fine granular structure; very friable; many fine and medium roots; slightly acid; clear wavy boundary.

E—6 to 26 inches; brown (7.5YR 5/4) loamy fine sand; weak fine granular structure; very friable; many fine and medium roots; slightly acid; clear wavy boundary.

Bw—26 to 39 inches; brown (7.5YR 5/4) loamy fine sand; weak medium granular structure; friable; many fine and medium roots; common streaks of uncoated sand; few spots and streaks of yellowish red loamy fine sand; medium acid; gradual wavy boundary.

Bt—39 to 65 inches; strong brown (7.5YR 5/6) loamy fine sand; moderate medium granular structure; friable; few streaks and pockets of yellowish brown (10YR 5/4) material; many fine and medium roots; sand grains coated with oxides and clay; medium acid.

The solum is 60 or more inches thick. At the critical depth for classifying at the order level, base saturation is 35 to 75 percent.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 6. Reaction ranges from very strongly acid to slightly acid. This horizon is 4 to 20 inches thick.

The E horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 to 4. It is loamy fine sand or fine sand. Reaction ranges from very strongly acid to slightly acid. This horizon is 11 to 40 inches thick.

The Bw horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. It has few or common pockets and streaks of uncoated sand. Reaction ranges from very strongly acid to medium acid.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 3 to 8. In some pedons it has mottles in shades of yellow, brown, or red. Reaction ranges from very strongly acid to medium acid. This horizon is underlain by an E&B horizon in some pedons.

Forbing Series

The Forbing series consists of moderately well drained, very slowly permeable soils that formed in clayey sediments of Pleistocene age. These soils are in the uplands, mainly near large lakes. Slopes range from 1 to 8 percent.

Soils of the Forbing series are very fine, montmorillonitic, thermic Vertic Paleudalfs.

Forbing soils commonly are near Gore, Kolin, and Wrightsville soils. Gore soils are in positions on ridgetops similar to those of the Forbing soils. They are grayish in the lower part of the subsoil. Kolin soils are on ridgetops. They are fine-silty. Wrightsville soils are on broad flats. They are grayish throughout.

Typical pedon of Forbing silt loam, 3 to 8 percent slopes; 6 miles northeast of Carmel, 0.3 mile east of Clear Lake bridge; 2.2 miles northeast on local road, 90 feet east of the road on north side of drain; NE¼NW¼ sec. 35, T. 14 N., R. 12 W.

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

A—3 to 5 inches; brown (10YR 4/3) silt loam; weak medium granular structure; friable; many fine and medium roots; many fine pores; few worm casts; medium acid; clear wavy boundary.

Bt1—5 to 14 inches; yellowish red (5YR 4/6) clay; common medium prominent brown (7.5YR 5/4) mottles; weak medium subangular blocky structure; firm; common fine roots; few shiny pressure faces; strongly acid; clear wavy boundary.

Bt2—14 to 26 inches; yellowish red (5YR 4/6) clay; weak medium subangular blocky structure; firm; common fine roots; common black stains; common fine soft black accumulations; few shiny pressure faces; slightly acid; gradual wavy boundary.

Bt3—26 to 36 inches; red (2.5YR 4/6) clay; weak medium subangular blocky structure; firm; few fine roots; common black stains; few fine concretions of calcium carbonate; moderately alkaline; few shiny pressure faces; strong effervescence; gradual wavy boundary.

Bt4—36 to 70 inches; dark red (2.5YR 3/6) clay; weak medium subangular blocky structure; firm; few fine roots; many black stains; many fine and medium concretions of calcium carbonate; common soft masses of calcium carbonate; few gleyed spots around old roots in the lower part; common slickensides; moderately alkaline; strong effervescence.

The thickness of the solum ranges from 60 to 80 inches.

The Ap and A horizons have hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4. Reaction ranges from strongly acid to slightly acid. The combined thickness of these horizons ranges from 4 to 8 inches. Some pedons in undisturbed areas have a thin E horizon.

The Bt horizon has hue of 5YR or 2.5YR, value of 3 to 5, and chroma of 4 to 6. In some pedons it has few or common brownish mottles. Concretions and masses of calcium carbonate 2 to 20 millimeters in diameter make up 1 to 5 percent of the lower part of this horizon in some pedons. Reaction ranges from strongly acid to neutral in the upper part of the horizon and from neutral to moderately alkaline in the lower part.

Some pedons have a BC horizon. This horizon has hue of 5YR or 2.5YR, value of 3 or 4, and chroma of 4 to 6. Grayish mottles are common. The texture is clay or silty clay. Reaction is mildly alkaline or moderately alkaline.

Gallion Series

The Gallion series consists of well drained, moderately permeable soils that formed in loamy alluvium. These soils are on natural levees on the alluvial plains along the Red River. Slopes are less than 1 percent.

Soils of the Gallion series are fine-silty, mixed, thermic Typic Hapludalfs.

Gallion soils commonly are near Armistead, Caspiana, and Moreland soils. Armistead and Caspiana soils are slightly lower on the landscape than the Gallion soils. They have a mollic epipedon. Also, Armistead soils are clayey in the upper part. Moreland soils are in the lower landscape positions. They are clayey throughout.

Typical pedon of Gallion silt loam; about 2 miles south of Evelyn, 0.7 mile east of Louisiana State Highway 177, about 150 feet south of access road, 200 feet west of Dolet Bayou; SE¼NE¼ sec. 12, T. 11 N., R. 11 W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine pores; many fine and few medium roots; strongly acid; abrupt smooth boundary.

Bt1—7 to 19 inches; yellowish red (5YR 4/6) silty clay loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; many fine pores; few fine roots; dark brown (7.5YR 3/2) material in root channels and worm casts; thin discontinuous clay films on vertical faces of peds; medium acid; gradual smooth boundary.

Bt2—19 to 31 inches; yellowish red (5YR 4/6) silt loam; weak coarse prismatic structure; friable; thin discontinuous clay films on vertical faces of peds; few fine roots; few fine pores; few dark brown (7.5YR 3/2) specks; slightly acid; gradual smooth boundary.

BC—31 to 44 inches; yellowish red (5YR 4/6) silt loam; weak medium subangular blocky structure; friable; few fine pores; few fine roots; medium acid; gradual smooth boundary.

C—44 to 66 inches; dark reddish brown (5YR 3/4) silty clay loam and yellowish red (5YR 5/6) silt loam; 2- to 3-inch strata of very fine sandy loam; massive; friable; medium acid.

The thickness of the solum ranges from 40 to 60 inches.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. The texture is silt loam or silty clay loam. Reaction ranges from strongly acid to neutral. This horizon is 4 to 10 inches thick.

The Bt horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam, silty clay loam, or clay loam. Reaction ranges from medium acid to mildly alkaline.

The BC horizon has the same range in color as the Bt horizon. The texture is very fine sandy loam, loam, silt loam, clay loam, or silty clay loam. The number of soft accumulations of carbonate ranges from none to common. Reaction ranges from medium acid to moderately alkaline.

The C horizon has the same range in color and texture as the Bt horizon. The number of soft accumulations of carbonate ranges from none to common. Reaction ranges from medium acid to moderately alkaline.

Gore Series

The Gore series consists of moderately well drained, very slowly permeable soils that formed in alluvial sediments of Pleistocene age. These soils are in the uplands, mainly near the major lakes in the parish. Slopes range from 1 to 5 percent.

Soils of the Gore series are fine, mixed, thermic Vertic Paleudalfs.

Gore soils commonly are near Forbing, Kolin, and Wrightsville soils. Forbing soils are on ridgetops and side slopes. They have a very fine textured control section. Kolin soils are on the higher ridgetops and side slopes. They are fine-silty. Wrightsville soils are on broad flats. They are grayish throughout.

Typical pedon of Gore silt loam, 1 to 5 percent slopes; 6 miles northeast of Carmel, 0.3 mile east of Clear Lake bridge, 1.5 miles north on access road, 130 feet east of the road; NW¼SW¼ sec. 35, T. 13 N., R. 12 W.

A—0 to 4 inches; dark brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; many fine and medium roots; medium acid; clear smooth boundary.

Bt1—4 to 11 inches; yellowish red (5YR 5/6) silty clay; few fine distinct pale brown (10YR 6/3) mottles; moderate fine and medium subangular blocky structure; few fine roots; few fine pores; thin patchy clay films on vertical faces of peds; strongly acid; clear wavy boundary.

Bt2—11 to 20 inches; yellowish red (5YR 5/6) clay; few fine and medium prominent light brownish gray (10YR 6/2) and few medium distinct red (2.5YR 4/6) mottles that increase in number and size with increasing depth; moderate medium subangular blocky structure; firm; few fine roots; few fine pores; thin patchy clay films on faces of all peds; very strongly acid; gradual wavy boundary.

Bt3—20 to 35 inches; light brownish gray (10YR 6/2) clay; many medium prominent dark red (2.5YR 3/6) and few medium and fine prominent red (10R 4/6) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; thin patchy clay films on vertical faces of peds; very strongly acid; gradual wavy boundary.

BC1—35 to 49 inches; gray (10YR 6/1) and light brownish gray (2.5YR 6/2) clay; many medium prominent red (2.5YR 4/6) and strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; very strongly acid; gradual wavy boundary.

BC2—49 to 55 inches; yellowish red (5YR 4/6) clay; common medium and coarse prominent light brownish gray (10YR 6/2) mottles; weak medium and fine subangular blocky structure; firm; very strongly acid; gradual wavy boundary.

C—55 to 65 inches; reddish brown (2.5YR 4/4) clay; few medium prominent light brownish gray (10YR 6/2) mottles; massive; firm; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The effective cation-exchange capacity is 50 percent or more saturated with exchangeable aluminum within a depth of 30 inches.

The A horizon has value of 3 to 5 and chroma of 1 to 3. Reaction ranges from very strongly acid to medium acid. This horizon is 2 to 4 inches thick.

The upper part of the Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 to 6. The lower part has the same range in color as the upper part, or it has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. It has few to many mottles in shades of red, brown, or gray. The Bt horizon is clay or silty clay. It is very strongly acid to neutral.

The upper part of the BC horizon typically has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. In some pedons, however, it has colors similar to those of the upper part of the Bt horizon. The texture of the upper part of the BC horizon is clay or silty clay. Reaction ranges from very strongly acid to neutral.

The lower part of the BC horizon and the C horizon have hue of 2.5YR or 5YR and value and chroma of 4 to 6. The number of nodules of carbonate as large as 20 millimeters in diameter ranges from none to common. Reaction ranges from medium acid to moderately alkaline.

Guyton Series

The Guyton series consists of poorly drained, slowly permeable soils that formed in alluvial sediments of Pleistocene age. These soils are on broad flats on low stream terraces and in the uplands. They also are on bottom land. They are subject to rare or frequent flooding. Slopes are mainly less than 1 percent.

Soils of the Guyton series are fine-silty, siliceous, thermic Typic Glossaqualfs.

Guyton soils commonly are near Beauregard, Bonn, Elysian, Iuka, Ochlockonee, and Wrightsville soils. Beauregard soils are in the higher areas on uplands. They contain more than 5 percent plinthite in the subsoil. Bonn, Elysian, and Wrightsville soils are in positions on stream terraces similar to those of the Guyton soils. Bonn soils have a natric horizon. Elysian soils are coarse-loamy. Wrightsville soils have a fine textured particle-size control section. Iuka and Ochlockonee soils are in the higher areas on bottom land. They are coarse-loamy.

Typical pedon of Guyton silt loam, in an area of Guyton and Iuka soils, frequently flooded; about 2.5 miles east of Benson, 2.5 miles east of the intersection of U.S. Highway 171 and Louisiana State Highway 512; 210 feet north of Louisiana State Highway 512; SE¼SW¼ sec. 1, T. 10 N., R. 13 W.

A—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many fine concretions of iron and manganese; few fine roots; common fine brown (10YR 4/3) stains; strongly acid; clear smooth boundary.

Eg1—8 to 14 inches; light brownish gray (10YR 6/2) silt loam; weak medium subangular blocky structure; friable; few fine roots; many fine and medium concretions of iron and manganese; strongly acid; gradual wavy boundary.

Eg2—14 to 29 inches; light brownish gray (10YR 6/2) silt loam; few medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; many fine and medium concretions of iron and manganese; strongly acid; clear irregular boundary.

B/E—29 to 38 inches; grayish brown (10YR 5/2) clay loam (Bt); few medium distinct yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; friable; thin discontinuous clay films on vertical faces of peds; tongues of light brownish gray (10YR 6/2) silt loam (E) about 10 millimeters wide; strongly acid; clear wavy boundary.

Btg1—38 to 44 inches; grayish brown (10YR 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; thin patchy clay films on vertical faces of peds; medium acid; gradual smooth boundary.

Btg2—44 to 65 inches; light brownish gray (2.5Y 6/2) silty clay loam; few medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; thin patchy clay films on vertical faces of peds; oxidation stains between faces of peds; medium acid.

The thickness of the solum ranges from 50 to 80 inches. The effective cation-exchange capacity is 50 percent or more saturated with exchangeable aluminum within 30 inches of the surface.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or 3. Reaction ranges from extremely acid to medium acid. This horizon is 3 to 8 inches thick.

The Eg horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 or 2. It has few to many mottles in shades of brown. This horizon is silt loam, loam, or very fine sandy loam. It is extremely acid to medium acid. It is 12 to 25 inches thick. Tongues of Eg material extend into the Bt horizon.

The Bt part of the B/E horizon and the Btg horizon have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. The texture is silt loam, silty clay loam, or clay loam. The E part of the B/E horizon has the same range in color and texture as the Eg horizon. The B/E and Btg horizons have few to many strong brown or yellowish brown mottles. They are extremely acid to medium acid.

Some pedons have a BC or Cg horizon. These horizons have the same color range as the Bt horizon. The texture is silt loam, silty clay loam, clay loam, or sandy clay loam. Reaction ranges from strongly acid to moderately alkaline.

Iuka Series

The Iuka series consists of moderately well drained, moderately permeable soils that formed in stratified, loamy and sandy alluvium. These soils are on bottom land. They are frequently flooded. Slopes are dominantly less than 1 percent.

Soils of the Iuka series are coarse-loamy, siliceous, acid, thermic Aquic Udifluvents.

Iuka soils commonly are near Guyton and Ochlockonee soils. Guyton soils are in the lower landscape positions. They are grayish throughout and are fine-silty. Ochlockonee soils are slightly higher on the landscape than the Iuka soils. They do not have mottles with chroma of 2 or less within 20 inches of the surface.

Typical pedon of Iuka fine sandy loam, in an area of Guyton and Iuka soils, frequently flooded; 2.2 miles northeast of Logansport, 1.2 miles north of Louisiana State Highway 5, about 1.4 miles north on Nash Road, 0.7 mile south on access road, 10 feet east of pipeline; SW¼SW¼NE¼ sec. 25, T. 12 N., R. 16 W.

A1—0 to 6 inches; dark brown (10YR 4/3) fine sandy loam; common medium distinct grayish brown (10YR 5/2) mottles; weak medium granular structure; very friable; strongly acid; clear smooth boundary.

A2—6 to 14 inches; dark yellowish brown (10YR 4/4) loamy sand; common medium distinct brown (10YR 5/3) mottles; single grained; very friable; strongly acid; gradual smooth boundary.

C1—14 to 24 inches; yellowish brown (10YR 5/4) loam; common medium faint brown (10YR 5/3) and few fine faint grayish brown mottles; massive; very friable; strongly acid; clear smooth boundary.

C2—24 to 42 inches; yellowish brown (10YR 5/4) and gray (10YR 5/1) loamy sand; massive; loose; few brown concretions; very strongly acid; clear smooth boundary.

C3—42 to 60 inches; pale brown (10YR 6/3) loamy sand; common medium distinct light gray (10YR 7/2) and yellowish brown (10YR 5/4) mottles; massive; very friable; very strongly acid.

Reaction is strongly acid or very strongly acid throughout the profile. Thin bedding planes of contrasting textures are common in most pedons.

The A horizon commonly has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 or 4. In some pedons, however, it has hue of 10YR or 7.5YR, value of 4, and chroma of 2. It has no mottles or has common mottles in shades of brown. This horizon is 5 to 16 inches thick.

The C1 horizon has hue of 10YR, 7.5YR, or 2.5Y, value of 4 to 6, and chroma of 3 to 6 or hue of 10YR or 7.5YR, value of 4, and chroma of 2. Mottles with chroma of 2 or less are within 20 inches of the surface. The texture is sandy loam, fine sandy loam, loam, or silt loam.

The C2 horizon has colors similar to those of the C1 horizon, is mottled in shades of gray, brown, or red, or is dominantly gray and has many brown, red, or yellow mottles. The texture is sandy loam, fine sandy loam, loam, silt loam, or loamy sand.

Keithville Series

The Keithville series consists of moderately well drained, very slowly permeable soils that formed in loamy sediments of Pleistocene age over clayey sediments of Tertiary age. These soils are in the uplands. Slopes range from 2 to 5 percent.

Soils of the Keithville series are fine-silty, siliceous, thermic Glossaquic Paleudalfs.

Keithville soils commonly are near Eastwood and Metcalf soils. Eastwood soils generally are in landscape positions similar to those of the Keithville soils, but they also are on strongly sloping side slopes. They have a fine textured control section. Metcalf soils are on the slightly less convex slopes. They have tongues of albic material in the Bt horizon.

Typical pedon of Keithville very fine sandy loam, 2 to 5 percent slopes; 3 miles south of Kickapoo, 0.4 mile west on Mustang Drive, 190 feet southeast of the intersection of Lariat Lane and Mustang Drive;

NW¼NW¼ sec. 6, T. 13 N., R. 14 W.

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

E—4 to 11 inches; yellowish brown (10YR 5/4) very fine sandy loam; weak fine granular structure; friable; common fine roots; many fine pores; few fine brown concretions; strongly acid; clear wavy boundary.

Bt1—11 to 17 inches; strong brown (7.5YR 5/6) loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; thin patchy clay films on vertical faces of peds; few fine brown concretions; strongly acid; clear wavy boundary.

Bt2—17 to 24 inches; strong brown (7.5YR 5/6) loam; common medium distinct red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; thin patchy clay films on vertical faces of peds; few fine brown concretions; strongly acid; clear wavy boundary.

Bt3—24 to 34 inches; strong brown (7.5YR 5/6) clay loam; many medium distinct red (2.5YR 4/8) and few medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; common fine pores; thin patchy clay films on vertical faces of peds; few fine brown concretions; very strongly acid; gradual wavy boundary.

B/E—34 to 39 inches; strong brown (7.5YR 5/6) clay loam (Bt); few medium distinct light brownish gray (10YR 6/2) mottles; weak medium angular and subangular blocky structure; friable; few fine roots; pockets and ped coatings of light gray (10YR 7/1) silt loam (E) make up about 8 percent of the horizon; very strongly acid; clear smooth boundary.

2Bt—39 to 55 inches; red (2.5YR 4/6) and light brownish gray (10YR 6/2) clay; weak coarse prismatic structure; very firm; few strong brown pressure faces and weakly defined slickensides; very strongly acid; clear wavy boundary.

2BC—55 to 75 inches; light brownish gray (2.5Y 6/2) silty clay; common medium distinct yellowish brown (10YR 5/6) and common medium prominent dark brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; firm; few disks of plinthite about 3 millimeters thick and 3 to 10 centimeters in diameter at the upper boundary; very strongly acid.

The thickness of the solum ranges from 60 to 100 inches. Depth to the clayey 2Bt horizon ranges from 30 to 40 inches. Reaction ranges from extremely acid to medium acid throughout the solum. The effective cation-exchange capacity is 50 percent or more saturated with exchangeable aluminum within a depth of 30 inches.

The A horizon has value of 3 to 6 and chroma of 2 to 4. It is 2 to 7 inches thick.

The E horizon, if it occurs, has value of 5 or 6 and chroma of 2 or 3. The texture is silt loam, very fine sandy loam, or loam. This horizon typically is 2 to 9 inches thick.

The Bt horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 6 to 8 or hue of 10YR, value of 5 or 6, and chroma of 6 to 8. The texture is loam, silt loam, clay loam, or silty clay loam. The total content of sand, which is dominantly very fine sand, ranges from 25 to 40 percent.

The Bt part of the B/E horizon has hue of 2.5YR, 5YR, 7.5YR, or 10YR, value of 3 to 6, and chroma of 3 to 6. The texture is silt loam, loam, silty clay loam, or clay loam. The E part of the B/E horizon is grayish silt, silt loam, or very fine sand.

The 2Bt and 2BC horizons are mottled in shades of gray, red, or brown. The texture is clay loam, silty clay, or clay.

Kirvin Series

The Kirvin series consists of well drained, moderately slowly permeable soils that formed in loamy and clayey sediments of Tertiary age. These soils are in the uplands. Slopes range from 1 to 12 percent.

Soils of the Kirvin series are clayey, mixed, thermic Typic Hapludults.

Kirvin soils commonly are near Bowie, Mahan, and Ruston soils. Bowie soils are on the less convex slopes. They are fine-loamy. Mahan and Ruston soils are in landscape positions similar to those of the Kirvin soils. Ruston soils are fine-loamy. Mahan soils have kaolinitic clay mineralogy.

Typical pedon of Kirvin fine sandy loam, 1 to 5 percent slopes; 2.5 miles east of Oxford, 0.2 mile north of the intersection of Louisiana State Highways 175 and 346, about 150 feet east of Highway 175; SW¼NW¼ sec. 15, T. 11 N., R. 12 W.

Ap—0 to 6 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; few ironstone pebbles; strongly acid; clear wavy boundary.

E—6 to 13 inches; pale brown (10YR 6/3) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; few ironstone pebbles; strongly acid; clear wavy boundary.

Bt1—13 to 21 inches; red (2.5YR 4/8) clay; few fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; common fine roots; thick continuous clay films on faces of peds; few ironstone pebbles; strongly acid; clear wavy boundary.

Bt2—21 to 37 inches; red (2.5YR 4/8) clay; many fine distinct strong brown (7.5YR 5/6) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; common fine roots; thin continuous clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt3—37 to 50 inches; red (2.5YR 4/8) clay loam; common medium distinct yellowish brown (10YR 5/6) and few medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

C—50 to 65 inches; yellowish red (5YR 5/6) clay loam; many fine distinct strong brown (7.5YR 5/6) and few fine distinct light gray (10YR 6/1) mottles; appears massive but has common bedding planes; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The number of fine or medium ironstone fragments ranges from none to common throughout the profile. The effective cation-exchange capacity is 50 percent or more saturated with exchangeable aluminum within 30 inches of the surface.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. Reaction ranges from strongly acid to neutral. This horizon is 3 to 8 inches thick.

The E horizon has hue of 10YR, 7.5YR, or 5YR, value of 5 or 6, and chroma of 2 to 4. The texture is fine sandy loam or very fine sandy loam. Reaction ranges from strongly acid to neutral. This horizon is 2 to 10 inches thick.

The Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 to 8. The number of yellowish or brownish mottles ranges from none to common. The number of grayish mottles ranges from none to common in the lower part of the horizon. The texture is clay, clay loam, or sandy clay. The content of clay in the upper 20

Some pedons have a BC horizon. This horizon has reddish colors similar to those of the Bt horizon, or it is yellowish or brownish. It has few or common grayish mottles. The texture is sandy clay loam, clay loam, or clay. Reaction is extremely acid or very strongly acid.

The C horizon has colors in shades of brown, red, or gray. It is massive or stratified. It is sandy loam, sandy clay loam, clay loam, weakly cemented sandstone, or shaly soil material. Reaction is extremely acid or very strongly acid.

Kolin Series

The Kolin series consists of moderately well drained, very slowly permeable soils that formed in silty sediments over clayey sediments of Pleistocene age. These soils are on the tops of ridges in the uplands. Slopes range from 1 to 5 percent.

Soils of the Kolin series are fine-silty, siliceous, thermic Glossaquic Paleudalfs.

Kolin soils commonly are near Gore and Wrightsville soils. Gore soils are on side slopes and ridgetops. They have a fine textured control section. Wrightsville soils are on broad flats. They are grayish throughout.

Typical pedon of Kolin silt loam, 1 to 5 percent slopes; about 2.6 miles east of Frierson, 2.8 miles east on Gravel Point Road, 55 yards south of the road; SE¼SE¼ sec. 36, T. 15 N., R. 13 W.

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

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

Bt1—10 to 14 inches; reddish yellow (7.5YR 6/6) silt loam; few fine faint strong brown mottles; weak medium subangular blocky structure; friable; few fine and medium roots; few fine pores; thin patchy clay films on vertical faces of peds; strongly acid; clear wavy boundary.

Bt2—14 to 20 inches; strong brown (7.5YR 5/6) silt loam; common medium distinct yellowish red (5YR 5/8) mottles; friable; few fine and medium roots; few fine pores; thin patchy clay films on faces of peds; strongly acid; clear wavy boundary.

Bt3—20 to 27 inches; yellowish brown (10YR 5/6) silty clay loam; common fine distinct yellowish red (5YR 5/8) and strong brown (7.5YR 5/6) mottles; pale brown (10YR 6/3) material around root channels; moderate medium subangular blocky structure; firm; fe cid to strongly acid.
strongly acid; clear wavy boundary.

B/E—27 to 38 inches; yellowish brown (10YR 5/6) silty clay loam (Bt); light brownish gray (10YR 6/2) coatings of silt 2 to 10 millimeters thick surround peds (E) and make up about 15 percent of the horizon; common fine prominent yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; few fine pores; thin patchy clay films on faces of peds; many fine and medium brown concretions; strongly acid; clear irregular boundary.

2Bt1—38 to 63 inches; red (2.5YR 4/8) and strong brown (7.5YR 5/6) silty clay; common medium distinct gray (10YR 6/1) mottles; strong medium subangular blocky structure; very firm; thin continuous clay films on vertical and horizontal faces of peds; medium acid; gradual wavy boundary.

2Bt2—63 to 85 inches; red (2.5YR 5/6) clay; few fine distinct light gray (10YR 6/1) and light yellowish brown (10YR 6/4) mottles; weak coarse angular blocky structure; firm; black stains on some peds; thin patchy clay films on vertical faces of peds; slightly acid.

The thickness of the solum ranges from 60 to 100 inches. Depth to the clayey 2Bt horizon ranges from 20 to 40 inches. The effective cation-exchange capacity is 50 percent or more saturated with exchangeable aluminum within 30 inches of the surface.

The A horizon has value of 3 or 4 and chroma of 1 to 3. Reaction ranges from strongly acid to slightly acid. This horizon is 3 to 7 inches thick.

The E horizon, if it occurs, has value of 5 or 6 and chroma of 1 to 3. Reaction ranges from strongly acid to slightly acid. Typically, this horizon is 2 to 6 inches thick.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 8. The texture is silty clay loam or silt loam. The content of clay is 20 to 35 percent. Reaction ranges from very strongly acid to medium acid.

The 2Bt horizon has hue of 7.5YR, 5YR, or 2.5YR, value of 4 or 5, and chroma of 6 to 8. It has few to many mottles in shades of gray. The mottles are fine to coarse. The texture is clay or silty clay. Reaction ranges from very strongly acid to slightly acid.

Larue Series

The Larue series consists of well drained, moderately permeable soils that formed in sandy and loamy sediments of Tertiary age. These soils are on ridgetops and side slopes in the uplands. Slopes range from 1 to 12 percent.

Soils of the Larue series are loamy, siliceous, thermic Arenic Paleudalfs.

Larue soils commonly are near Bowie, Flo, Kirvin, and Ruston soils. All of the nearby soils are in landscape positions similar to those of the Larue soils. Bowie, Kirvin, and Ruston soils do not have a thick surface layer and subsurface layer of sandy material. Flo soils are sandy throughout.

Typical pedon of Larue loamy fine sand, 1 to 5 percent slopes; about 3 miles east of Stanley, 0.6 mile south of U.S. Highway 84, about 900 feet west of parish road; NE¼SW¼ sec. 6, T. 12 N., R. 15 W.

A—0 to 6 inches; brown (10YR 4/3) loamy fine sand; weak fine granular structure; very friable; many medium roots; strongly acid; gradual smooth boundary.

E—6 to 24 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; very friable; few medium roots; strongly acid; clear smooth boundary.

Bt1—24 to 32 inches; yellowish red (5YR 5/6) sandy clay loam; weak fine subangular blocky structure; many fine roots; strongly acid; gradual smooth boundary.

Bt2—32 to 42 inches; yellowish red (5YR 5/6) sandy clay loam; weak medium subangular blocky structure; few fine roots; thin discontinuous clay films on vertical faces of peds; sand grains coated and bridged with clay; strongly acid; gradual smooth boundary.

Bt3—42 to 62 inches; yellowish red (5YR 5/8) sandy clay loam; common medium distinct light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; firm; few fine red (2.5YR 4/6) concretions; thin discontinuous clay films on vertical faces of peds; strongly acid.

The solum is more than 60 inches thick. Reaction ranges from strongly acid to slightly acid throughout the profile.

The A horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 or 4. It is 4 to 10 inches thick. The E horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 or 4.

The Bt1 and Bt2 horizons have hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 to 8. The Bt3 horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 6 to 8 or hue of 7.5YR, value of 5, and chroma of 6. It has few to many mottles in shades of red, yellow, or brown. The Bt1 and Bt2 horizons are sandy clay loam in which the content of clay is 20 to 30 percent. The Bt3 horizon is loam, sandy clay loam, or clay loam.

Mahan Series

The Mahan series consists of well drained, moderately permeable soils that formed in loamy and clayey sediments of Tertiary age. These soils are in the uplands. Slopes range from 1 to 8 percent.

Soils of the Mahan series are clayey, kaolinitic, thermic Typic Hapludults.

Mahan soils commonly are near Bowie, Kirvin, and Sacul soils. All of the nearby soils are in landscape positions similar to those of the Mahan soils. Bowie soils are fine-loamy. Kirvin soils have mixed mineralogy. Sacul soils have grayish mottles in the upper part of the subsoil.

Typical pedon of Mahan fine sandy loam, 1 to 8 percent slopes; about 2.0 miles southeast of Zion Hill Baptist Church, 2.8 miles north of Louisiana State Highway 346, about 250 feet south of timber company road; SE¼NE¼ sec. 7, T. 11 N., R. 11 W.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; soft, very friable; many fine and medium roots; about 14 percent, by volume, rounded, angular, and flattened fragments of ironstone; medium acid; clear smooth boundary.

E—5 to 9 inches; brown (7.5YR 5/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; about 10 percent, by volume, rounded, angular, and flattened fragments of ironstone; medium acid; clear smooth boundary.

Bt1—9 to 13 inches; yellowish red (5YR 5/6) loam; moderate medium subangular blocky structure; friable; common fine and medium roots; common medium pores; about 10 percent, by volume, rounded, angular, and flattened fragments of ironstone; few patchy clay films on vertical faces of peds; medium acid; clear wavy boundary.

Bt2—13 to 25 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; friable; common fine and medium roots; common fine and medium pores; about 10 percent, by volume, rounded, angular, and flattened fragments of ironstone; thick continuous clay films on faces of peds; medium acid; clear wavy boundary.

Bt3—25 to 50 inches; red (10R 4/6) clay; common fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; few medium and coarse roots; few fine pores; about 10 percent, by volume, fragments of ironstone; thick continuous clay films on faces of peds; strongly acid; gradual wavy boundary.

BC—50 to 63 inches; red (10R 4/6) sandy clay loam; few medium distinct gray (10YR 6/1) and yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; friable; about 14 percent, by volume, rounded ironstone fragments ¼ inch to 2 inches in diameter and 5 inches long; few thin discontinuous clay films on faces of peds; strongly acid; gradual smooth boundary.

C—63 to 75 inches; red (10R 4/6) sandy clay loam; few medium gray (10YR 5/1) and yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; friable; about 14 percent, by volume, rounded fragments of ironstone; strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. Gravel-sized fragments of ironstone make up from 1 to 15 percent of the solum and substratum. The particle-size control section is 35 to 60 percent clay. The effective cation-exchange capacity is 50 percent or more saturated with exchangeable aluminum within 30 inches of the surface.

The A horizon has hue of 10YR, 7.5YR, or 5YR, value of 3 to 5, and chroma of 2 to 6. Reaction is strongly acid or medium acid unless lime has been applied. This horizon is 3 to 8 inches thick.

The E horizon, if it occurs, has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 3 to 6. It is loamy fine sand, sandy loam, or fine sandy loam. Reaction is strongly acid or medium acid. This horizon is 0 to 6 inches thick.

The Bt horizon has hue of 5YR, 2.5YR, or 10R, value of 4 or 5, and chroma of 6 to 8. In some pedons the lower part of this horizon has mottles in shades of brown or gray. The texture is clay, sandy clay, sandy clay loam, clay loam, or loam. The content of silt is less than 30 percent. Reaction ranges from very strongly acid to medium acid.

The BC horizon has hue of 5YR, 2.5YR, or 10R, value of 4 or 5, and chroma of 6 to 8. It has no mottles or has common mottles in shades of brown or gray. The texture is sandy loam, fine sandy loam, clay loam, sandy clay loam, or sandy clay. Reaction ranges from very strongly acid to medium acid.

The C horizon typically is reddish or brownish sandy clay loam, sandy loam, or clay loam. It has thin to thick layers of weakly cemented sandstone in some pedons. Reaction ranges from very strongly acid to medium acid.

Metcalf Series

The Metcalf series consists of somewhat poorly drained, very slowly permeable soils that formed in loamy sediments of Pleistocene age over clayey sediments of Tertiary age. These soils are in the uplands. Slopes range from 0 to 2 percent.

Soils of the Metcalf series are fine-silty, siliceous, thermic Aquic Glossudalfs.

Metcalf soils commonly are near Bowie, Eastwood, Guyton, and Keithville soils. Bowie, Eastwood, and Keithville soils are on the more convex slopes. Bowie soils are fine-loamy. Eastwood soils have a fine textured control section. Keithville soils do not have tongues of albic material in the Bt horizon. Guyton soils are in drainageways and on broad flats. They are grayish and loamy throughout.

Typical pedon of Metcalf silt loam; 6 miles west of Keatchie, 0.9 mile north on a farm road, 600 feet southeast of a house, east of a dairy barn; NE¼NW¼ sec. 21, T. 14 N., R. 16 W.

Ap—0 to 6 inches; dark brown (10YR 4/3) silt loam; common fine distinct strong brown (7.5YR 5/6) and very dark grayish brown (10YR 3/2) mottles; moderate fine granular structure; very friable; many fine roots; strongly acid; clear wavy boundary.

Bt1—6 to 11 inches; yellowish brown (10YR 5/6) loam; many medium distinct light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; friable; few medium brown concretions; common fine roots; few patchy clay films on vertical faces of peds; strongly acid; clear wavy boundary.

Bt2—11 to 24 inches; yellowish brown (10YR 5/6) and light brownish gray (2.5Y 6/2) silt loam; weak very coarse prismatic structure; firm; very thin coatings of sand on faces of peds; few medium strong brown and black concretions; few fine roots; strongly acid; clear wavy boundary.

B/E—24 to 27 inches; light brownish gray (10YR 6/2) loam (Bt); about 15 percent coarse distinct yellowish brown (10YR 5/6) mottles surrounded by gray (10YR 6/1) coatings of silt (E) 1.0 to 2.5 centimeters thick; moderate medium subangular blocky structure; slightly brittle; few fine strong brown concretions; few fine roots; common fine pores; about 15 percent, by volume, tongues of light brownish gray (10YR 6/2) silt loam (E) between peds; strongly acid; abrupt wavy boundary.

2Bt1—27 to 40 inches; gray (10YR 6/1) clay; common medium prominent red (2.5YR 4/6) and common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; common pressure faces that do not intersect; dark gray clay flows in channels; very strongly acid; gradual wavy boundary.

2Bt2—40 to 60 inches; light brownish gray (2.5Y 6/2) silty clay; common medium distinct strong brown (7.5YR 5/6) and few medium prominent red (2.5YR 4/6) mottles; weak medium subangular blocky structure; firm; very strongly acid.

The thickness of the solum ranges from 60 to about 100 inches. Depth to the clayey 2Bt horizon ranges from 27 to 40 inches. Reaction ranges from extremely acid to medium acid throughout the solum. The effective cation-exchange capacity is 20 to 50 percent saturated with exchangeable aluminum within 30 inches of the surface.

The Ap horizon has value of 3 to 5 and chroma of 2 to 4. It is 3 to 8 inches thick.

Some pedons have an E horizon. This horizon has value of 5 or 6 and chroma of 3 or 4. The texture is silt loam or very fine sandy loam. This horizon is 0 to 9 inches thick.

The Bt horizon has value of 5 or 6 and chroma of 4 to 8. In the lower part it has few or common mottles that have chroma of 1 or 2. The texture is loam, silt loam, clay loam, or silty clay loam.

The Bt part of the B/E horizon has value of 5 or 6 and chroma of 2 to 4. The texture is silt loam, loam, clay loam, or silty clay loam. The E part is grayish, uncoated silt, silt loam, or very fine sand.

The 2Bt horizon is mottled in shades of gray, red, or brown. The texture is silty clay, clay, silty clay loam, or clay loam.

Meth Series

The Meth series consists of well drained, moderately slowly permeable soils that formed in clayey and loamy sediments of Tertiary age. These soils are in the uplands. Slopes range from 3 to 8 percent.

Soils of the Meth series are fine, mixed, thermic Ultic Hapludalfs.

Meth soils commonly are near Bowie and Eastwood soils. The nearby soils are in landscape positions similar to those of the Meth soils. Bowie soils are fine-loamy. Eastwood soils have montmorillonitic mineralogy and vertic properties.

Typical pedon of Meth fine sandy loam, 3 to 8 percent slopes; about 1.4 miles northeast of Kickapoo, 1 mile east of the intersection of U.S. Highway 171 and a local road, 1.2 miles south of access road, 100 feet east of the road, in a pasture; NW¼NW¼ sec. 9, T. 14 N., R. 14 W.

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine and medium granular structure; very friable; many fine and medium roots; many fine pores; many fragments of ironstone less than 1 centimeter long; strongly acid; clear smooth boundary.

E—8 to 13 inches; brown (7.5YR 5/4) fine sandy loam; weak fine and medium granular structure; very friable; common fine roots; few fine pores and worm casts; medium acid; clear smooth boundary.

Bt1—13 to 20 inches; red (2.5YR 4/6) sandy clay loam; moderate medium subangular blocky structure; firm; few fine and medium roots; few fine pores; distinct continuous clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—20 to 31 inches; red (2.5YR 4/6) sandy clay; common medium and coarse yellowish brown (10YR 5/6) mottles on exteriors of peds; strong medium subangular blocky structure; friable; few fine roots; many fine pores; continuous clay films on faces of peds; medium acid; clear wavy boundary.

Bt3—31 to 47 inches; red (10R 4/8) sandy clay; weak coarse prismatic structure parting to strong medium and coarse subangular blocky; firm; slightly brittle; pale brown (10YR 6/3) coatings of sand on vertical faces of some peds; few fine and medium roots; common fine pores; distinct continuous clay films on faces of peds; pockets of yellowish brown (10YR 5/6) sandy loam; many black sand grains; medium acid; gradual wavy boundary.

BC—47 to 62 inches; red (2.5YR 4/6) sandy clay loam; weak coarse subangular blocky structure; firm; pockets and streaks of light brownish gray (10YR 6/2) fine sand; few pockets of red (10R 4/8) sandy loam; many black sand grains; slightly acid.

The thickness of the solum ranges from 60 to 80 inches.

The Ap horizon has value of 3 to 5 and chroma of 2 to 4. Reaction is strongly acid or medium acid. This horizon is 3 to 10 inches thick.

The E horizon, if it occurs, has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 6. Reaction ranges from strongly acid or medium acid. This horizon is 2 to 10 inches thick.

The Bt horizon has hue of 5YR, 2.5YR, or 10R, value of 4 to 6, and chroma of 4 to 8. The upper part is sandy clay loam, clay loam, sandy clay, or clay. The lower part is sandy clay loam, sandy loam, or fine sandy loam that has ped coatings and streaks or pockets of yellowish or grayish sand or fine sandy loam. Reaction ranges from very strongly acid to medium acid.

The BC horizon has hue of 10YR, 7.5YR, 5YR, or 2.5YR, value of 4 to 6, and chroma of 4 to 8, or it is mottled in shades of red, yellow, or gray. It is sandy loam, sandy clay, sandy clay loam, or fine sandy loam that has streaks or pockets of less clayey material. Reaction ranges from very strongly acid to slightly acid.

Moreland Series

The Moreland series consists of somewhat poorly drained, very slowly permeable soils that formed in clayey alluvium. These soils are in low areas on natural levees on the alluvial plains along the Red River. They are subject to rare flooding. Slopes are dominantly less than 1 percent.

Soils of the Moreland series are fine, mixed, thermic Vertic Hapludolls.

Moreland soils commonly are near Armistead, Buxin, and Gallion soils. Armistead soils are at the slightly higher elevations. They are fine-silty. Buxin soils are in landscape positions similar to those of the Moreland soils. They have a dark gray buried horizon at a depth of 20 to 40 inches. Gallion soils are in the higher landscape positions. They do not have a mollic epipedon and have a fine-silty control section.

Typical pedon of Moreland clay; 2.8 miles south of Evelyn, 2,000 feet east of Rambin store on parish road, 3,400 feet south on farm road, 75 feet south in a field; NW¼NW¼ sec. 18, T. 11 N., R. 10 W.

Ap—0 to 5 inches; dark brown (7.5YR 3/2) clay; moderate fine granular structure; firm; many medium and fine roots; neutral; clear smooth boundary.

A—5 to 16 inches; dark reddish brown (5YR 3/2) clay; moderate fine subangular blocky structure; firm; common fine and medium roots; few fine soft black accumulations; shiny surfaces on peds; mildly alkaline; gradual wavy boundary.

Bw—16 to 31 inches; dark reddish brown (5YR 3/4) clay; few fine distinct dark gray (10YR 4/1) mottles in the lower part; moderate fine angular blocky structure; firm; few fine roots; common distinct slickensides; moderate effervescence; moderately alkaline; gradual wavy boundary.

Bk1—31 to 46 inches; dark reddish brown (5YR 3/4) clay; few fine distinct gray (10YR 5/1) mottles; strong fine angular blocky structure; firm; common distinct slickensides; few fine black concretions; common fine and medium masses of carbonate that have a hard center; common black stains; strong effervescence; moderately alkaline; gradual wavy boundary.

Bk2—46 to 60 inches; reddish brown (5YR 4/4) clay; few fine faint dark gray mottles; weak medium angular blocky structure; firm; few distinct slickensides; few fine black concretions; few fine masses of carbonate that have a hard center; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 80 inches. Reaction ranges from slightly acid to mildly alkaline in the A horizon and from neutral to moderately alkaline in the B horizon. The depth to a calcareous layer ranges from 10 to 40 inches.

The Ap and A horizons have hue of 7.5YR or 5YR and value and chroma of 2 or 3. The combined thickness of these horizons is 4 to 20 inches.

The Bw and Bk horizons have hue of 2.5YR, 5YR, or 7.5YR, value of 3 or 4, and chroma of 2 to 4. The Bw and Bk1 horizons are clay or silty clay. The Bk2 horizon is clay, silty clay, or silty clay loam. Thin strata of lighter textured material are common at a depth of more than 30 inches. Grayish mottles are within 30 inches of the surface. The Bk horizon has few or common accumulations of carbonate.

Ochlockonee Series

The Ochlockonee series consists of well drained, moderately rapidly permeable soils that formed in stratified, loamy and sandy alluvium. These soils are on bottom land. They are frequently flooded. Slopes are less than 1 percent.

Soils of the Ochlockonee series are coarse-loamy, siliceous, acid, thermic Typic Udifluvents.

Ochlockonee soils commonly are near Iuka and Guyton soils. Iuka soils are in the slightly lower landscape positions. They have grayish mottles within 20 inches of the surface. Guyton soils are lower on the landscape than the Iuka and Ochlockonee soils. They are grayish throughout and are fine-silty.

Typical pedon of Ochlockonee silt loam, in an area of Iuka and Ochlockonee soils, frequently flooded; 2.25 miles east of Kickapoo, 300 feet south of a cemetery, 60 feet north of a local stream; NW¼NW¼ sec. 22, T. 14 N., R. 14 W.

A—0 to 6 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine roots; strongly acid; clear smooth boundary.

C1—6 to 33 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; many fine roots; very strongly acid; gradual smooth boundary.

C2—33 to 60 inches; dark yellowish brown (10YR 4/4) silt loam; many medium distinct light brownish gray (10YR 6/2) and few fine distinct yellowish brown (10YR 5/6) mottles; weak medium granular structure; friable; extremely acid; gradual wavy boundary.

C3—60 to 70 inches; yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) silty clay loam; massive; firm; very strongly acid.

These soils are characterized by strata of contrasting textures and an irregular distribution of organic matter. A darker buried horizon is common at a depth of 25 inches or more. The effective cation-exchange capacity is 20 to 50 percent saturated with exchangeable aluminum within 30 inches of the surface.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 6, and chroma of 2 to 4. Reaction is very strongly acid or strongly acid. This horizon is 4 to 12 inches thick.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. In some pedons it has mottles in shades of brown, yellow, or gray below a depth of 20 inches. The texture is sandy loam, silt loam, loam, or silty clay loam.

Perry Series

The Perry series consists of poorly drained, very slowly permeable soils that formed in clayey alluvium. These soils are in low areas on natural levees and in depressions on the alluvial plains along the Red River. They are occasionally flooded. Slopes are less than 1 percent.

Soils of the Perry series are very fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts.

Perry soils commonly are near Buxin, Moreland, and Yorktown soils. Buxin and Moreland soils are in landscape positions similar to those of the Perry soils. Buxin soils have a dark gray buried horizon. Moreland soils have a fine textured control section. Yorktown soils are lower on the landscape than the Perry soils. They do not dry enough to crack so deeply as the Perry soils.

Typical pedon of Perry clay, occasionally flooded; about 3 miles south of Evelyn, 0.4 mile east on a local road, 3,400 feet south on a field road, 600 feet south in a field; NW¼NW¼ sec. 18, T. 11 N., R. 10 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) clay; moderate medium subangular blocky structure; firm; few fine roots; slightly acid; clear smooth boundary.

Bg1—6 to 23 inches; dark gray (10YR 4/1) clay; many medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; few slickensides and glazed spots; slightly acid; clear smooth boundary.

Bg2—23 to 35 inches; dark gray (10YR 4/1) clay; many medium distinct strong brown (7.5YR 5/6) and few fine prominent reddish brown (2.5YR 4/4) mottles; moderate medium angular blocky structure; firm; reddish brown (5YR 4/4) oxidation stains along root channels; common slickensides; neutral; clear smooth boundary.

2BC—35 to 45 inches; reddish brown (5YR 4/3) clay; few fine prominent dark gray (10YR 4/1) mottles; moderate medium angular blocky structure; firm; few concretions of calcium carbonate about 5 millimeters in diameter; common slickensides; mildly alkaline; clear smooth boundary.

2Ck—45 to 60 inches; reddish brown (5YR 4/3) clay; moderate medium subangular blocky structure; firm; many fine concretions of carbonate; moderately alkaline.

The thickness of the solum ranges from 30 to 60 inches. Depth to the 2BC horizon ranges from 14 to 36 inches.

The Ap horizon has value of 3 to 6 and chroma of 1 or 2. Reaction ranges from very strongly acid to slightly acid. This horizon is 4 to 9 inches thick.

The Bg horizon has value of 4 to 6 and chroma of 1. It is mottled in shades of brown or red. Reaction ranges from strongly acid to neutral.

The 2BC horizon has value of 3 or 4 and chroma of 2 to 4. Reaction ranges from slightly acid to moderately alkaline.

The 2Ck horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 1 to 4. It is calcareous and has few to many, fine to coarse concretions of carbonate. Reaction ranges from slightly acid to moderately alkaline.

Ruston Series

The Ruston series consists of well drained, moderately permeable soils that formed in loamy sediments of Pleistocene and Tertiary age. These soils are in the uplands. Slopes range from 1 to 8 percent.

Soils of the Ruston series are fine-loamy, siliceous, thermic Typic Paleudults.

Ruston soils commonly are near Bowie, Kirvin, and Larue soils. Bowie soils are on the less convex slopes. They have more than 5 percent plinthite in the subsoil. Kirvin and Larue soils are in landscape positions similar to those of the Ruston soils. Kirvin soils have a fine textured control section. Larue soils have a thick surface layer and subsurface layer of sandy material.

Typical pedon of Ruston fine sandy loam, 1 to 3 percent slopes; about 1 mile northeast of Logansport, 60 feet west of a local road, 20 feet south of pipeline; SW¼NE¼ sec. 35, T. 12 N., R. 16 W.

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

AE—5 to 16 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine subangular blocky structure; friable; few fine pores; few medium roots; medium acid; clear smooth boundary.

Bt—16 to 30 inches; yellowish red (5YR 4/8) sandy clay loam; weak medium subangular blocky structure; few fine roots; few fine pores; thin discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.

B/E—30 to 36 inches; yellowish red (5YR 4/8) fine sandy loam (Bt); many medium distinct red (2.5YR 4/8) mottles; weak medium subangular blocky structure; friable; thin patchy clay films on vertical faces of some peds; common fine pores; pockets and vertical seams of somewhat brittle, light yellowish brown (10YR 6/4) fine sandy loam 5 to 10 millimeters in diameter (E); strongly acid; clear wavy boundary.

B′t1—36 to 43 inches; red (2.5YR 4/8) sandy clay loam; common medium distinct yellowish red (5YR 5/8) and light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; firm; somewhat brittle; thin patchy clay films on vertical faces of peds; very strongly acid; clear wavy boundary.

B′t2—43 to 53 inches; yellowish red (5YR 4/8) sandy clay loam; moderate medium subangular blocky structure; firm; thin patchy clay films on vertical faces of peds; very strongly acid; gradual wavy boundary.

B′t3—53 to 73 inches; yellowish red (5YR 4/8) sandy clay loam; many coarse distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; thin patchy clay films on vertical faces of peds; very strongly acid.

The solum is more than 60 inches thick. The effective cation-exchange capacity is 20 to 50 percent saturated with exchangeable aluminum within 30 inches of the surface.

The A horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4. Reaction ranges from very strongly acid to slightly acid. This horizon is 3 to 6 inches thick.

The AE horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 or 4. It is fine sandy loam or sandy loam. Reaction ranges from very strongly acid to slightly acid. This horizon is 4 to 12 inches thick. Some pedons have an E or BE horizon rather than an AE horizon.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. It is sandy clay loam, loam, clay loam, or fine sandy loam. It has a few small fragments of ironstone in some pedons. Reaction ranges from very strongly acid to medium acid.

The Bt part of the B/E horizon has colors and textures similar to those of the Bt horizon. The E part has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. It occurs as pockets and streaks and makes up as much as 50 percent of the horizon. It is fine sandy loam, loamy sand, or sandy loam. The B/E horizon is very strongly acid to medium acid.

The B't horizon is similar in color to the Bt horizon. It is mottled in shades of gray, red, or brown in most pedons. The texture is sandy clay loam or fine sandy loam. Reaction ranges from very strongly acid to medium acid.

Sacul Series

The Sacul series consists of moderately well drained, slowly permeable soils that formed in loamy and clayey sediments of Tertiary age. These soils are on ridgetops and side slopes in the uplands. Slopes range from 1 to 30 percent.

Soils of the Sacul series are clayey, mixed, thermic Aquic Hapludults.

Sacul soils commonly are near Bowie, Kirvin, Larue, Mahan, and Ruston soils. Bowie soils are on ridgetops. They are fine-loamy. Kirvin, Larue, Mahan, and Ruston soils are on ridgetops and side slopes. Kirvin and Mahan soils do not have gray mottles in the upper part of the subsoil. Larue soils have a thick surface layer and subsurface layer of sandy material. Ruston soils are fine-loamy.

Typical pedon of Sacul fine sandy loam, 5 to 12 percent slopes; about 6 miles east of Pelican, 1.1 miles east of the intersection of Louisiana State Highways 177 and 175, about 1 mile north on parish road, 0.4 mile east on access road, 275 feet north of the road, in pine woodland; NW¼NW¼ sec. 10, R. 11 W., T. 10 N.

A—0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam; moderate medium granular structure; very friable; many fine and medium roots; few fine concretions of iron and manganese; slightly acid; clear smooth boundary.

E—4 to 9 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine subangular blocky structure; very friable; many roots of all sizes; about 2 percent, by volume, fragments of ironstone; slightly acid; clear smooth boundary.

Bt1—9 to 21 inches; red (2.5YR 4/8) clay; few fine prominent yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm, plastic; common fine and medium roots; about 2 percent, by volume, fragments of ironstone; thin continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—21 to 31 inches; red (2.5YR 4/8) clay; common fine prominent yellowish brown (10YR 5/6), few fine prominent light brownish gray (10YR 6/2), and common medium prominent red (10R 4/6) mottles; moderate medium subangular blocky structure; firm, plastic; few fine and medium roots; about 2 percent, by volume, fragments of ironstone; thin continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt3—31 to 47 inches; mottled red (2.5YR 4/8) and light brownish gray (10YR 6/2) sandy clay; weak very coarse prismatic structure; firm, plastic; few fine roots; about 2 percent, by volume, fragments of ironstone; yellowish brown stains around fragments of ironstone; few pockets of red (10R 4/6) sandy clay; thin continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt4—47 to 52 inches; mottled light brownish gray (10YR 6/2) and red (10R 4/6) sandy clay loam; few pockets of yellowish brown (10YR 5/6) sandy clay loam; thin coatings of grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) silt on faces of prisms; weak coarse prismatic structure; firm; slightly plastic; thin continuous clay films on faces of peds; strongly acid; clear smooth boundary.

BC—52 to 60 inches; light brownish gray (10YR 6/2) sandy clay loam; common medium prominent yellowish brown (10YR 5/4) and red (2.5YR 4/6) mottles; weak very coarse prismatic structure; slightly firm; thin patchy clay films on peds; very strongly acid; abrupt wavy boundary.

C—60 to 70 inches; grayish brown (10YR 5/2) and light brownish gray (10YR 6/2), weakly cemented sandy loam; common medium prominent light olive brown (2.5YR 5/4), light yellowish brown (2.5YR 6/4), and strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure; very firm; very strongly acid.

The thickness of the solum ranges from 40 to more than 72 inches. Fragments of ironstone make up 0 to 10 percent of any horizon. The effective cation-exchange capacity is 50 percent or more saturated with exchangeable aluminum within 30 inches of the surface.

The A horizon has value of 3 or 4 and chroma of 2 or 3. Reaction ranges from very strongly acid to slightly acid. This horizon is 1 to 4 inches thick.

The E horizon has value of 4 to 6 and chroma of 3 or 4. The texture is fine sandy loam, sandy loam, or loam. Reaction ranges from very strongly acid to slightly acid. This horizon is 4 to 10 inches thick.

The Bt1 and Bt2 horizons have hue of 5YR, 2.5YR, or 10R, value of 3 to 5, and chroma of 6 to 8. The Bt2 horizon has mottles in shades of gray, brown, or red. The texture of both horizons is silty clay or clay. The content of clay ranges from 35 to 60 percent.

The Bt3, Bt4, and BC horizons are mottled in shades of brown, red, or gray. These colors make up equal parts of the horizons, or the red or gray is dominant. All three horizons are silty clay loam, sandy clay, clay loam, sandy clay loam, or silt loam. Reaction is very strongly acid or strongly acid in all parts of the Bt horizon.

The C horizon, if it occurs, is mottled in shades of brown or gray. It is stratified in some pedons. The texture is clay loam, sandy clay loam, or sandy loam. Reaction is very strongly acid or strongly acid.

The Sacul soils in De Soto Parish are taxadjuncts to the series because reaction in the E horizon is slightly higher than is defined as the range for the series. This difference, however, does not significantly affect use and management of the soils.

Wrightsville Series

The Wrightsville series consists of poorly drained, very slowly permeable soils that formed in clayey alluvial sediments of Pleistocene age. These soils are on broad flats in the uplands and on low stream terraces. They are subject to rare flooding. Slopes are less than 1 percent.

Soils of the Wrightsville series are fine, mixed, thermic Typic Glossaqualfs.

Wrightsville soils commonly are near Forbing, Gore, Guyton, and Kolin soils. All of the nearby soils, except for Guyton soils, are on the more convex slopes. Guyton soils are in drainageways and in landscape positions similar to those of the Wrightsville soils. Forbing and Gore soils have a reddish subsoil. Guyton and Kolin soils are fine-silty.

Typical pedon of Wrightsville silt loam; about 8.75 miles west of Kingston, 2.5 miles north of the intersection of Louisiana State Highway 509 and an access road, 2.25 miles west of Bayou Pierre, 100 yards east of a local road; SE¼SE¼ sec. 26, T. 14 N., R. 12 W.

A—0 to 1 inch; grayish brown (10YR 5/2) silt loam; weak fine granular structure; friable; many fine pores; many fine roots; extremely acid; abrupt smooth boundary.

Eg—1 to 10 inches; light gray (2.5Y 7/2) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak fine granular structure; friable; many fine roots; common fine pores; very strongly acid; gradual wavy boundary.

B/E—10 to 22 inches; light brownish gray (10YR 6/2) silty clay loam (Bt); few medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm, plastic; tongues of light gray (2.5Y 7/2) silt loam (E) 0.5 inch to 2.5 inches wide extend downward and make up about 25 percent of the horizon; very strongly acid; gradual wavy boundary.

Btg1—22 to 29 inches; grayish brown (2.5Y 5/2) silty clay; coatings of light gray (2.5Y 7/1) silt loam on faces of peds; few medium faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm, plastic and sticky; few fine pores; few fine roots; few tongues of light gray (2.5Y 7/2) material extending into the horizon; very strongly acid; clear wavy boundary.

Btg2—29 to 46 inches; grayish brown (2.5Y 5/2) silty clay; few fine faint yellowish brown mottles; moderate medium subangular blocky structure; firm, plastic and sticky; few fine pores; thin patchy clay films on vertical faces of peds; very strongly acid; clear wavy boundary.

Btg3—46 to 52 inches; grayish brown (2.5Y 5/2) silty clay loam; few fine distinct yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; firm; few fine pores; strongly acid; gradual wavy boundary.

Cg—52 to 61 inches; grayish brown (2.5Y 5/2) silty clay loam; many coarse distinct yellowish red (5YR 5/6) mottles; massive; firm; strongly acid.

The thickness of the solum ranges from 40 to more than 72 inches. The effective cation-exchange capacity is 20 to 50 percent saturated with exchangeable aluminum within 30 inches of the surface.

The A horizon has value of 3 to 5 and chroma of 2. Reaction ranges from extremely acid to strongly acid. This horizon is 1 to 5 inches thick.

The Eg horizon and the E part of the B/E horizon have hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Reaction ranges from extremely acid to strongly acid. The Eg horizon is 9 to 20 inches thick.

The Btg horizon and the B part of the B/E horizon have hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. The upper part of the Btg horizon is silty clay loam, silty clay, or clay. The lower part is silty clay loam or silty clay. Typically, reaction ranges from extremely acid to medium acid. In some pedons, however, the lower part of the horizon is neutral to moderately alkaline.

The Cg horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. The texture is silty clay or silty clay loam. This horizon is stratified in some pedons. Typically, reaction ranges from extremely acid to strongly acid. Some pedons have a 2C horizon, which is reddish, neutral to moderately alkaline clay or silty clay.

Yorktown Series

The Yorktown series consists of very poorly drained, very slowly permeable soils that formed in clayey alluvium. These soils are in low depressions and backswamp areas on alluvial plains. They are frequently flooded. Slopes are less than 1 percent.

Soils of the Yorktown series are very fine, montmorillonitic, nonacid, thermic Typic Fluvaquents.

Yorktown soils commonly are near Buxin, Moreland, and Perry soils. All of the nearby soils are higher on the landscape than the Yorktown soils. They have vertic properties. Also, Buxin and Moreland soils have a mollic epipedon.

Typical pedon of Yorktown clay, frequently flooded; about 2.3 miles west of Evelyn, 0.4 mile southwest of Louisiana State Highway 510, in Boon Brake; NE¼SE¼ sec. 27, T. 12 N., R. 11 W.

O—0 to 2 inches; dark grayish brown (10YR 4/2), partially decomposed twigs, leaves, and roots; medium acid; abrupt smooth boundary.

A—2 to 9 inches; dark gray (5Y 4/1) clay; few fine prominent dark brown (10YR 3/4) mottles; weak coarse subangular blocky structure; firm, very sticky; many fine roots; medium acid; clear smooth boundary.

Bg1—9 to 17 inches; dark gray (10YR 4/1) clay; many medium prominent yellowish red (5YR 4/6) and few fine prominent strong brown (7.5YR 5/6) mottles; moderate coarse blocky structure; very firm, very sticky; common fine roots; common fine black accumulations; medium acid; clear smooth boundary.

Bg2—17 to 28 inches; gray (5Y 5/1) clay; common medium prominent yellowish red (5YR 4/6) and few fine prominent strong brown (7.5YR 5/6) mottles; moderate medium and coarse blocky structure; very firm; few fine and medium roots; common fine black accumulations; medium acid; clear smooth boundary.

Bg3—28 to 43 inches; dark gray (5Y 4/1) clay; many coarse prominent strong brown (7.5YR 5/6) and few fine prominent yellowish red (5YR 5/8) mottles; weak coarse blocky structure; very firm, very sticky; few medium roots; common fine black accumulations; neutral; abrupt smooth boundary.

BC—43 to 65 inches; dark reddish brown (2.5YR 3/4) clay; common fine prominent gray (5Y 5/1) mottles; strong medium blocky structure; very firm, sticky; common fine pressure faces; gray silt in root channels; few fine black accumulations; few fine concretions of carbonate; mildly alkaline.

The thickness of the solum ranges from 50 to 80 inches. Depth to the BC horizon ranges from 40 to 60 inches. Reaction is medium acid to neutral in the A and Bg horizons and mildly alkaline or moderately alkaline in the BC horizon.

The A horizon has hue of 10YR, 5Y, or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is 4 to 10 inches thick.

The Bg horizon has hue of 10YR or 5Y, value of 4 to 6, and chroma of 1 or less. It is mottled in shades of red or brown. The number of fine or medium, weakly cemented black accumulations ranges from none to many.

The BC horizon has hue of 5YR or 2.5YR, value of 3 to 5, and chroma of 3 or 4. It is mottled in shades of gray.

Formation of the Soils

In this section the processes and factors of soil formation are related to the soils in the survey area. Also, the landforms and surface geology are described.

Processes of Soil Formation

The processes of soil formation influence the kind and degree of profile development. The rate and relative effectiveness of different processes are determined by parent material, climate, living organisms, relief, and time.

Important soil-forming processes are those that result in additions of organic, mineral, and gaseous material to the soil; losses of this material from the soil; translocation of material from one point to another within the soil; and physical and chemical transformation of mineral and organic material within the soil *(8, 17)*. Many processes take place simultaneously. Examples in the survey area include the accumulation of organic matter, the development of soil structure, the formation and translocation of clay, and the leaching of bases from some soil horizons.

Organic matter has accumulated and partly decomposed in all of the soils in De Soto Parish and has been mixed into the soils. The accumulation of organic matter is greatest in and above the surface layer. It results in the formation of soils in which the surface layer is higher in content of organic matter than the lower horizons. Decomposition and mixing of organic residue into the soil horizons are brought about largely by the activity of living organisms. Many of the more stable products of decomposition remain as finely divided material that darkens the soil, increases the available water and cation-exchange capacities, contributes to granulation, and serves as a source of plant nutrients. In this parish the conversion of woodland and pasture to cropland has reduced the content of organic matter in many of the soils.

The addition of alluvial sediments at the surface has been important in the formation of some of the soils in the parish. The added sediments provide new parent material in which the processes of soil formation occur. In many areas the new material accumulated faster than the processes of soil formation could appreciably alter it. The depositional strata in Iuka and Ochlockonee soils are a result of this kind of accumulation. Alluvial sediments also are added to flooded areas of the Guyton, Perry, and Yorktown soils.

Processes resulting in the development of soil structure have taken place in all of the soils. Plant roots and other organisms are effective agents that rearrange soil material into secondary aggregates. Decomposition products or organic residue, secretions of organisms, clays, and oxides of elements, such as iron, that form during profile development serve as cementing agents that help to stabilize structural aggregates.

Alternating cycles of wetting and drying and shrinking and swelling contribute to the development of structural aggregates, particularly in soils that have large amounts of clay. Perry soils are an example.

The poorly drained and very poorly drained soils in the survey area have horizons in which the reduction and segregation of iron and manganese compounds are important. Reducing conditions prevail for long periods in poorly aerated horizons. Consequently, the relatively soluble reduced forms of iron and manganese dominate over the less soluble oxidized forms. The reduced forms of these elements result in the gray colors that are characteristic of the subsoil in Guyton and Wrightsville soils. Appreciable amounts of the more soluble reduced forms of iron and manganese can be removed from the soils or translocated from one position to another within the soil by water. Browner mottles in predominantly gray horizons indicate the segregation and concentration of oxidized iron compounds that result from alternating oxidizing and reducing conditions in the soils.

Water moving through the profile has leached soluble bases and any free carbonates that may have been initially present from some horizons of most of the soils in the parish. The effects of leaching are least pronounced in Buxin, Moreland, and Yorktown soils. These soils formed in relatively young parent material that initially contained free calcium carbonate. All of these soils contain free calcium carbonate in the lower part. All of the other soils in the parish, except for Bonn and Forbing soils, are typically acid throughout. Bonn soils are alkaline because of an accumulation of sodium salts. Forbing soils have calcium carbonate in the subsoil. They formed in very clayey sediments. Because water moves very slowly through the profile, carbonates have not been leached from these soils.

The formation, translocation, and accumulation of clay have been important in the formation of nearly all of the soils in the parish, except for Iuka, Ochlockonee, Perry, and Yorktown soils. Silicon and aluminum, released as a result of weathering of such minerals as pyroxenes, amphiboles, and feldspar, can recombine with the components of water to form secondary clay minerals, such as kaolinite. Layer silicate minerals, such as biotite and montmorillonite, can also weather to form other clay minerals, such as vermiculite or kaolinite.

Horizons characterized by a secondary accumulation of clay result largely from the translocation of clay from upper to lower horizons. As it moves downward, water can carry small amounts of clay in suspension. This clay is deposited at the depth of water penetration or in horizons where it becomes flocculated or filtered out by fine pores in the soil. Over long periods, this process can result in distinct horizons of clay accumulation.

Secondary accumulation of calcium carbonate has occurred in the lower part of the solum in some of the soils in the parish. Water has translocated dissolved carbonates from overlying horizons to this part of the profile. Calcium carbonate generally has accumulated in the lower part of Buxin, Caspiana, Forbing, Moreland, Perry, and Yorktown soils.

Factors of Soil Formation

Soil forms through processes that act on deposited or accumulated geologic material. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material, the climate under which the soil has accumulated and existed since accumulation, the plant and animal life on and in the soil, the relief, and the length of time that the forces of soil formation have acted on the soil material *(10)*.

Climate and plant and animal life, chiefly plants, are active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material affects the kind of soil profile that forms and, in some areas, determines it almost entirely. Finally, time is needed for the transformation of the parent material into a soil. In most areas a very long time is needed for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four.

Climate

De Soto Parish is in a region characterized by a humid, subtropical climate. Detailed climatological data is given in the section "General Nature of the Parish."

The relatively uniform climate throughout the parish does not account for differences among the soils within the parish. The warm, moist climate promotes rapid soil formation. High precipitation rates promote rapid weathering of readily weatherable minerals and the movement of colloidal material downward in the soil. Plant remains decompose rapidly in the warm climate. This rapid decomposition prevents the formation of soils that have a high content of organic matter. The organic acids produced by decomposition hasten the development of clay minerals and the removal of carbonates. Soil formation is not retarded by cold temperatures. The soils are seldom frozen for prolonged periods.

Living Organisms

Plants, animals, insects, bacteria, fungi, and other micro-organisms are important in the formation of soils. Plant growth and animal activity physically alter the soils. Human activities, such as land clearing and cultivation, physically alter the surface layer of the soils.

The native vegetation was mainly hardwood forests on the bottom land and low terraces in the parish and mixed hardwood and pine forests in the uplands. Soils that formed under mixed hardwood and pine forests are generally lower in content of organic matter and have a more distinct E horizon than soils that formed under hardwood forests.

Bacteria, fungi, and other micro-organisms generally are responsible for the decomposition of organic matter and the oxidation-reduction reactions that affect the physical and chemical properties of the soils. Aerobic bacteria, more abundant in well drained soils, decompose organic matter rapidly. Anaerobic bacteria, more abundant in poorly drained soils, decompose organic matter slowly. As a result, the content of organic matter is lower in well drained soils than in poorly drained soils.

Parent Material

Parent material is the mass in which a soil forms. It affects the color, texture, permeability, mineralogy, and erosion potential of the soil. The soils in De Soto Parish formed in alluvium deposited by the Red River and by local streams. They also formed in Pleistocene and Tertiary sediments of the Prairie, Montgomery, and Bentley Formations and several formations of the Wilcox Group *(16)*.

The characteristics, distribution, and depositional pattern of the different kinds of parent material in the parish are described in more detail in the section "Landforms and Surface Geology."

Relief

Relief influences soil formation through its effect on soil drainage, runoff, erosion, deposition, and soil temperature. In De Soto Parish it especially affects the rate at which water runs off the surface, internal soil drainage, and the depth to a seasonal high water table. For example, Ruston soils are higher on the landscape than Beauregard soils. In areas of the well drained Ruston soils, runoff is medium or rapid and the seasonal high water table is at a depth of more than 6 feet. In areas of the moderately well drained Beauregard soils, runoff is slow or medium and the seasonal high water table fluctuates between depths of about 1.5 to 3.0 feet.

In some areas on uplands, relief is strong and slopes are steep. Runoff is rapid, and little water enters the soil. The rate of erosion is nearly equal to the rate of soil formation. As a result, Sacul and other soils in these areas have a relatively thin solum.

Time

Many years are needed for changes to take place in the parent material *(9)*. Generally, the longer the parent material has remained in place, the more fully developed the soil profile. The parent material in De Soto Parish is a few hundred to many million years old. The age of a soil is determined by the degree of profile development. Soils that are characterized by little profile development are immature, and those that have a well expressed profile are mature.

The youngest soils, such as Buxin, Moreland, Perry, and Yorktown soils, formed in recent alluvium that was deposited by overflow from the Red River during the last 500 years. These soils have weakly expressed horizons. Some of the soils, such as Armistead, Caspiana, and Gallion soils, formed in alluvium that has been in place for as long as 7,000 years. These soils have distinct horizons.

The oldest soils in the parish are those that formed in parent material 20,000 to perhaps 45 million years old *(16)*. These soils are in the uplands.

Landforms and Surface Geology

Wayne H. Hudnall, Agronomy Department, Louisiana State University, and Jimmy P. Edwards, soil scientist, Soil Conservation Service, prepared this section.

De Soto Parish can be separated into three general physiographic areas—the recent flood plains and low stream terraces, the Pleistocene terraces and uplands, and the Tertiary uplands. Each of these areas can be further subdivided on the basis of differences in parent material, time of deposition, or physiographic features.

Recent Flood Plains and Terraces

The soils on flood plains formed in Holocene and late Pleistocene terrace alluvial deposits along the Red River, the Sabine River, and many small streams that drain the uplands. The flood plains along the Red River and its tributaries and distributaries make up about 19 percent of the parish. The alluvial plains along the Red River occur as a continuous north-south band along the eastern edge of the parish. This band is bordered on the east by Bayou Pierre and on the west by a low bluff, which separates it from the Pleistocene terraces and the uplands. The elevation ranges from about 140 feet at the northern edge of the parish to about 120 feet at the southern edge. It decreases from north to south at a rate of about 0.4 foot per mile. Except for small areas on ridges and in swales, the flood plains are level or nearly level.

A great logjam choked the main channel of the Red River for about 175 years. It exerted a marked influence on the drainage pattern and the alluvial sediments deposited by the Red River system. While the main channel of the river was blocked, natural levees formed along outlet bayous. The damming of tributaries formed large lakes, which were destroyed when the logjam was removed. After the logjam was removed and the outlet bayous were closed by manmade plugs and levees, the river was forced to begin cutting and enlarging its main channel. This process lowered the base level of the streambed and eventually resulted in the partial drainage of many of the lakes. Agricultural drainage has completed this process. Little remains of the extensive lakes that once provided routes for steamboats to get around the logjam. Deposition of alluvium has been minor and of local extent since the outlet bayous were closed.

Most of the alluvial sediments transported by the Red River are eroded from Permian red beds, which are mainly in Oklahoma. These sediments give the soils their characteristic red color. When the alluvium is deposited by the Red River, it is relatively unweathered and typically contains free calcium carbonate. Acid horizons develop in the soils only after considerable time and leaching.

The partial sorting of sediments that occurs when a stream overflows results in a depositional pattern that forms high, sandy or loamy natural levees near the stream channel. The natural levees extend downslope and away from the channel to the more clayey backswamps. Differences in the time of deposition, as well as partial sorting of the sediments, result in the formation of different kinds of soil. The soils in the Gallion-Caspiana, Buxin-Moreland, and Yorktown-Perry general soil map units formed on the alluvial plains along the Red River.

Gallion soils formed in loamy alluvium on old natural levees along the Red River. Caspiana soils formed mainly in silty and clayey sediments at the slightly lower elevations on these levees. Their natural vegetation was probably marsh grasses.

Buxin soils formed in areas where a 20- to 30-inch layer of clayey recent alluvium overlies a buried soil that formed in clayey old alluvium. Armistead soils, which are of minor extent in the Gallion-Caspiana and Buxin-Moreland general soil map units, are slightly higher on the landscape than the Buxin soils. They formed in a 10- to 20-inch layer of clayey recent alluvium, which overlies loamy alluvium.

Moreland and Perry soils are in low areas on the natural levees and in depressions. Moreland soils formed in clayey recent alluvium. In places they are underlain by buried soils that formed in old alluvium at a depth of more than 40 inches. Perry soils formed mainly in clayey old alluvium. They are subject to flooding.

Yorktown soils formed in clayey alluvium in old channel scars and depressional areas on the alluvial plains. They are subject to ponding and are frequently flooded for very long periods.

The soils in the Guyton-Iuka-Cahaba general soil map unit formed on alluvial plains along streams that drain the uplands and on low terraces that flank the alluvial plains. Bienville, Bonn, Cahaba, Elysian, and Wrightsville soils are on the low terraces, and Iuka and Ochlockonee soils are on the flood plains. Guyton soils are on both the terraces and the flood plains. The parent material of the soils in this map unit is of late Pleistocene or early Holocene age. It generally was eroded from soils on uplands and was deposited by streams.

Bienville soils formed in sandy sediments; Bonn, Cahaba, Elysian, and Guyton soils formed in loamy sediments; and Wrightsville soils formed in loamy and clayey sediments. All of these soils have a distinct Bt horizon marked by an accumulation of clay. Bienville, Cahaba, Elysian, Guyton, and Wrightsville soils generally are acid throughout. In places, however, Guyton soils have a neutral to moderately alkaline Cg horizon. Bonn soils have 15 to 50 percent exchangeable sodium throughout the subsoil. The source of this large quantity of exchangeable sodium has not been determined.

Guyton, Iuka, and Ochlockonee soils formed in recent alluvial sediments associated with the present drainage systems. These drainage systems are narrow, have weakly expressed natural levees, and are subject to flooding by runoff from the uplands. Guyton soils are in the drainageways. They are fine-silty. Iuka and Ochlockonee soils are on natural levees along the drainageways. They are coarse-loamy.

Pleistocene Terraces and Uplands

The Pleistocene age was characterized by periods of deposition associated with continental glaciation. Alluvial terraces formed during each of these periods. The oldest terrace is at the highest elevation, and each subsequent terrace is at a slightly lower elevation. The sediments were deposited as lobes of a major delta system. The sources of these sediments vary. Each terrace has a toposequence of soils that is unique to that terrace. The terraces are the Prairie Terrace, the Montgomery Terrace, and the Bentley Terrace.

The Red River was one of the major distributary sources of the Pleistocene sediments. The soils on the Prairie Terrace *(16)* make up about 5 percent of the parish. They are in the Forbing-Gore-Wrightsville general soil map unit. The Prairie Terrace is discontinuous and is gently sloping to level. It adjoins major lakes or flanks the alluvial plains along the Red River. Gore, Forbing, Kolin, and Wrightsville soils are on the Prairie Terrace.

The source of sediments for the Pleistocene terraces that are older than the Prairie Terrace was the Sabine River *(16)*. The river forms the western boundary of the parish from north of Logansport south to the parish line.

The area of the Montgomery Terrace is less than 15 square miles. The soils on this terrace are in the Bowie-Ruston general soil map unit. The terrace is upwarped over the Logansport anticline. The elevation is 220 feet at a site 2 miles southeast of Logansport, 240 feet at a site east of Logansport, and 230 feet at a site 2 miles northwest of Logansport. This upbowing of the surface indicates a post-Montgomery uplift along the Logansport anticline *(16)*.

The Montgomery Terrace extends in a northwest direction from south of Logansport, parallel to the Sabine River, and into Panola County, Texas. It can be traced for more than 10 miles into Texas. It occurs as a flat, almost featureless area interrupted locally by irregularly spaced mounds.

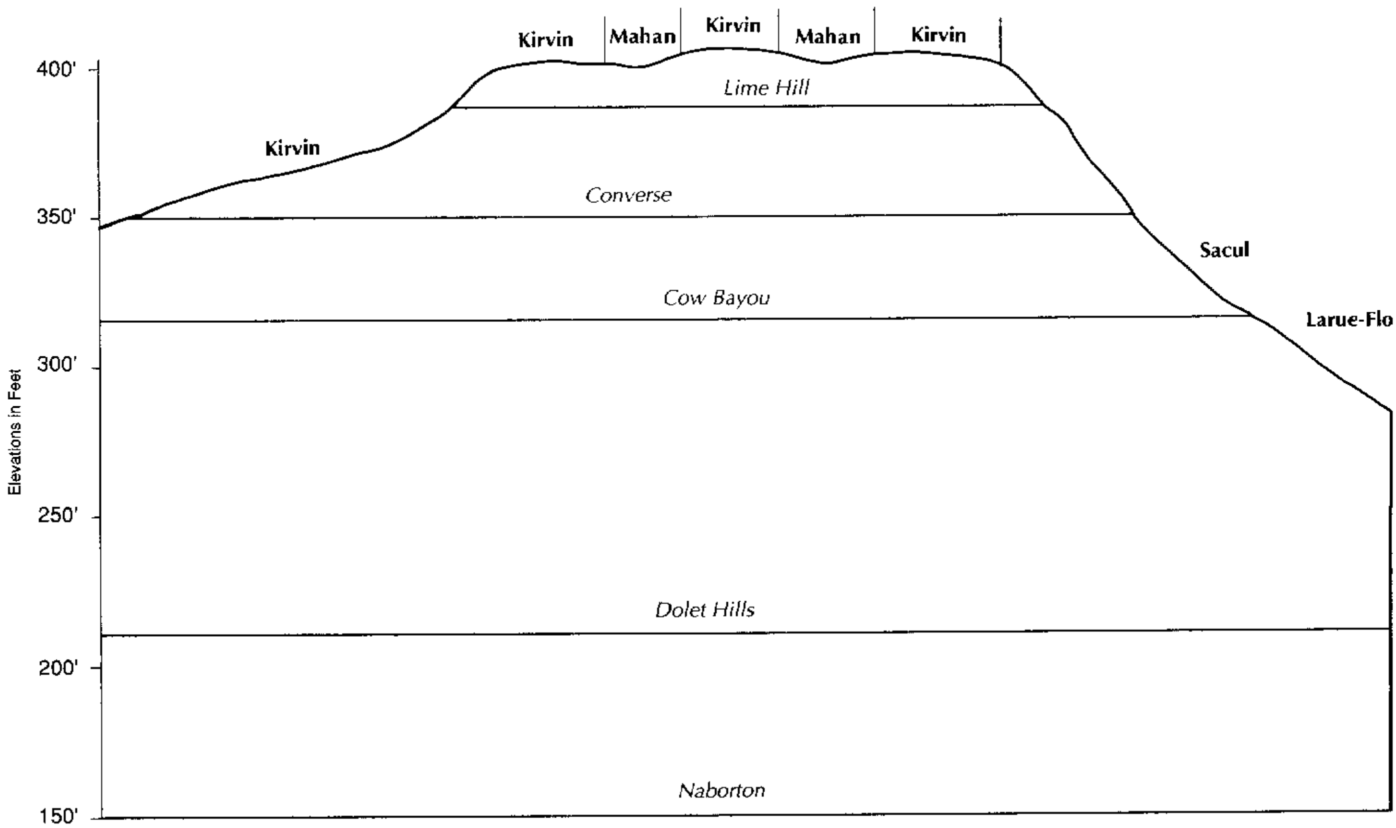

Figure 9.—Relationship of soils, elevation, and geologic formations in the Tertiary uplands.

Beauregard, Bowie, and Ruston soils are on the Montgomery Terrace. Ruston soils are on convex ridgetops and are well drained. Bowie and Beauregard soils are gently sloping and moderately well drained. Bowie soils are on the less convex slopes on ridgetops. Beauregard soils are on foot slopes and near the head of drainageways.

The Bentley Terrace in De Soto Parish occurs only as remnants along the valley of the Sabine River. Residual pebbles in the soils in an area east of the present outcropping of the Bentley Terrace suggest that the Bentley deposits also formerly extended over this area.

Ruston, Larue, and Flo soils are on the Bentley Terrace. Ruston soils are loamy throughout, and Larue and Flo soils have a thick layer of sandy material in the upper part of the solum. Larue and Flo soils are on broad ridgetops and on side slopes, and Ruston soils are on narrow ridgetops and side slopes.

Cahaba and Elysian soils are on low terraces along streams that dissect the Montgomery and Bentley Terraces. They formed in sediments that were eroded from the soils on those terraces.

Tertiary Uplands

The Tertiary sediments in De Soto Parish are in the Wilcox Group. The Naborton, Dolet Hills, Cow Bayou, Converse, Lime Hill, and Hall Summit Formations crop out in the parish (fig. 9). These outcrops are a result of the Sabine Uplift and subsequent erosion. The Sabine Uplift is a flat-topped dome in northwestern Louisiana and northeastern Texas. It is the highest structural point in northwestern and north-central Louisiana *(16)*.

The Wilcox Group consists of fluviatile sediments deposited in brackish and marine environments. The sediments of the Wilcox Group probably accumulated as a result of a cycling series of depositions, which are similar to the present deposition of the Mississippi River deltaic sediments. Each cycle began with an encroachment of the seas as a result of the cessation of deltaic deposition. Basal beach sand and marl were deposited first. These were overlain by fossiliferous clays as the sea advanced inland. The cycle reached its completion with recurrent deltaic sedimentation and seaward building of the land. Preceding this seaward advance of the land, the raw material for shales was deposited at the margins of the great deltaic masses.

Lignitic shales formed from what are commonly called prodeltaic sediments.

Continued deltaic sedimentation resulted in the deposition of thick masses of sand and lignitic shales that were incorporated with the fluviatile sediments. Tilting of the land coincided with the downwarping of the continental margin of the Gulf Coast geosyncline and with the upwarping of the Sabine Uplift. These events exposed the Wilcox Group in De Soto Parish.

Extensive faulting accompanied the Sabine Uplift. This faulting further confuses the soil-geology relationship within the parish. The soils and the geology of the Tertiary uplands are very complex. Similar soils can be mapped on adjacent landscapes that have different kinds of geologic material, and dissimilar soils can occur on opposite side slopes because of the tilting and faulting of the landscape. In places the confusion is compounded because a thin veneer of Pleistocene sediments was deposited over the Tertiary sediments.

The soils on the Tertiary uplands are in two areas. Those in the area north of U.S. Highway 84 are in the Keithville-Eastwood-Metcalf and Eastwood-Meth general soil map units. Keithville and Metcalf soils make up about 45 percent of the area. They formed in loamy sediments of Pleistocene age over clayey marine deposits of the Hall Summit Formation. Eastwood and Meth soils formed entirely in Tertiary sediments of the Naborton and Lime Hill Formations respectively. These soils make up about 45 percent of the area. The rest of the area is made up of Bowie soils, which formed in loamy sediments of the Converse Formation; soils in drainageways, such as Guyton, Iuka, and Ochlockonee soils; and several minor soils on uplands, such as Ruston soils.

The topography of the uplands north of U.S. Highway 84 appears to have developed as a result of differential erosion of the various nearly horizontally bedded formations in the Wilcox Group. Large areas of gently sloping soils, such as Keithville, Metcalf, and other soils that formed in loamy deposits, are separated from large areas of similar soils at higher or lower elevations by narrow bands of steeper soils, such as Eastwood soils. Because of the nearly horizontal bedding of the sediments and the proximity of the Red River and other large streams, the secondary drainageways in the parish are roughly parallel. The deposition of alluvium and the accumulation of other sediments during the Pleistocene Epoch also may have contributed to this pattern.

The soils on Tertiary uplands south of U.S. Highway 84 are in the Sacul-Kirvin-Keithville and Sacul-Larue-Mahan general soil map units. Sacul soils formed in loamy and clayey sediments of the Cow Bayou Formation. They are in several landscape positions at varying elevations. This variety occurs because of many deltaic advances in the Tertiary system and because of faulting, tilting, and uplifting, which caused the sediments to occur at several elevations.

The Sacul soils are generally on broad ridgetops and the upper side slopes. They are lower on the landscape than most other clayey soils of Tertiary age in the parish. An acid reaction and high levels of aluminum saturation in the Sacul soils indicate that the sediments originally contained pyrite. The upper horizons are reddish and are in a well oxidized zone. The lower horizons generally are grayish because the parent material was gray and the soils formed in a reducing environment during part of the year.

Kirvin soils are on narrow ridgetops and the upper side slopes. They are higher on the landscape than the Sacul soils. They are associated mainly with the Converse and Lime Hill Formations. Keithville soils generally are lower on the landscape than the Sacul soils. They formed in loamy Pleistocene sediments over clayey, acid Tertiary marine sediments.

Soils on the Dolet Hills, in the southeastern part of the parish, are in the Sacul-Larue-Mahan general soil map unit. The landscape is one of steep slopes, narrow ridgetops, and high relief. The Dolet Hills slope towards the Red River to the east. Sacul soils are at an elevation of about 300 to 350 feet. Larue and Flo soils and possibly Kirvin soils are associated with the Dolet Hills Formation and are at an elevation of about 200 to 300 feet. Because it is sandy, the Dolet Hills Formation has been eroded and deeply dissected into a landscape of high relief. Larue and Flo soils are on ridgetops and the upper side slopes. Kirvin soils are on the steeper, more convex side slopes. These soils generally contain fragments of ironstone, which formed as a precipitate as water moved through the soil profile.

Mahan and Kirvin soils are associated with the Converse and Lime Hill Formations and possibly with the Hall Summit Formations on the Dolet Hills. The sediments of these formations are believed to be deltaic and fluviatile. Mahan soils are similar to Kirvin soils, but they are redder and generally contain more organic matter in the surface layer. Kirvin and Mahan soils are at elevations of 350 to 380 feet. They generally are at higher elevations in the western part of the Dolet Hills than in the eastern and northeastern parts.

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Glossary

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.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

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.

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

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

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

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 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.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil 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 are somewhat similar in all areas.

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

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

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

Loose.—Noncoherent when dry or moist; does not hold together in a mass.
Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.
Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess sodium (in tables). Excess exchangeable sodium is in the soil. The resulting poor physical properties restrict the growth of plants.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

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 and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

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. The major horizons 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, any plowed or disturbed surface layer.

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 O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon 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) granular, 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 horizon. 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.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

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.

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

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Leaching. The removal of soluble material from soil or other material by percolating water.

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.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

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.

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.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 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. For example, slope, stoniness, and thickness.

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 permeability, the soil may not adequately filter effluent from a waste disposal system.

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—

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

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.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

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. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

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.

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 underlying material. The living roots and plant and animal activities are largely confined to the solum.

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).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Subsurface layer. Generally, the horizon directly below the Ap or A horizon. It can be either an A or an E horizon.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 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.

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.

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 too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1953-77 at Converse, Louisiana)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	57.1	33.0	45.1	80	10	63	4.02	1.70	5.91	7	0.4
February----	62.4	35.8	49.1	81	17	95	3.96	2.14	5.44	6	.4
March-------	68.5	42.4	55.5	86	22	229	4.52	2.05	6.52	7	.4
April-------	77.2	51.9	64.6	89	29	438	4.57	1.56	6.96	5	.0
May---------	83.5	58.9	71.2	92	40	657	5.61	3.06	7.69	7	.0
June--------	88.8	65.2	77.0	96	52	810	3.90	1.26	6.02	5	.0
July--------	92.6	68.8	80.7	100	58	952	3.66	1.21	5.60	6	.0
August------	92.3	67.1	79.7	101	54	921	2.96	.88	4.62	5	.0
September---	87.7	62.2	75.0	97	44	750	4.10	1.32	6.31	5	.0
October-----	79.1	49.1	64.2	93	31	440	2.95	1.18	4.38	4	.0
November----	68.6	40.6	54.5	86	18	188	3.83	1.74	5.53	6	.0
December----	60.6	34.5	47.6	80	15	86	4.76	2.22	6.83	7	.0
Yearly:											
Average---	76.5	50.8	63.7	---	---	---	---	---	---	---	---
Extreme---	---	---	---	101	10	---	---	---	---	---	---
Total-----	---	---	---	---	---	5,629	48.84	36.92	59.79	70	1.2

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1953-77 at Converse, Louisiana)

Probability	Temperature		
	24 ^{o}F or lower	28 ^{o}F or lower	32 ^{o}F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 14	Mar. 28	Apr. 12
2 years in 10 later than--	Mar. 6	Mar. 23	Apr. 7
5 years in 10 later than--	Feb. 20	Mar. 12	Mar. 29
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 3	Oct. 27	Oct. 16
2 years in 10 earlier than--	Nov. 10	Nov. 2	Oct. 22
5 years in 10 earlier than--	Nov. 24	Nov. 12	Nov. 4

TABLE 3.--GROWING SEASON

(Recorded in the period 1953-77 at Converse, Louisiana)

Probability	Daily minimum temperature during growing season		
	Higher than 24 ^{o}F	Higher than 28 ^{o}F	Higher than 32 ^{o}F
	Days	Days	Days
9 years in 10	249	222	197
8 years in 10	259	230	205
5 years in 10	277	244	219
2 years in 10	295	259	233
1 year in 10	305	267	240

TABLE 4.--SUITABILITY AND LIMITATIONS OF GENERAL SOIL MAP UNITS FOR MAJOR LAND USES

Map unit	Percent of area	Cultivated crops	Pasture	Woodland	Urban uses
Gallion-Caspiana	1.5	Well suited	Well suited	Well suited	Moderately well suited: moderate permeability, moderate shrink-swell potential, low strength for roads.
Buxin-Moreland	1.5	Moderately well suited: wetness, poor tilth.	Moderately well suited: wetness, poor tilth.	Moderately well suited: wetness, clayey surface layer.	Poorly suited: flooding, wetness, very slow permeability, very high shrink-swell potential, low strength for roads.
Yorktown-Perry	1.0	Not suited: ponding, flooding.	Not suited: ponding, flooding.	Not suited: ponding, flooding.	Not suited: ponding, flooding.
Guyton-Iuka-Cahaba	15.0	Poorly suited: flooding, wetness, low fertility, potential aluminum toxicity in root zone.	Somewhat poorly suited: flooding, wetness, low fertility.	Moderately well suited: flooding, wetness.	Not suited: flooding, wetness.
Keithville-Eastwood-Metcalf	29.0	Moderately well suited: slope, low fertility, wetness, potential aluminum toxicity in root zone.	Well suited	Well suited	Moderately well suited: slope, wetness, very slow permeability, high and very high shrink-swell potential, low strength for roads.
Eastwood-Meth	10.0	Moderately well suited: slope, low fertility, potential aluminum toxicity in root zone.	Well suited	Moderately well suited: clayey subsoil.	Poorly suited: slope, very slow and moderately slow permeability, moderate and very high shrink-swell potential, low strength for roads.
Forbing-Gore-Wrightsville	5.0	Poorly suited: slope, low fertility, wetness, potential aluminum toxicity in root zone.	Moderately well suited: slope, low fertility, wetness.	Moderately well suited: slope, clayey subsoil, wetness.	Poorly suited: slope, very slow permeability, high and very high shrink-swell potential, wetness, flooding, low strength for roads.

TABLE 4.--SUITABILITY AND LIMITATIONS OF GENERAL SOIL MAP UNITS FOR MAJOR LAND USES--Continued

Map unit	Percent of area	Cultivated crops	Pasture	Woodland	Urban uses
Sacul-Kirvin-Keithville	26.0	Moderately well suited: slope, low fertility, potential aluminum toxicity in root zone.	Well suited	Well suited	Poorly suited: slope; wetness; moderately slow, slow, and very slow permeability; moderate and high shrink-swell potential; low strength for roads.
Bowie-Ruston	7.0	Moderately well suited: slope, low fertility, potential aluminum toxicity in root zone.	Well suited	Well suited	Moderately well suited: slope, moderate and moderately slow permeability, low strength for roads.
Sacul-Larue-Mahan	4.0	Moderately well suited: slope, low fertility, droughtiness, potential aluminum toxicity in root zone.	Moderately well suited: slope, low fertility, droughtiness.	Moderately well suited: droughtiness, slope.	Poorly suited: slope, high shrink-swell potential, moderate and slow permeability.

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Ar	Armistead clay	2,230	0.4
Ba	Beauregard silt loam, 1 to 3 percent slopes	5,789	1.0
Be	Bienville loamy fine sand, 1 to 3 percent slopes	1,569	0.3
Bn	Bonn silt loam	1,689	0.3
Bo	Bowie fine sandy loam, 1 to 5 percent slopes	30,086	5.3
Bx	Buxin clay	5,352	0.9
Ca	Cahaba fine sandy loam, 1 to 3 percent slopes	10,008	1.7
Cs	Caspiana silt loam	808	0.1
Ct	Caspiana silty clay loam	1,477	0.3
Ea	Eastwood fine sandy loam, 1 to 5 percent slopes	43,108	7.5
Ec	Eastwood fine sandy loam, 5 to 12 percent slopes	49,098	8.6
Eg	Elysian-Guyton complex, gently undulating	2,983	0.5
Fb	Flo loamy fine sand, 1 to 5 percent slopes	586	0.1
Fc	Flo loamy fine sand, 5 to 12 percent slopes	251	*
Fr	Forbing silt loam, 1 to 3 percent slopes	1,783	0.3
Fs	Forbing silt loam, 3 to 8 percent slopes	8,173	1.4
Ga	Gallion silt loam	3,613	0.6
Gn	Gallion silty clay loam	1,047	0.2
Go	Gore silt loam, 1 to 5 percent slopes	8,205	1.4
Gu	Guyton silt loam	12,170	2.1
GY	Guyton and Iuka soils, frequently flooded	53,884	9.4
IU	Iuka and Ochlockonee soils, frequently flooded	12,328	2.2
Ke	Keithville very fine sandy loam, 2 to 5 percent slopes	86,115	15.2
Kh	Kirvin fine sandy loam, 1 to 5 percent slopes	33,301	5.8
Kn	Kirvin fine sandy loam, 5 to 12 percent slopes	21,788	3.8
Ko	Kolin silt loam, 1 to 5 percent slopes	4,168	0.7
La	Larue loamy fine sand, 1 to 5 percent slopes	4,941	0.9
Le	Larue loamy fine sand, 5 to 12 percent slopes	1,232	0.2
Ma	Mahan fine sandy loam, 1 to 8 percent slopes	1,249	0.2
Mc	Metcalf silt loam	38,952	6.9
Me	Meth fine sandy loam, 3 to 8 percent slopes	10,107	1.8
Mo	Moreland clay	2,882	0.5
Pe	Perry clay, occasionally flooded	2,920	0.5
Rt	Ruston fine sandy loam, 1 to 3 percent slopes	5,797	1.0
Ru	Ruston fine sandy loam, 3 to 8 percent slopes	4,135	0.7
Sa	Sacul fine sandy loam, 1 to 5 percent slopes	38,059	6.7
Sc	Sacul fine sandy loam, 5 to 12 percent slopes	30,790	5.4
Su	Sacul fine sandy loam, 12 to 30 percent slopes	12,040	2.1
Wr	Wrightsville silt loam	6,928	1.2
Yo	Yorktown clay, frequently flooded	3,116	0.5
	Water	7,614	1.3
	Total	572,371	100.0

* Less than 0.1 percent.

TABLE 6.--LAND CAPABILITY CLASSES, PASTURE GROUPS, 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	Pasture group	Cotton lint	Soybeans	Grain sorghum	Common bermudagrass	Improved bermudagrass	Bahiagrass
			Lbs	Bu	Bu	AUM*	AUM*	AUM*
Ar-------------- Armistead	IIw	1A	675	35	55	10.0	13.0	---
Ba-------------- Beauregard	IIe	8F	450	25	50	6.0	12.0	7.0
Be-------------- Bienville	IIs	9A	---	20	40	---	11.0	6.5
Bn-------------- Bonn	IVs	8I	---	15	---	6.0	---	6.0
Bo-------------- Bowie	IIIe	8B	450	22	47	5.5	15.0	8.0
Bx-------------- Buxin	IIIw	1A	---	32	50	10.0	14.5	---
Ca-------------- Cahaba	IIe	8B	635	30	42	---	12.0	6.0
Cs-------------- Caspiana	I	2C	875	35	60	12.0	18.5	13.0
Ct-------------- Caspiana	IIw	2C	825	35	55	12.5	19.0	12.0
Ea-------------- Eastwood	IIIe	8D	---	20	40	4.5	12.0	6.5
Ec-------------- Eastwood	VIe	8E	---	---	---	4.0	10.0	5.5
Eg-------------- Elysian-Guyton	IIIw	8B, 8G	---	22	36	---	12.0	6.0
Fb-------------- Flo	IIIs	9A	---	---	35	---	12.0	6.0
Fc-------------- Flo	IVe	9A	---	---	---	---	10.0	5.5

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES, PASTURE GROUPS, AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Pasture group	Cotton lint	Soybeans	Grain sorghum	Common bermudagrass	Improved bermudagrass	Bahiagrass
			Lbs	Bu	Bu	AUM*	AUM*	AUM*
Fr-------------- Forbing	IIIe	8D	---	20	40	4.5	12.0	6.0
Fs-------------- Forbing	IVe	8D	---	---	---	4.5	11.5	6.0
Ga-------------- Gallion	I	2D	875	35	55	11.5	17.0	11.5
Gn-------------- Gallion	IIw	2D	825	30	50	7.0	16.5	11.0
Go-------------- Gore	IVe	8D	---	---	36	4.5	12.0	6.5
Gu-------------- Guyton	IIIw	8G	---	25	40	4.5	---	6.0
GY-------------- Guyton and Iuka	Vw	2B	---	---	---	5.0	---	8.0
IU-------------- Iuka and Ochlockonee	Vw	2B	---	---	30	6.0	14.0	9.0
Ke-------------- Keithville	IIIe	8B	---	25	45	5.5	15.0	7.5
Kh-------------- Kirvin	IIIe	8D	---	20	40	4.5	12.0	6.0
Kn-------------- Kirvin	VIe	8E	---	---	---	4.0	---	5.5
Ko-------------- Kolin	IIIe	8B	---	25	45	5.5	15.0	8.0
La-------------- Larue	IIIs	9A	275	---	35	---	12.5	6.0
Le-------------- Larue	IVe	9A	---	---	30	---	11.0	5.5
Ma-------------- Mahan	IIIe	8D	---	20	40	4.5	12.0	6.0

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES, PASTURE GROUPS, AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Pasture group	Cotton lint	Soybeans	Grain sorghum	Common bermudagrass	Improved bermudagrass	Bahiagrass
			Lbs	Bu	Bu	AUM*	AUM*	AUM*
Mc-------------- Metcalf	IIw	8F	---	30	45	5.0	14.0	7.0
Me-------------- Meth	IVe	8D	---	25	40	5.0	11.0	5.5
Mo-------------- Moreland	IIIw	1A	---	30	45	10.0	14.5	---
Pe-------------- Perry	IVw	1A	---	20	35	8.5	13.0	---
Rt-------------- Ruston	IIe	8B	---	25	50	5.5	15.0	8.0
Ru-------------- Ruston	IIIe	8B	---	20	45	5.0	14.0	7.5
Sa-------------- Sacul	IIIe	8D	---	25	40	5.0	12.0	6.0
Sc-------------- Sacul	VIe	8E	---	---	---	4.0	---	5.5
Su-------------- Sacul	VIIe	8E	---	---	---	4.0	---	5.0
Wr-------------- Wrightsville	IIIw	8G	---	25	45	4.5	---	6.0
Yo-------------- Yorktown	VIIw	---	---	---	---	---	---	---

* 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.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
Ar------------------ Armistead	4W	Slight	Moderate	Moderate	Green ash------------	81	4	Eastern cottonwood, American sycamore.
					Cherrybark oak-------	90	8	
					Water oak------------	90	6	
					Pecan----------------	---	---	
					Sweetgum-------------	90	7	
					American sycamore----	---	---	
					Eastern cottonwood---	110	11	
Ba------------------ Beauregard	9W	Slight	Moderate	Moderate	Loblolly pine--------	90	9	Loblolly pine, shortleaf pine.
					Shortleaf pine-------	---	---	
					Sweetgum-------------	---	---	
Be------------------ Bienville	10S	Slight	Severe	Moderate	Loblolly pine--------	96	10	Loblolly pine, shortleaf pine, longleaf pine.
					Longleaf pine--------	88	8	
					Shortleaf pine-------	75	8	
Bn------------------ Bonn	5T	Slight	Severe	Severe	Eastern redcedar-----	---	---	Eastern redcedar.
Bo------------------ Bowie	9A	Slight	Slight	Slight	Loblolly pine--------	86	9	Loblolly pine, shortleaf pine.
					Shortleaf pine-------	80	9	
Bx------------------ Buxin	3W	Slight	Severe	Severe	Green ash------------	78	3	Eastern cottonwood, American sycamore, sweetgum.
					Eastern cottonwood---	90	7	
					Sweetgum-------------	88	7	
					Cherrybark oak-------	87	7	
					Nuttall oak----------	75	---	
					Water oak------------	86	6	
					Willow oak-----------	89	6	
Ca------------------ Cahaba	9A	Slight	Slight	Slight	Loblolly pine--------	87	9	Loblolly pine, longleaf pine, shortleaf pine.
					Slash pine-----------	91	12	
					Shortleaf pine-------	70	8	
					Yellow poplar--------	---	---	
					Sweetgum-------------	90	7	
					Southern red oak-----	---	---	
					Water oak------------	---	---	
Cs, Ct-------------- Caspiana	3A	Slight	Slight	Slight	Green ash------------	75	3	Eastern cottonwood, sweetgum, American sycamore.
					Eastern cottonwood---	105	10	
					Cherrybark oak-------	100	10	
					Pecan----------------	---	---	
					Sweetgum-------------	100	10	
					American sycamore----	---	---	
Ea------------------ Eastwood	10C	Slight	Moderate	Slight	Loblolly pine--------	93	10	Loblolly pine.
					Shortleaf pine-------	---	---	
					Sweetgum-------------	---	---	
					Southern red oak-----	---	---	
					Hickory--------------	---	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
Ec: Eastwood	9C	Moderate	Moderate	Slight	Loblolly pine	86	9	Loblolly pine.
					Shortleaf pine	77	9	
					Sweetgum	---	---	
					Southern red oak	---	---	
					Hickory	---	---	
Eg: Elysian	9A	Slight	Moderate	Slight	Loblolly pine	90	9	Loblolly pine, sweetgum, cherrybark oak, American sycamore.
					Shortleaf pine	80	9	
					Sweetgum	---	---	
					Southern red oak	---	---	
Guyton	9W	Slight	Severe	Moderate	Loblolly pine	90	9	Loblolly pine, sweetgum.
					Slash pine	90	11	
					Sweetgum	---	---	
					Green ash	---	---	
					Southern red oak	---	---	
					Water oak	---	---	
Fb, Fc: Flo	8S	Slight	Severe	Moderate	Shortleaf pine	72	8	Loblolly pine, shortleaf pine, longleaf pine.
					Loblolly pine	---	7	
Fr, Fs: Forbing	6C	Slight	Moderate	Moderate	Loblolly pine	70	6	Loblolly pine, shortleaf pine.
					Shortleaf pine	60	6	
					Slash pine	70	8	
Ga, Gn: Gallion	9A	Slight	Slight	Slight	Cherrybark oak	95	9	Eastern cottonwood, American sycamore.
					Green ash	80	4	
					Sweetgum	83	6	
					Water oak	---	---	
					Pecan	---	---	
					American sycamore	---	---	
					Eastern cottonwood	100	9	
Go: Gore	7C	Slight	Moderate	Moderate	Loblolly pine	76	7	Loblolly pine.
					Shortleaf pine	---	---	
Gu: Guyton	9W	Slight	Severe	Moderate	Loblolly pine	90	9	Loblolly pine, sweetgum.
					Slash pine	90	11	
					Sweetgum	---	---	
					Green ash	---	---	
					Southern red oak	---	---	
					Water oak	---	---	
GY: Guyton	9W	Slight	Severe	Severe	Loblolly pine	90	9	Loblolly pine, sweetgum.
					Slash pine	90	11	
					Sweetgum	---	---	
					Green ash	---	---	
					Southern red oak	---	---	
					Water oak	---	---	
Iuka	11W	Slight	Moderate	Moderate	Loblolly pine	100	11	Loblolly pine, eastern cottonwood, yellow poplar.
					Sweetgum	100	10	
					Eastern cottonwood	105	10	
					Water oak	100	7	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
IU:								
Iuka	11W	Slight	Moderate	Moderate	Loblolly pine	100	11	Loblolly pine, eastern cottonwood, yellow poplar.
					Sweetgum	100	10	
					Eastern cottonwood	105	10	
					Water oak	100	7	
Ochlockonee	11W	Slight	Moderate	Moderate	Loblolly pine	100	11	Loblolly pine, eastern cottonwood.
					Eastern cottonwood	---	---	
					Sweetgum	---	---	
Ke: Keithville	9W	Slight	Moderate	Slight	Loblolly pine	90	9	Loblolly pine.
					Shortleaf pine	80	9	
					Sweetgum	---	---	
Kh, Kn: Kirvin	8A	Slight	Slight	Slight	Loblolly pine	83	8	Loblolly pine, shortleaf pine.
					Shortleaf pine	72	8	
Ko: Kolin	8W	Slight	Moderate	Slight	Loblolly pine	80	8	Loblolly pine.
					Shortleaf pine	---	---	
La, Le: Larue	8S	Slight	Moderate	Moderate	Loblolly pine	80	8	Loblolly pine, shortleaf pine, longleaf pine.
					Shortleaf pine	70	8	
					Longleaf pine	70	6	
					Southern red oak	---	---	
					Sweetgum	---	---	
Ma: Mahan	9A	Slight	Slight	Slight	Loblolly pine	90	9	Loblolly pine, shortleaf pine.
					Shortleaf pine	---	---	
					Hickory	---	---	
					Southern red oak	---	---	
					Sweetgum	---	---	
					White oak	---	---	
Mc: Metcalf	10W	Slight	Moderate	Slight	Loblolly pine	92	10	Loblolly pine.
					Shortleaf pine	74	8	
					Sweetgum	---	---	
Me: Meth	8A	Slight	Slight	Slight	Loblolly pine	80	8	Loblolly pine, shortleaf pine.
					Shortleaf pine	74	8	
					Sweetgum	---	---	
					Southern red oak	---	---	
Mo: Moreland	3W	Slight	Severe	Moderate	Green ash	75	3	Eastern cottonwood, American sycamore.
					Eastern cottonwood	100	9	
					Sweetgum	90	7	
					American sycamore	---	---	
					Water oak	90	6	
					Cherrybark oak	90	8	
Pe: Perry	7W	Slight	Severe	Moderate	Eastern cottonwood	90	7	Eastern cottonwood, sweetgum.
					Green ash	72	2	
					Sweetgum	92	8	
					Water oak	---	---	
					Pecan	---	---	
					Water hickory	---	---	
Rt, Ru: Ruston	8A	Slight	Slight	Slight	Loblolly pine	84	8	Loblolly pine, longleaf pine.
					Shortleaf pine	75	8	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
Sa, Sc: Sacul	8C	Slight	Moderate	Slight	Loblolly pine	80	8	Loblolly pine, shortleaf pine.
					Shortleaf pine	70	8	
Su: Sacul	8C	Moderate	Moderate	Slight	Loblolly pine	80	8	Loblolly pine, shortleaf pine.
					Shortleaf pine	70	8	
Wr: Wrightsville	8W	Slight	Severe	Moderate	Loblolly pine	80	8	Loblolly pine, sweetgum, water oak, willow oak.
					Sweetgum	80	6	
					Water oak	80	5	
Yo: Yorktown	3W	Slight	Severe	Severe	Baldcypress	70	3	Baldcypress, green ash, water tupelo.
					Water tupelo	---	---	
					Water hickory	---	---	
					Green ash	---	---	
					Black willow	---	---	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

TABLE 8.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ar: Armistead	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Ba: Beauregard	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Be: Bienville	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
Bn: Bonn	Severe: flooding, wetness, percs slowly.	Severe: wetness, excess sodium, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: excess sodium, wetness.
Bo: Bowie	Slight	Slight	Moderate: slope.	Slight	Slight.
Bx: Buxin	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
Ca: Cahaba	Slight	Slight	Moderate: slope.	Slight	Slight.
Cs, Ct: Caspiana	Slight	Slight	Slight	Slight	Slight.
Ea: Eastwood	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Slight.
Ec: Eastwood	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: slope.
Eg:					
Elysian	Slight	Slight	Moderate: slope.	Slight	Slight.
Guyton	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Fb: Flo	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
Fc: Flo	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: droughty, slope.
Fr, Fs: Forbing	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Slight.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ga, Gn: Gallion	Slight	Slight	Slight	Slight	Slight.
Go: Gore	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Slight.
Gu: Guyton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
GY:					
Guyton	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Iuka	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
IU:					
Iuka	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
Ochlockonee	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Ke: Keithville	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Slight.
Kh: Kirvin	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope.	Slight	Slight.
Kn: Kirvin	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Ko: Kolin	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Moderate: wetness.
La: Larue	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
Le: Larue	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: droughty, slope.
Ma: Mahan	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Mc: Metcalf	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
Me: Meth	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Mo------ Moreland	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
Pe------ Perry	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
Rt, Ru------ Ruston	Slight------	Slight------	Moderate: slope, small stones.	Slight------	Slight.
Sa------ Sacul	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight------	Slight.
Sc------ Sacul	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight------	Moderate: slope.
Su------ Sacul	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Wr------ Wrightsville	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Yo------ Yorktown	Severe: flooding, ponding, percs slowly.	Severe: ponding, too clayey, excess humus.	Severe: too clayey, excess humus, ponding.	Severe: ponding, too clayey, excess humus.	Severe: ponding, flooding, too clayey.

TABLE 9.--WILDLIFE HABITAT

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

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Ar----------------- Armistead	Fair	Fair	Fair	Good	---	Good	Good	Fair	Fair	Good	Fair.
Ba----------------- Beauregard	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Be----------------- Bienville	Fair	Fair	Fair	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
Bn----------------- Bonn	Poor	Poor	Poor	Poor	---	Poor	Poor	Good	Poor	Poor	Fair.
Bo----------------- Bowie	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Bx----------------- Buxin	Fair	Fair	Fair	Good	---	Good	Good	Good	Fair	Good	Good.
Ca----------------- Cahaba	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Cs, Ct------------- Caspiana	Good	Good	Good	Good	---	Good	Poor	Poor	Good	Good	Poor.
Ea----------------- Eastwood	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ec----------------- Eastwood	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Eg:											
Elysian-----------	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Guyton------------	Fair	Fair	Fair	Fair	---	Fair	Good	Good	Fair	Fair	Good.
Fb, Fc------------- Flo	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Fr----------------- Forbing	Fair	Good	Good	Fair	Fair	Good	Poor	Poor	Fair	Fair	Poor.
Fs----------------- Forbing	Fair	Good	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
Ga, Gn------------- Gallion	Good	Good	Good	Good	---	Good	Poor	Very poor.	Good	Good	Very poor.
Go----------------- Gore	Poor	Good	Good	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Gu----------------- Guyton	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Fair	Fair	Good.
GY:											
Guyton------------	Poor	Fair	Fair	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
Iuka---------------	Poor	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
IU:											
Iuka	Poor	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
Ochlockonee	Poor	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Ke: Keithville	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Kh: Kirvin	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Kn: Kirvin	Poor	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ko: Kolin	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
La: Larue	Poor	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Le: Larue	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ma: Mahan	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Mc: Metcalf	Fair	Good	Good	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
Me: Meth	Fair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Mo: Moreland	Fair	Fair	Fair	Good	---	Good	Good	Good	Fair	Good	Good.
Pe: Perry	Poor	Fair	Fair	Fair	---	Fair	Fair	Fair	Fair	Fair	Fair.
Rt: Ruston	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ru: Ruston	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Sa: Sacul	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Sc: Sacul	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Su: Sacul	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wr: Wrightsville	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Yo: Yorktown	Very poor.	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Good	Very poor.	Very poor.	Fair.

TABLE 10.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ar: Armistead	Severe: wetness.	Moderate: wetness, flooding.	Moderate: wetness, flooding.	Moderate: low strength, wetness, flooding.	Severe: too clayey.
Ba: Beauregard	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Moderate: wetness.
Be: Bienville	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: droughty.
Bn: Bonn	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: excess sodium, wetness.
Bo: Bowie	Moderate: wetness.	Slight	Slight	Moderate: low strength.	Slight.
Bx: Buxin	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness.	Severe: wetness, too clayey.
Ca: Cahaba	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Cs, Ct: Caspiana	Moderate: wetness.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
Ea: Eastwood	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
Ec: Eastwood	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
Eg:					
Elysian	Moderate: wetness.	Slight	Slight	Slight	Slight.
Guyton	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.
Fb: Flo	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: droughty.
Fc: Flo	Severe: cutbanks cave.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
Fr, Fs: Forbing	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ga, Gn: Gallion	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
Go: Gore	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
Gu: Guyton	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: low strength, wetness.	Severe: wetness.
GY:					
Guyton	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
Iuka	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.
IU:					
Iuka	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.
Ochlockonee	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Ke: Keithville	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Slight.
Kh: Kirvin	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
Kn: Kirvin	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
Ko: Kolin	Severe: wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
La: Larue	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: droughty.
Le: Larue	Severe: cutbanks cave.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
Ma: Mahan	Moderate: too clayey.	Slight	Moderate: slope.	Moderate: low strength.	Slight.
Mc: Metcalf	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: low strength.	Moderate: wetness.
Me: Meth	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Mo----------------- Moreland	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness.	Severe: wetness, too clayey.
Pe----------------- Perry	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness, flooding.	Severe: wetness, too clayey.
Rt----------------- Ruston	Slight-----------	Slight-----------	Slight-----------	Moderate: low strength.	Slight.
Ru----------------- Ruston	Slight-----------	Slight-----------	Moderate: slope.	Moderate: low strength.	Slight.
Sa----------------- Sacul	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
Sc----------------- Sacul	Moderate: too clayey, slope, wetness.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
Su----------------- Sacul	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Wr----------------- Wrightsville	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness.	Severe: wetness.
Yo----------------- Yorktown	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding, too clayey.

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it 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
Ar: Armistead	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness, thin layer.
Ba: Beauregard	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
Be: Bienville	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Fair: too sandy.
Bn: Bonn	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, excess sodium.	Severe: wetness.	Poor: wetness, excess sodium.
Bo: Bowie	Severe: wetness, percs slowly.	Severe: seepage.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
Bx: Buxin	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Ca: Cahaba	Slight	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
Cs, Ct: Caspiana	Moderate: wetness, percs slowly.	Moderate: seepage, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
Ea: Eastwood	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Ec: Eastwood	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Eg:					
Elysian	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Slight	Fair: wetness.
Guyton	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Fb: Flo	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
Fc: Flo	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too sandy, slope.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Fr, Fs-------------- Forbing	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
Ga, Gn-------------- Gallion	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
Go------------------ Gore	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
Gu------------------ Guyton	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
GY:					
Guyton-------------	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Iuka---------------	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
IU:					
Iuka---------------	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
Ochlockonee--------	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.
Ke------------------ Keithville	Severe: wetness, percs slowly.	Moderate: slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Poor: thin layer.
Kh------------------ Kirvin	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
Kn------------------ Kirvin	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Ko------------------ Kolin	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
La------------------ Larue	Severe: poor filter.	Severe: seepage.	Slight-----------	Severe: seepage.	Good.
Le------------------ Larue	Severe: poor filter.	Severe: seepage, slope.	Moderate: slope.	Severe: seepage.	Fair: slope.
Ma------------------ Mahan	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey, hard to pack.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Mc: Metcalf	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Moderate: wetness.	Poor: thin layer.
Me: Meth	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Mo: Moreland	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Pe: Perry	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Rt, Ru: Ruston	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Sa: Sacul	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
Sc: Sacul	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: too clayey.	Moderate: slope, wetness.	Poor: too clayey, hard to pack.
Su: Sacul	Severe: percs slowly, slope, wetness.	Severe: slope, wetness.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Wr: Wrightsville	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Yo: Yorktown	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.

TABLE 12.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ar: Armistead	Fair: low strength, wetness, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Ba: Beauregard	Fair: low strength, thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Be: Bienville	Good	Probable	Improbable: excess fines.	Fair: too sandy.
Bn: Bonn	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.
Bo: Bowie	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Bx: Buxin	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Ca: Cahaba	Good	Probable	Improbable: too sandy.	Fair: too clayey.
Cs, Ct: Caspiana	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Ea, Ec: Eastwood	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Eg:				
Elysian	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Guyton	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Fb: Flo	Good	Probable	Improbable: excess fines.	Fair: too sandy.
Fc: Flo	Good	Probable	Improbable: excess fines.	Fair: too sandy, slope.
Fr, Fs: Forbing	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ga, Gn: Gallion	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Go: Gore	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Gu: Guyton	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
GY:				
Guyton	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Iuka	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
IU:				
Iuka	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ochlockonee	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Ke: Keithville	Fair: low strength, thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, too clayey.
Kh, Kn: Kirvin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Ko: Kolin	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
La: Larue	Good	Probable	Improbable: excess fines.	Fair: too sandy.
Le: Larue	Good	Probable	Improbable: excess fines.	Fair: too sandy, slope.
Ma: Mahan	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Mc: Metcalf	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, too clayey.
Me: Meth	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Mo: Moreland	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Pe-------------------- Perry	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Rt, Ru---------------- Ruston	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Sa, Sc---------------- Sacul	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Su-------------------- Sacul	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Wr-------------------- Wrightsville	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Yo-------------------- Yorktown	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

TABLE 13.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ar----------------- Armistead	Slight----------	Severe: piping, wetness.	Percs slowly---	Wetness, slow intake, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
Ba----------------- Beauregard	Slight----------	Severe: piping, wetness.	Percs slowly---	Wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
Be----------------- Bienville	Severe: seepage.	Severe: piping, seepage.	Deep to water	Droughty, fast intake.	Favorable------	Droughty.
Bn----------------- Bonn	Slight----------	Severe: wetness, excess sodium.	Percs slowly, excess sodium.	Wetness, droughty, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, excess sodium, erodes easily.
Bo----------------- Bowie	Moderate: seepage.	Moderate: piping, wetness.	Deep to water	Slope, rooting depth.	Favorable------	Rooting depth.
Bx----------------- Buxin	Slight----------	Severe: hard to pack, wetness.	Percs slowly---	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Ca----------------- Cahaba	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Favorable------	Favorable------	Favorable.
Cs----------------- Caspiana	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
Ct----------------- Caspiana	Moderate: seepage.	Severe: piping.	Deep to water	Favorable------	Favorable------	Favorable.
Ea----------------- Eastwood	Slight----------	Severe: hard to pack.	Deep to water	Slope, percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Ec----------------- Eastwood	Slight----------	Severe: hard to pack.	Deep to water	Slope, percs slowly, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Eg: Elysian-----------	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope-----------	Favorable------	Favorable.
Guyton------------	Moderate: seepage.	Severe: piping, wetness.	Percs slowly---	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Fb----------------- Flo	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, fast intake, droughty.	Soil blowing---	Droughty.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Fc: Flo	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, fast intake, droughty.	Slope, soil blowing.	Slope, droughty.
Fr: Forbing	Slight	Severe: hard to pack.	Deep to water	Percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Fs: Forbing	Moderate: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Ga, Gn: Gallion	Moderate: seepage.	Moderate: thin layer, piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
Go: Gore	Moderate: slope.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, slope.	Erodes easily, percs slowly.	Erodes easily.
Gu: Guyton	Moderate: seepage.	Severe: piping, wetness.	Percs slowly	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
GY:						
Guyton	Moderate: seepage.	Severe: piping, wetness.	Percs slowly, flooding.	Wetness, percs slowly, erodes easily, flooding.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Iuka	Moderate: seepage.	Severe: piping, wetness.	Flooding	Wetness, flooding.	Wetness	Wetness.
IU:						
Iuka	Moderate: seepage.	Severe: piping, wetness.	Flooding	Wetness, flooding.	Wetness	Wetness.
Ochlockonee	Severe: seepage.	Severe: piping.	Deep to water	Flooding	Favorable	Favorable.
Ke: Keithville	Moderate: slope.	Moderate: piping, wetness.	Percs slowly, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
Kh: Kirvin	Slight	Severe: hard to pack.	Deep to water	Percs slowly, slope.	Erodes easily	Erodes easily.
Kn: Kirvin	Slight	Severe: hard to pack.	Deep to water	Percs slowly, slope.	Slope, erodes easily.	Slope, erodes easily.
Ko: Kolin	Slight	Moderate: hard to pack, wetness.	Percs slowly, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
La: Larue	Severe: seepage.	Severe: thin layer.	Deep to water	Droughty, fast intake, slope.	Soil blowing	Droughty.
Le: Larue	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Droughty, fast intake, slope.	Slope, soil blowing.	Slope, droughty.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ma----------------- Mahan	Moderate: slope, seepage.	Moderate: hard to pack, thin layer, piping.	Deep to water	Slope----------	Favorable------	Favorable.
Mc----------------- Metcalf	Slight---------	Moderate: piping, wetness.	Percs slowly---	Wetness, percs slowly, erodes easily.	Erodes easily, wetness.	Erodes easily, percs slowly.
Me----------------- Meth	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Favorable------	Favorable.
Mo----------------- Moreland	Slight---------	Severe: hard to pack, wetness.	Percs slowly---	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Pe----------------- Perry	Slight---------	Severe: hard to pack, wetness.	Percs slowly, flooding.	Wetness, slow intake, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Rt----------------- Ruston	Moderate: seepage.	Severe: thin layer.	Deep to water	Favorable------	Favorable------	Favorable.
Ru----------------- Ruston	Moderate: seepage, slope.	Severe: thin layer.	Deep to water	Slope----------	Favorable------	Favorable.
Sa----------------- Sacul	Slight---------	Severe: hard to pack.	Deep to water	Slope, percs slowly, wetness.	Percs slowly, wetness.	Percs slowly.
Sc----------------- Sacul	Slight---------	Severe: hard to pack.	Deep to water	Slope, percs slowly, wetness.	Slope, percs slowly, wetness.	Slope, percs slowly.
Su----------------- Sacul	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, percs slowly, wetness.	Slope, percs slowly, wetness.	Slope, percs slowly.
Wr----------------- Wrightsville	Slight---------	Severe: wetness.	Percs slowly---	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Yo----------------- Yorktown	Slight---------	Severe: hard to pack, ponding.	Ponding, percs slowly, flooding.	Ponding, slow intake, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.

TABLE 14.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Ar-----Armistead	0-12	Clay	CH	A-7-6	0	100	100	100	95-100	51-70	25-40
	12-60	Silt loam, silty clay loam, loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	75-100	<40	NP-20
Ba-----Beauregard	0-8	Silt loam	ML	A-4	0	100	100	90-100	70-95	<23	NP-3
	8-27	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	100	100	95-100	70-95	25-35	7-15
	27-65	Silty clay loam, silt loam.	CL	A-6	0	100	100	85-100	70-95	30-40	12-19
Be-----Bienville	0-56	Loamy fine sand	SM	A-2-4, A-4	0	100	100	90-100	15-50	<25	NP-3
	56-71	Loamy fine sand, fine sandy loam, fine sand.	SM, ML	A-2-4, A-4	0	100	100	90-100	30-55	<25	NP-3
Bn-----Bonn	0-10	Silt loam	ML, CL-ML	A-4	0	100	100	95-100	75-100	<28	NP-7
	10-48	Silt loam, silty clay loam.	CL	A-6, A-7-6	0	95-100	90-100	85-100	65-100	30-44	12-22
	48-60	Silt loam, silty clay loam.	CL	A-6, A-4	0	100	95-100	90-100	75-100	28-40	8-18
Bo-----Bowie	0-11	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-2-4, A-4	0	97-100	94-100	90-100	30-55	<25	NP-6
	11-40	Sandy clay loam, clay loam, loam.	SC, CL	A-4, A-6	0	90-100	87-100	80-100	40-72	20-40	8-25
	40-70	Sandy clay loam, clay loam, fine sandy loam.	SC, CL	A-4, A-6, A-2	0	80-100	70-100	65-100	35-77	20-40	8-25
Bx-----Buxin	0-6	Clay	CH, CL	A-7-6	0	100	100	100	95-100	41-75	20-45
	6-44	Clay, silty clay	CH	A-7-6	0	100	100	100	95-100	51-75	30-45
	44-60	Clay, silty clay loam, silty clay.	CH, CL	A-7-6	0	100	100	100	95-100	41-75	20-45
Ca-----Cahaba	0-16	Fine sandy loam	SM	A-4, A-2-4	0	95-100	95-100	65-90	30-45	---	NP
	16-46	Sandy clay loam, loam, clay loam.	SC, CL	A-4, A-6	0	90-100	80-100	75-90	40-75	22-35	8-15
	46-65	Loamy sand, sandy loam, fine sandy loam.	SM, SP-SM	A-2-4	0	95-100	90-100	60-85	10-35	---	NP
Cs-----Caspiana	0-13	Silt loam	CL-ML, ML	A-4	0	100	100	100	85-100	<27	NP-7
	13-33	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-7-6, A-4	0	100	100	100	85-100	23-43	4-20
	33-62	Silt loam, very fine sandy loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	100	80-100	23-37	4-15
Ct-----Caspiana	0-13	Silty clay loam	CL	A-6, A-7-6	0	100	100	100	85-100	32-50	11-25
	13-49	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-7-6, A-4	0	100	100	100	85-100	23-43	4-20
	49-62	Silt loam, very fine sandy loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	100	80-100	23-37	4-15

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Ea---------------- Eastwood	0-4	Fine sandy loam	SM, SM-SC, CL-ML, ML	A-4, A-6	0	98-100	98-100	90-100	40-75	20-33	3-13
	4-46	Clay, silty clay	CH, CL	A-7-6	0	100	95-100	90-100	70-98	40-75	25-45
	46-52	Clay loam, silty clay loam, loam.	CL, CH	A-6, A-7-6	0	100	95-100	90-100	55-98	35-65	15-45
	52-60	Stratified fine sandy loam to shaly silty clay loam.	CL, SC, CL-ML, SM-SC	A-6, A-4	0	95-100	95-100	90-100	40-90	25-40	5-20
Ec---------------- Eastwood	0-6	Fine sandy loam	SM, SM-SC, CL-ML, ML	A-4, A-6	0	98-100	98-100	90-100	40-75	20-33	3-13
	6-42	Clay, silty clay	CH, CL	A-7-6	0	100	95-100	90-100	70-98	40-75	25-45
	42-46	Clay loam, silty clay loam, loam.	CL, CH	A-6, A-7-6	0	100	95-100	90-100	55-98	35-65	15-45
	46-60	Stratified fine sandy loam to shaly silty clay loam.	CL, SC, CL-ML, SM-SC	A-6, A-4	0	95-100	95-100	90-100	40-90	25-40	5-20
Eg:											
Elysian---------	0-25	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4	0	100	98-100	94-100	36-60	<26	NP-7
	25-65	Loam-------------	ML, CL-ML	A-4	0	100	95-100	94-100	65-85	22-29	2-7
Guyton----------	0-18	Silt loam--------	ML, CL-ML	A-4	0	100	100	95-100	65-90	<27	NP-7
	18-51	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-6, A-4	0	100	100	94-100	75-95	22-40	6-18
	51-62	Silt loam, silty clay loam, clay loam.	CL, CL-ML, ML	A-6, A-4	0	100	100	95-100	50-95	<40	NP-18
Fb---------------- Flo	0-26	Loamy fine sand	SM, SP-SM	A-2, A-3	0	98-100	95-100	85-100	5-35	<25	NP-3
	26-65	Loamy fine sand	SM	A-2, A-4	0	98-100	95-100	90-100	15-45	<25	NP-3
Fc---------------- Flo	0-25	Loamy fine sand	SM, SP-SM	A-2, A-3	0	98-100	95-100	85-100	5-35	<25	NP-3
	25-65	Loamy fine sand	SM	A-2, A-4	0	98-100	95-100	90-100	15-45	<25	NP-3
Fr---------------- Forbing	0-4	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	100	70-90	<30	NP-10
	4-25	Clay-------------	CH	A-7-6	0	100	100	95-100	85-100	51-76	26-50
	25-70	Clay-------------	CH	A-7-6	0	95-100	95-100	95-100	85-100	51-76	26-50
Fs---------------- Forbing	0-5	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	100	70-90	<30	NP-10
	5-26	Clay-------------	CH	A-7-6	0	100	100	95-100	85-100	51-76	26-50
	26-70	Clay-------------	CH	A-7-6	0	95-100	95-100	95-100	85-100	51-76	26-50
Ga---------------- Gallion	0-7	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	100	100	90-100	<28	NP-11
	7-44	Silt loam, silty clay loam, clay loam.	CL	A-6	0	100	100	100	90-100	28-40	11-17
	44-66	Stratified silty clay loam to very fine sandy loam.	CL, CL-ML	A-6, A-4	0	100	100	100	90-100	23-34	4-12

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Gn---------------- Gallion	0-10	Silty clay loam	CL	A-6	0	100	100	100	90-100	33-40	15-20
	10-47	Silt loam, silty clay loam, clay loam.	CL	A-6	0	100	100	100	90-100	28-40	11-17
	47-60	Stratified silty clay loam to very fine sandy loam.	CL, CL-ML	A-6, A-4	0	100	100	100	90-100	23-34	4-12
Go---------------- Gore	0-4	Silt loam--------	ML, CL-ML	A-4	0	100	100	95-100	60-90	<27	NP-7
	4-49	Clay, silty clay	CH	A-7-6, A-7-5	0	100	100	95-100	85-100	53-65	28-40
	49-65	Clay-------------	CH	A-7-6, A-7-5	0	100	100	95-100	85-100	51-83	25-53
Gu---------------- Guyton	0-25	Silt loam--------	ML, CL-ML	A-4	0	100	100	95-100	65-90	<27	NP-7
	25-50	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-6, A-4	0	100	100	94-100	75-95	22-40	6-18
	50-62	Silt loam, silty clay loam, clay loam.	CL, CL-ML, ML	A-6, A-4	0	100	100	95-100	50-95	<40	NP-18
GY: Guyton----------	0-29	Silt loam--------	ML, CL-ML	A-4	0	100	100	95-100	65-90	<27	NP-7
	29-44	Silt loam, silty clay loam, clay loam.	CL, CL-ML	A-6, A-4	0	100	100	94-100	75-95	22-40	6-18
	44-65	Silt loam, silty clay loam, clay loam.	CL, CL-ML, ML	A-6, A-4	0	100	100	95-100	50-95	<40	NP-18
Iuka------------	0-14	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4, A-2	0	95-100	90-100	70-100	30-60	<20	NP-7
	14-42	Fine sandy loam, loam, sandy loam.	SM, SM-SC, ML, CL-ML	A-4	0	95-100	85-100	65-100	36-75	<30	NP-7
	42-60	Sandy loam, fine sandy loam, loam.	SM, ML	A-2, A-4	0	95-100	90-100	70-100	25-60	<30	NP-7
IU: Iuka------------	0-6	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4, A-2	0	95-100	90-100	70-100	30-60	<20	NP-7
	6-24	Fine sandy loam, loam, loamy sand.	SM, SM-SC, ML, CL-ML	A-4	0	95-100	85-100	65-100	36-75	<30	NP-7
	24-60	Sandy loam, fine sandy loam, loamy sand.	SM, ML	A-2, A-4	0	95-100	90-100	70-100	25-60	<30	NP-7
Ochlockonee-----	0-6	Silt loam--------	SM, ML, SM-SC, CL-ML	A-4, A-2	0	100	95-100	65-90	40-70	<26	NP-5
	6-60	Fine sandy loam, sandy loam, silt loam.	SM, ML, SC, CL	A-4	0	100	95-100	95-100	36-75	<32	NP-9
	60-70	Sandy loam, silt loam, silty clay loam.	SM, ML, CL, SC	A-4, A-2	0	100	95-100	85-99	13-80	<32	NP-9

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
Ke----------------- Keithville	0-11	Very fine sandy loam.	ML, CL-ML	A-4	0	100	100	85-100	50-90	<25	NP-6
	11-39	Clay loam, loam, silty clay loam.	CL	A-6, A-4	0	100	100	90-100	65-95	25-35	8-16
	39-75	Silty clay, clay, clay loam.	CH, CL	A-7-6	0	100	100	95-100	65-95	41-66	22-38
Kh----------------- Kirvin	0-13	Fine sandy loam	SM, ML, CL, SC	A-4	0-2	85-100	78-98	70-95	36-70	<30	NP-8
	13-21	Clay loam, sandy clay, clay.	CL, CH	A-7	0-1	95-100	90-100	85-100	53-95	42-67	24-43
	21-50	Sandy clay loam, clay loam, clay.	CL, CH	A-6, A-7	0-1	95-100	90-100	75-100	51-90	32-59	16-32
	50-65	Stratified sandy clay loam to very shaly clay.	SC, CL, CH	A-4, A-6, A-7	0-1	95-100	90-100	50-90	36-80	25-52	9-32
Kn----------------- Kirvin	0-7	Fine sandy loam	SM, ML, CL, SC	A-4	0-2	85-100	78-98	70-95	36-70	<30	NP-8
	7-20	Clay loam, sandy clay, clay.	CL, CH	A-7	0-1	95-100	90-100	85-100	53-95	42-67	24-43
	20-48	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
	48-60	Stratified sandy clay loam to very shaly clay.	SC, CL, CH	A-4, A-6, A-7	0-1	95-100	90-100	50-90	36-80	25-52	9-32
Ko----------------- Kolin	0-10	Silt loam--------	ML, CL-ML	A-4	0	100	100	85-100	60-85	<27	NP-7
	10-38	Silty clay loam, silt loam.	CL	A-6, A-7-6	0	100	100	95-100	85-97	30-46	11-22
	38-85	Clay, silty clay	CH	A-7-6	0	100	100	90-100	75-95	50-63	25-35
La----------------- Larue	0-24	Loamy fine sand	SM	A-2-4	0	100	98-100	50-75	15-30	---	NP
	24-62	Sandy clay loam, loam, clay loam.	SM, SM-SC, SC	A-2-4, A-4	0	100	95-100	60-70	30-40	20-30	3-10
Le----------------- Larue	0-25	Loamy fine sand	SM	A-2-4	0	100	98-100	50-75	15-30	---	NP
	25-61	Sandy clay loam, loam, clay loam.	SM, SM-SC, SC	A-2-4, A-4	0	100	95-100	60-70	30-40	20-30	3-10
Ma----------------- Mahan	0-9	Fine sandy loam	SM, SM-SC, ML, SC	A-2-4, A-4	0-1	90-100	85-100	65-80	30-55	<25	NP-8
	9-50	Sandy clay, clay, loam.	CL, MH, ML, CH	A-7-6, A-6, A-7-5	0-2	90-100	85-95	80-90	50-85	36-55	12-22
	50-63	Sandy loam, fine sandy loam, sandy clay loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0-2	90-100	85-95	65-85	35-55	16-35	4-18
	63-75	Stratified sandy clay loam to sandy loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0-1	90-100	85-95	65-85	35-55	16-30	4-15

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Mc-----------------Metcalf	0-6	Silt loam--------	ML, CL-ML	A-4	0	100	100	90-100	65-90	<25	NP-6
	6-27	Silt loam, loam, clay loam.	CL	A-6	0	100	100	90-100	65-95	31-40	11-18
	27-60	Silty clay, clay, clay loam.	CH, CL	A-7-6	0	100	100	95-100	85-100	46-66	20-38
Me-----------------Meth	0-13	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4, A-2-4	0	80-100	80-100	65-100	40-75	<25	NP-5
	13-47	Sandy clay, clay loam, sandy clay loam.	CL, SC, CH	A-6, A-7-6, A-7-5	0	100	100	85-100	45-95	36-66	14-34
	47-62	Sandy clay loam, sandy loam, fine sandy loam.	CL, SC, SM-SC, CL-ML	A-6, A-4, A-7-6	0	100	100	75-100	40-60	25-45	5-21
Mo-----------------Moreland	0-16	Clay-------------	CH	A-7-6	0	100	95-100	90-100	90-100	51-74	25-45
	16-46	Clay, silty clay	CH	A-7-6	0	100	95-100	90-100	90-100	51-74	25-45
	46-60	Clay, silty clay loam, silty clay.	CH, CL	A-7-6, A-6	0	100	100	100	90-100	35-74	25-45
Pe-----------------Perry	0-6	Clay-------------	CH, CL	A-7-6	0	100	100	100	95-100	45-75	22-45
	6-35	Clay-------------	CH	A-7-6	0	100	100	100	95-100	60-80	33-50
	35-60	Clay-------------	CH, CL	A-7-6	0	90-100	85-100	75-100	70-100	45-80	22-50
Rt-----------------Ruston	0-16	Fine sandy loam	SM, ML	A-4, A-2-4	0	85-100	78-100	65-100	30-75	<20	NP-3
	16-30	Sandy clay loam, loam, clay loam.	SC, CL	A-6	0	85-100	78-100	70-100	36-75	30-40	11-20
	30-36	Fine sandy loam, sandy loam, loamy sand.	SM, ML, CL-ML, SM-SC	A-4, A-2-4	0	85-100	78-100	65-100	30-75	<27	NP-7
	36-73	Sandy clay loam, loam, clay loam.	SC, CL	A-6	0	85-100	78-100	70-100	36-75	30-42	11-20
Ru-----------------Ruston	0-14	Fine sandy loam	SM, ML	A-4, A-2-4	0	85-100	78-100	65-100	30-75	<20	NP-3
	14-30	Sandy clay loam, loam, clay loam.	SC, CL	A-6	0	85-100	78-100	70-100	36-75	30-40	11-20
	30-42	Fine sandy loam, sandy loam, loamy sand.	SM, ML, CL-ML, SM-SC	A-4, A-2-4	0	85-100	78-100	65-100	30-75	<27	NP-7
	42-60	Sandy clay loam, loam, clay loam.	SC, CL	A-6	0	85-100	78-100	70-100	36-75	30-42	11-20
Sa-----------------Sacul	0-9	Fine sandy loam	SM, ML	A-4	0	95-100	90-100	80-100	40-65	<20	NP-3
	9-36	Clay, silty clay	CH, CL	A-7	0	95-100	90-100	85-95	80-90	45-70	20-40
	36-60	Clay loam, sandy clay loam, sandy loam.	CL, CH, SC	A-6, A-7, A-4	0	95-100	90-100	85-100	40-90	25-55	8-32
Sc-----------------Sacul	0-9	Fine sandy loam	SM, ML	A-4	0	95-100	90-100	80-100	40-65	<20	NP-3
	9-31	Clay, silty clay	CH, CL	A-7	0	95-100	90-100	85-95	80-90	45-70	20-40
	31-70	Clay loam, sandy clay loam, sandy loam.	CL, CH, SC	A-6, A-7, A-4	0	95-100	90-100	85-100	40-90	25-55	8-32

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Su----------------Sacul	0-12	Fine sandy loam	SM, ML	A-4	0	95-100	90-100	80-100	40-65	<20	NP-3
	12-45	Clay, silty clay	CH, CL	A-7	0	95-100	90-100	85-95	80-90	45-70	20-40
	45-70	Clay loam, sandy clay loam, sandy loam.	CL, CH, SC	A-6, A-7, A-4	0	95-100	90-100	85-100	40-90	25-55	8-32
Wr----------------Wrightsville	0-10	Silt loam--------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	75-100	<31	NP-10
	10-46	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	90-100	41-65	22-40
	46-61	Silty clay loam, silty clay, silt loam.	CL, CH	A-7, A-6	0	100	95-100	95-100	90-100	35-55	16-30
Yo----------------Yorktown	0-9	Clay-------------	MH, CH, OH	A-7	0	100	100	100	95-100	55-75	24-45
	9-43	Clay-------------	CH	A-7	0	100	100	100	95-100	60-80	32-50
	43-65	Clay-------------	CH	A-7	0	100	100	95-100	90-100	60-80	32-50

TABLE 15.--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	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Ar: Armistead	0-12	40-55	1.20-1.35	0.06-0.2	0.18-0.20	5.6-8.4	High	0.32	5	2-6
	12-60	14-30	1.35-1.65	0.2-0.6	0.18-0.22	5.1-8.4	Low	0.37		
Ba: Beauregard	0-8	5-15	1.35-1.65	0.6-2.0	0.20-0.22	5.1-6.5	Low	0.49	5	.5-4
	8-27	18-32	1.35-1.70	0.2-0.6	0.20-0.22	4.5-6.0	Low	0.37		
	27-65	15-32	1.35-1.70	0.06-0.2	0.20-0.22	4.5-6.0	Low	0.37		
Be: Bienville	0-56	5-15	1.35-1.60	2.0-6.0	0.08-0.11	4.5-6.5	Low	0.20	5	.5-2
	56-71	5-20	1.35-1.70	2.0-6.0	0.08-0.13	4.5-6.0	Low	0.20		
Bn: Bonn	0-10	5-15	1.30-1.50	0.2-0.6	0.15-0.23	4.5-7.3	Low	0.49	1	.5-2
	10-48	18-35	1.40-1.75	<0.06	0.08-0.14	5.6-9.0	Low	0.49		
	48-60	15-35	1.40-1.75	<0.2	0.08-0.14	6.6-9.0	Low	0.49		
Bo: Bowie	0-11	5-15	1.40-1.70	2.0-6.0	0.10-0.15	4.5-6.5	Low	0.32	5	.5-2
	11-40	18-35	1.35-1.75	0.6-2.0	0.11-0.18	4.5-5.5	Low	0.32		
	40-70	18-35	1.35-1.80	0.2-0.6	0.11-0.18	4.5-5.5	Low	0.32		
Bx: Buxin	0-6	40-55	1.20-1.60	<0.06	0.17-0.20	6.1-7.8	High	0.28	5	1-4
	6-44	40-55	1.20-1.60	<0.06	0.17-0.20	6.1-8.4	High	0.32		
	44-60	30-55	1.20-1.70	<0.2	0.17-0.22	6.6-8.4	High	0.32		
Ca: Cahaba	0-16	7-17	1.35-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low	0.24	5	.5-2
	16-46	18-35	1.35-1.60	0.6-2.0	0.12-0.20	4.5-6.0	Low	0.28		
	46-65	4-20	1.40-1.70	2.0-20	0.05-0.10	4.5-6.0	Low	0.24		
Cs: Caspiana	0-13	10-27	1.30-1.65	0.6-2.0	0.21-0.23	5.6-8.4	Low	0.43	5	1-4
	13-33	20-35	1.30-1.65	0.6-2.0	0.20-0.22	5.6-8.4	Moderate	0.32		
	33-62	10-35	1.30-1.65	0.6-2.0	0.15-0.23	6.1-8.4	Low	0.32		
Ct: Caspiana	0-13	27-35	1.30-1.65	0.6-2.0	0.20-0.22	5.6-8.4	Moderate	0.37	5	1-4
	13-49	20-35	1.30-1.65	0.6-2.0	0.20-0.22	5.6-8.4	Moderate	0.32		
	49-62	10-35	1.30-1.65	0.6-2.0	0.15-0.23	6.1-8.4	Low	0.32		
Ea: Eastwood	0-4	3-18	1.20-1.60	0.6-2.0	0.11-0.15	4.5-6.0	Low	0.49	4	.5-1
	4-46	40-65	1.20-1.45	<0.06	0.12-0.18	3.6-5.5	Very high	0.32		
	46-52	25-40	1.20-1.50	0.06-0.2	0.12-0.20	3.6-6.5	High	0.32		
	52-60	15-35	1.35-1.65	0.06-0.2	0.10-0.15	4.5-7.3	Moderate	0.37		
Ec: Eastwood	0-6	3-18	1.20-1.60	0.6-2.0	0.11-0.15	4.5-6.0	Low	0.49	4	.5-1
	6-42	40-65	1.20-1.45	<0.06	0.12-0.18	3.6-5.5	Very high	0.32		
	42-46	25-40	1.20-1.50	0.06-0.2	0.12-0.20	3.6-6.5	High	0.32		
	46-60	15-35	1.35-1.65	0.06-0.2	0.10-0.15	4.5-7.3	Moderate	0.37		
Eg:										
Elysian	0-25	10-18	1.30-1.60	2.0-6.0	0.11-0.15	4.5-6.5	Low	0.24	5	.5-1
	25-65	10-18	1.40-1.65	0.6-2.0	0.15-0.20	4.5-6.0	Low	0.37		
Guyton	0-18	7-25	1.35-1.65	0.6-2.0	0.20-0.23	3.6-6.0	Low	0.43	5	<2
	18-51	20-35	1.35-1.70	0.06-0.2	0.15-0.22	3.6-6.0	Low	0.37		
	51-62	20-35	1.35-1.70	0.06-2.0	0.15-0.22	3.6-8.4	Low	0.37		
Fb: Flo	0-26	1-6	1.35-1.60	6.0-20	0.05-0.09	4.5-6.5	Low	0.17	5	<1
	26-65	5-12	1.35-1.70	6.0-20	0.07-0.14	4.5-6.0	Low	0.17		

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Fc-----------------	0-25	1-6	1.35-1.60	6.0-20	0.05-0.09	4.5-6.5	Low-----------	0.17	5	<1
Flo	25-65	5-12	1.35-1.70	6.0-20	0.07-0.14	4.5-6.0	Low-----------	0.17		
Fr-----------------	0-4	12-27	1.40-1.60	0.6-2.0	0.21-0.23	5.1-6.5	Low-----------	0.49	5	---
Forbing	4-25	60-85	1.20-1.60	<0.06	0.18-0.20	5.1-7.3	Very high----	0.32		
	25-70	60-85	1.20-1.60	<0.06	0.16-0.20	6.6-8.4	Very high----	0.32		
Fs-----------------	0-5	12-27	1.40-1.60	0.6-2.0	0.21-0.23	5.1-6.5	Low-----------	0.49	5	---
Forbing	5-26	60-85	1.20-1.60	<0.06	0.18-0.20	5.1-7.3	Very high----	0.32		
	26-70	60-85	1.20-1.60	<0.06	0.16-0.20	6.6-8.4	Very high----	0.32		
Ga-----------------	0-7	14-27	1.35-1.65	0.6-2.0	0.21-0.23	5.1-7.3	Low-----------	0.43	5	.5-5
Gallion	7-44	14-35	1.35-1.70	0.6-2.0	0.20-0.22	5.6-8.4	Moderate------	0.32		
	44-66	14-35	1.35-1.70	0.6-2.0	0.20-0.23	5.6-8.4	Low-----------	0.37		
Gn-----------------	0-10	27-35	1.35-1.65	0.6-2.0	0.20-0.22	5.1-7.3	Moderate------	0.37	5	.5-5
Gallion	10-47	14-35	1.35-1.70	0.6-2.0	0.20-0.22	5.6-8.4	Moderate------	0.32		
	47-60	14-35	1.35-1.70	0.6-2.0	0.20-0.23	5.6-8.4	Low-----------	0.37		
Go-----------------	0-4	5-15	1.30-1.50	0.6-2.0	0.20-0.22	4.5-6.0	Low-----------	0.49	5	.5-5
Gore	4-49	40-60	1.30-1.75	<0.06	0.14-0.18	4.5-7.3	High----------	0.32		
	49-65	40-80	1.30-1.75	<0.06	0.14-0.18	5.6-8.4	High----------	0.32		
Gu-----------------	0-25	7-25	1.35-1.65	0.6-2.0	0.20-0.23	3.6-6.0	Low-----------	0.43	5	<2
Guyton	25-50	20-35	1.35-1.70	0.06-0.2	0.15-0.22	3.6-6.0	Low-----------	0.37		
	50-62	20-35	1.35-1.70	0.06-2.0	0.15-0.22	3.6-8.4	Low-----------	0.37		
GY:										
Guyton-----------	0-29	7-25	1.35-1.65	0.6-2.0	0.20-0.23	3.6-6.0	Low-----------	0.43	5	<2
	29-44	20-35	1.35-1.70	0.06-0.2	0.15-0.22	3.6-6.0	Low-----------	0.37		
	44-65	20-35	1.35-1.70	0.06-2.0	0.15-0.22	3.6-8.4	Low-----------	0.37		
Iuka-------------	0-14	6-15	1.35-1.65	2.0-6.0	0.10-0.15	4.5-5.5	Low-----------	0.24	5	.5-2
	14-42	8-18	1.40-1.70	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.28		
	42-60	5-15	1.40-1.70	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.20		
IU:										
Iuka-------------	0-6	6-15	1.35-1.65	2.0-6.0	0.10-0.15	4.5-5.5	Low-----------	0.24	5	.5-2
	6-24	8-18	1.40-1.70	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.28		
	24-60	5-15	1.40-1.70	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.20		
Ochlockonee------	0-6	3-18	1.40-1.60	2.0-6.0	0.07-0.14	4.5-5.5	Low-----------	0.20	5	.5-2
	6-60	8-18	1.40-1.60	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.20		
	60-70	3-18	1.40-1.70	2.0-6.0	0.06-0.12	4.5-5.5	Low-----------	0.17		
Ke-----------------	0-11	8-22	1.35-1.65	0.2-2.0	0.15-0.20	3.6-6.0	Low-----------	0.49	5	.5-5
Keithville	11-39	18-35	1.35-1.70	0.2-0.6	0.15-0.20	3.6-6.0	Low-----------	0.37		
	39-75	40-60	1.20-1.60	<0.06	0.15-0.18	3.6-6.0	High----------	0.32		
Kh-----------------	0-13	2-15	1.20-1.40	2.0-6.0	0.11-0.16	5.1-7.3	Low-----------	0.37	4	.5-4
Kirvin	13-21	35-60	1.24-1.45	0.2-0.6	0.10-0.15	3.6-5.5	Moderate------	0.32		
	21-50	25-50	1.35-1.60	0.2-0.6	0.10-0.16	3.6-5.5	Moderate------	0.32		
	50-65	20-45	1.40-1.65	0.06-0.2	0.08-0.16	3.6-5.0	Moderate------	0.32		
Kn-----------------	0-7	2-15	1.20-1.40	2.0-6.0	0.11-0.16	5.1-7.3	Low-----------	0.37	4	.5-4
Kirvin	7-20	35-60	1.24-1.45	0.2-0.6	0.10-0.15	3.6-5.5	Moderate------	0.32		
	20-48	25-50	1.35-1.60	0.2-0.6	0.10-0.16	3.6-5.5	Moderate------	0.32		
	48-60	20-45	1.40-1.65	0.06-0.2	0.08-0.16	3.6-5.0	Moderate------	0.32		

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Ko----------------	0-10	10-27	1.35-1.65	0.6-2.0	0.18-0.22	5.1-6.5	Low-----------	0.49	5	.5-4
Kolin	10-38	20-35	1.35-1.65	0.2-0.6	0.18-0.22	4.5-6.0	Moderate-----	0.37		
	38-85	40-55	1.20-1.65	<0.06	0.15-0.18	4.5-6.5	High---------	0.32		
La----------------	0-24	3-15	1.30-1.50	6.0-20	0.05-0.10	5.1-6.5	Low-----------	0.17	5	.5-2
Larue	24-62	15-30	1.40-1.60	0.6-2.0	0.10-0.15	5.1-6.5	Low-----------	0.24		
Le----------------	0-25	3-15	1.30-1.50	6.0-20	0.05-0.10	5.1-6.5	Low-----------	0.17	5	.5-2
Larue	25-61	15-30	1.40-1.60	0.6-2.0	0.10-0.15	5.1-6.5	Low-----------	0.24		
Ma----------------	0-9	2-15	1.35-1.70	2.0-6.0	0.10-0.15	5.1-6.0	Low-----------	0.28	5	.5-4
Mahan	9-50	35-60	1.30-1.70	0.6-2.0	0.12-0.18	4.5-6.0	Low-----------	0.32		
	50-63	10-35	1.35-1.70	0.6-2.0	0.10-0.17	4.5-6.0	Low-----------	0.28		
	63-75	10-35	1.35-1.70	0.2-0.6	0.10-0.17	4.5-6.0	Low-----------	0.28		
Mc----------------	0-6	7-22	1.35-1.65	0.6-2.0	0.12-0.18	3.6-6.0	Low-----------	0.49	5	.5-4
Metcalf	6-27	18-27	1.35-1.65	0.2-0.6	0.15-0.20	3.6-6.0	Low-----------	0.37		
	27-60	40-60	1.20-1.60	<0.06	0.15-0.18	3.6-6.0	High---------	0.32		
Me----------------	0-13	5-20	1.30-1.60	0.6-2.0	0.12-0.18	5.1-6.5	Low-----------	0.32	5	.5-3
Meth	13-47	35-55	1.20-1.65	0.2-0.6	0.15-0.18	4.5-6.0	Moderate-----	0.28		
	47-62	10-35	1.30-1.70	0.6-2.0	0.12-0.18	4.5-6.5	Low-----------	0.32		
Mo----------------	0-16	39-50	1.20-1.50	<0.06	0.18-0.20	6.1-7.8	Very high----	0.32	5	2-4
Moreland	16-46	39-60	1.20-1.45	<0.06	0.18-0.20	6.6-8.4	High---------	0.32		
	46-60	35-60	1.20-1.70	<0.2	0.18-0.21	6.6-8.4	Very high----	0.32		
Pe----------------	0-6	40-80	1.20-1.60	<0.06	0.17-0.20	4.5-6.5	High---------	0.32	5	.5-5
Perry	6-35	55-85	1.17-1.50	<0.06	0.17-0.20	5.1-7.3	Very high----	0.28		
	35-60	55-85	1.17-1.50	<0.06	0.17-0.20	6.1-8.4	Very high----	0.28		
Rt----------------	0-16	5-20	1.30-1.70	0.6-2.0	0.09-0.16	4.5-6.5	Low-----------	0.28	5	.5-2
Ruston	16-30	18-35	1.40-1.70	0.6-2.0	0.12-0.17	4.5-6.0	Low-----------	0.28		
	30-36	10-20	1.30-1.70	0.6-2.0	0.12-0.15	4.5-6.0	Low-----------	0.32		
	36-73	15-38	1.40-1.70	0.6-2.0	0.12-0.17	4.5-6.0	Low-----------	0.28		
Ru----------------	0-14	5-20	1.30-1.70	0.6-2.0	0.09-0.16	4.5-6.5	Low-----------	0.28	5	.5-2
Ruston	14-30	18-35	1.40-1.70	0.6-2.0	0.12-0.17	4.5-6.0	Low-----------	0.28		
	30-42	10-20	1.30-1.70	0.6-2.0	0.12-0.15	4.5-6.0	Low-----------	0.32		
	42-60	15-38	1.40-1.70	0.6-2.0	0.12-0.17	4.5-6.0	Low-----------	0.28		
Sa----------------	0-9	5-25	1.30-1.50	0.6-2.0	0.10-0.20	4.5-6.5	Low-----------	0.32	5	1-3
Sacul	9-36	35-60	1.20-1.35	0.06-0.2	0.12-0.18	4.5-5.5	High---------	0.32		
	36-60	20-40	1.25-1.45	0.2-0.6	0.16-0.24	4.5-5.5	Moderate-----	0.37		
Sc----------------	0-9	5-25	1.30-1.50	0.6-2.0	0.10-0.20	4.5-6.5	Low-----------	0.32	5	1-3
Sacul	9-31	35-60	1.20-1.35	0.06-0.2	0.12-0.18	4.5-5.5	High---------	0.32		
	31-70	20-40	1.25-1.45	0.2-0.6	0.16-0.24	4.5-5.5	Moderate-----	0.37		
Su----------------	0-12	5-25	1.30-1.50	0.6-2.0	0.10-0.20	4.5-6.5	Low-----------	0.32	5	1-3
Sacul	12-45	35-60	1.20-1.35	0.06-0.2	0.12-0.18	4.5-5.5	High---------	0.32		
	45-70	20-40	1.25-1.45	0.2-0.6	0.16-0.24	4.5-5.5	Moderate-----	0.37		
Wr----------------	0-10	10-25	1.25-1.50	0.2-0.6	0.16-0.24	3.6-5.5	Low-----------	0.49	5	.5-5
Wrightsville	10-46	35-55	1.20-1.45	<0.06	0.14-0.22	3.6-6.0	High---------	0.37		
	46-61	20-45	1.20-1.50	<0.06	0.14-0.22	3.6-8.4	High---------	0.43		
Yo----------------	0-9	40-65	1.15-1.45	<0.06	0.12-0.18	5.6-7.3	High---------	0.32	5	2-5
Yorktown	9-43	60-80	1.15-1.45	<0.06	0.12-0.18	5.6-7.3	Very high----	0.32		
	43-65	60-80	1.15-1.45	<0.06	0.12-0.18	7.4-8.4	Very high----	0.32		

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol > means 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: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft				
Ar: Armistead	C	Rare	---	---	1.5-3.0	Apparent	Dec-Apr	High	Low.
Ba: Beauregard	C	None	---	---	1.5-3.0	Apparent	Dec-Mar	High	High.
Be: Bienville	A	None	---	---	4.0-6.0	Apparent	Dec-Apr	Low	Moderate.
Bn: Bonn	D	Rare	---	---	0-2.0	Perched	Dec-Apr	High	Low.
Bo: Bowie	B	None	---	---	3.5-5.0	Apparent	Jan-Apr	Moderate	High.
Bx: Buxin	D	Rare	---	---	0-3.0	Apparent	Dec-Apr	High	Low.
Ca: Cahaba	B	None	---	---	>6.0	---	---	Moderate	Moderate.
Cs, Ct: Caspiana	B	None	---	---	4.0-6.0	Apparent	Dec-Apr	Moderate	Low.
Ea, Ec: Eastwood	D	None	---	---	>6.0	---	---	High	High.
Eg:									
Elysian	B	None	---	---	3.0-6.0	Perched	Dec-May	Moderate	High.
Guyton	D	Rare	---	---	0-1.5	Perched	Dec-May	High	Moderate.
Fb, Fc: Flo	A	None	---	---	>6.0	---	---	Low	Moderate.
Fr, Fs: Forbing	D	None	---	---	>6.0	---	---	High	Low.
Ga, Gn: Gallion	B	None	---	---	>6.0	---	---	Moderate	Low.
Go: Gore	D	None	---	---	>6.0	---	---	High	Low.
Gu: Guyton	D	Rare	---	---	0-1.5	Perched	Dec-May	High	Moderate.
GY:									
Guyton	D	Frequent	Very brief to long.	Jan-Dec	0-1.5	Perched	Dec-May	High	Moderate.
Iuka	C	Frequent	Very brief to brief.	Dec-Apr	1.0-3.0	Apparent	Dec-Apr	Moderate	High.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft				
IU:									
Iuka	C	Frequent	Very brief to brief.	Dec-Apr	1.0-3.0	Apparent	Dec-Apr	Moderate	High.
Ochlockonee	B	Frequent	Very brief	Dec-Apr	3.0-5.0	Apparent	Dec-Apr	Low	High.
Ke: Keithville	C	None	---	---	2.0-3.0	Perched	Dec-Apr	High	Moderate.
Kh, Kn: Kirvin	C	None	---	---	>6.0	---	---	High	High.
Ko: Kolin	C	None	---	---	1.5-3.0	Perched	Dec-Apr	High	Moderate.
La, Le: Larue	A	None	---	---	>6.0	---	---	Moderate	Moderate.
Ma: Mahan	C	None	---	---	>6.0	---	---	High	High.
Mc: Metcalf	D	None	---	---	1.5-2.5	Perched	Dec-Apr	High	Moderate.
Me: Meth	C	None	---	---	>6.0	---	---	High	Moderate.
Mo: Moreland	D	Rare	---	---	0-1.5	Perched	Dec-Apr	High	Low.
Pe: Perry	D	Occasional	Brief to very long.	Dec-Jun	0-2.0	Apparent	Dec-Jun	High	Moderate.
Rt, Ru: Ruston	B	None	---	---	>6.0	---	---	Moderate	Moderate.
Sa, Sc, Su: Sacul	C	None	---	---	2.0-4.0	Apparent	Dec-Apr	High	Moderate.
Wr: Wrightsville	D	Rare	---	---	0-1.5	Perched	Dec-Apr	High	High.
Yo: Yorktown	D	Frequent	Very long	Jan-Dec	+1-0.5	Apparent	Jan-Dec	High	Low.

TABLE 17.--FERTILITY TEST DATA FOR SELECTED SOILS

(Analyses by the Soil Fertility Laboratory, Louisiana Agricultural Experiment Station. The symbol < means less than. Dashes indicate analyses not made)

Soil name and sample number	Depth	Horizon	pH 1:1 H_2O	Organic carbon	Extractable phosphorus	Exchangeable cations: Ca	Exchangeable cations: Mg	Exchangeable cations: K	Exchangeable cations: Na	Exchangeable cations: Al	Exchangeable cations: H	Total acidity	Cation-exchange capacity (sum)	Base saturation (sum)	Saturation: Sum of cation-exchange capacity, Na	Saturation: Effective cation-exchange capacity, Al
	In			Pct	Ppm	----Milliequivalents/100 grams of soil-----								Pct	Pct	Pct
Armistead clay:[1,2]																
(S84LA-31-10)	0-6	Ap	6.3	3.59	37	37.3	10.7	0.9	0.1	0.0	0.0	6.8	55.8	87.8	0.0	0.2
	6-12	A1	6.0	1.16	28	35.1	11.7	0.7	0.1	0.0	0.0	6.8	54.4	87.5	0.0	0.2
	12-23	2A2	5.1	1.07	40	12.9	5.9	0.3	0.1	0.0	0.0	8.0	27.2	70.6	0.0	0.4
	23-38	2Bt1	5.2	0.24	15	8.9	6.4	0.3	0.1	0.2	0.3	5.5	21.2	74.1	1.2	0.5
	38-48	2Bt2	6.1	0.10	51	13.7	7.5	0.3	0.1	0.0	0.0	4.2	25.8	83.7	0.0	0.4
	48-60	2BC	5.5	0.06	41	7.5	7.8	0.2	0.1	0.0	0.0	4.0	19.6	79.6	0.0	0.5
Bienville loamy fine sand:[1]																
(S83LA-31-9)	0-7	Ap	6.0	1.21	38	4.9	1.0	0.2	0.1	0.0	0.0	2.8	9.0	68.9	0.0	1.1
	7-13	E	6.2	0.59	11	3.7	0.6	0.1	0.1	0.0	0.0	0.6	5.1	88.2	0.0	2.0
	13-36	B/E	6.4	0.01	11	1.9	0.3	<0.1	0.1	0.0	0.0	0.0	2.3	100.0	0.0	4.3
	36-56	Bt1	6.4	0.01	25	2.7	0.3	<0.1	0.1	0.0	0.0	0.6	3.7	83.8	0.0	2.7
	56-71	Bt2	6.0	0.01	18	2.2	0.4	<0.1	0.1	0.0	0.0	1.1	3.8	71.1	0.0	2.6
Buxin clay:[1]																
(S84LA-31-11)	0-6	Ap	6.7	1.07	140	23.8	14.8	0.7	0.2	0.0	0.0	7.2	46.7	84.6	0.0	0.4
	6-10	Bw1	7.0	0.54	134	24.1	16.0	0.7	0.3	0.0	0.0	6.0	47.1	87.3	0.0	0.6
	10-22	Bw2	7.5	0.46	138	22.1	16.4	0.6	0.3	0.0	0.0	5.1	44.5	88.5	0.0	0.7
	22-30	Ab	7.7	0.90	32	26.4	26.3	1.0	0.8	0.0	0.0	2.4	56.9	95.8	0.0	1.4
	30-44	Bb	8.0	0.15	14	26.8	31.5	0.9	0.9	0.0	0.0	3.9	64.0	93.9	0.0	1.4
	44-60	Cb	7.9	0.10	108	22.7	26.7	0.8	1.0	0.0	0.0	3.9	55.1	92.9	0.0	1.8
Caspiana silt loam:[1]																
(S82LA-31-12)	0-7	Ap	6.1	2.33	72	9.8	3.9	0.4	0.1	0.0	0.2	4.7	18.9	75.1	0.0	0.5
	7-13	A	6.3	1.07	41	7.6	3.1	0.2	0.1	0.0	0.2	2.5	13.5	81.5	0.0	0.7
	13-18	BA	6.7	0.83	55	7.2	3.2	0.2	0.5	0.0	0.2	1.8	12.9	86.0	0.0	3.9
	18-26	Bt1	6.5	0.47	50	6.2	4.1	0.2	0.5	0.0	0.2	2.2	13.2	83.3	0.0	3.8
	26-33	Bt2	6.4	0.58	59	8.3	6.0	0.3	0.5	0.0	0.2	4.0	19.1	79.1	0.0	2.6
	33-60	C	7.4	0.50	207	8.1	5.2	0.2	0.5	0.0	0.0	0.7	14.7	95.2	0.0	3.4

See footnotes at end of table.

TABLE 17.--FERTILITY TEST DATA FOR SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	pH 1:1 H_2O	Organic carbon	Extractable phosphorus	Exchangeable cations: Ca	Mg	K	Na	Al	H	Total acidity	Cation-exchange capacity (sum)	Base saturation (sum)	Saturation: Sum of cation-exchange capacity Na	Effective cation-exchange capacity Al
	In			Pct	Ppm	----Milliequivalents/100 grams of soil-----								Pct	Pct	Pct
Flo loamy fine sand:[3]																
(S83LA-31-12)	0-6	A	5.3	1.38	5	1.9	0.3	0.1	0.1	0.0	0.0	2.2	4.6	52.2	0.0	2.2
	6-25	E	5.9	0.10	5	0.9	0.1	<0.1	<0.1	0.0	0.0	1.1	2.1	47.6	0.0	0.0
	25-38	Bw	6.0	0.02	5	0.9	0.1	<0.1	<0.1	0.0	0.0	0.6	1.6	62.6	0.0	0.0
	38-60	Bt	5.9	0.10	5	3.8	0.5	0.1	0.1	0.0	0.0	2.2	6.7	67.2	0.0	1.5
Flo loamy fine sand:[1]																
(S83LA-31-13)	0-6	A	6.4	1.43	5	4.1	0.6	0.1	0.1	0.0	0.0	1.7	6.6	74.2	0.0	1.5
	6-26	E	6.3	0.01	5	1.0	0.3	<0.1	<0.1	0.0	0.0	0.6	1.9	68.4	0.0	0.0
	26-39	Bw	5.9	0.01	5	1.6	0.2	0.1	<0.1	0.0	0.0	0.3	2.2	86.4	0.0	0.0
	39-65	Bt	5.6	0.01	5	3.2	0.5	0.1	0.1	0.0	0.0	1.7	5.6	69.6	0.0	1.8
Forbing silt loam:[1]																
(S82LA-31-14)	0-3	Ap	5.2	2.84	5	7.2	4.3	0.4	0.3	0.0	0.0	5.6	17.8	68.5	0.0	1.7
	3-5	A	5.8	0.85	5	5.3	3.5	0.1	0.4	0.0	0.0	1.7	11.0	84.5	0.0	3.6
	5-14	Bt1	5.3	0.63	5	25.6	11.4	0.5	0.3	0.0	0.0	10.1	47.5	78.7	0.0	0.6
	14-26	Bt2	6.1	0.41	18	31.0	11.0	0.5	0.3	0.0	0.0	5.0	47.8	89.5	0.0	0.6
	26-36	Bt3	8.0	0.19	150	35.2	6.2	0.3	0.2	0.0	0.0	0.6	42.5	98.6	0.0	0.5
	36-70	Bt4	8.2	0.15	192	34.0	6.4	0.2	0.2	0.0	0.0	0.0	40.8	100.0	0.0	0.5
Gallion silt loam:[1,4]																
(S82LA-31-16)	0-7	Ap	5.4	1.52	157	6.8	2.3	0.6	0.1	0.2	0.2	3.9	13.7	71.5	2.0	0.7
	7-19	Bt1	5.9	0.37	44	5.4	2.0	0.2	<0.1	0.2	0.2	1.1	8.7	87.4	2.5	0.0
	19-31	Bt2	6.2	0.02	161	4.9	2.1	0.1	0.1	0.2	0.0	1.7	8.9	80.9	2.7	1.1
	31-44	BC	5.8	0.01	185	5.6	3.7	0.2	0.1	0.2	0.2	2.8	12.4	77.4	2.0	0.8
	44-66	C	5.6	0.01	160	4.6	3.9	0.1	0.2	0.2	0.2	3.4	12.2	72.1	2.2	1.6
Gore silt loam:[1]																
(S82LA-31-22)	0-4	Ap	5.7	2.89	8	3.4	1.4	0.2	0.3	0.0	0.2	3.6	8.9	59.9	0.0	3.4
	4-11	Bt1	5.4	0.94	<5	1.0	3.0	0.2	0.6	7.2	0.2	12.6	17.4	27.6	59.0	3.4
	11-20	Bt2	4.9	0.66	<5	0.2	3.0	0.2	0.5	7.8	0.5	12.6	16.5	23.6	63.9	3.0
	20-35	Bt3	5.0	0.66	<5	0.2	4.4	0.3	0.8	12.2	0.6	19.8	25.5	22.4	65.9	3.1
	35-49	BC1	4.9	0.44	<5	0.7	5.6	0.4	0.8	12.5	0.5	19.1	26.6	28.2	61.0	3.0
	49-55	BC2	5.0	0.33	<5	0.7	5.6	0.3	0.8	11.1	0.1	14.5	21.9	33.8	59.7	3.7
	55-65	C	4.9	0.44	<5	1.6	5.6	0.3	0.8	9.0	0.0	11.9	20.2	41.1	52.0	4.0

See footnotes at end of table.

TABLE 17.--FERTILITY TEST DATA FOR SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	pH 1:1 H_2O	Organic carbon	Extractable phosphorus	Exchangeable cations: Ca	Mg	K	Na	Al	H	Total acidity	Cation-exchange capacity (sum)	Base saturation (sum)	Saturation: Sum of cation-exchange capacity Na	Effective cation-exchange capacity Al
	In			Pct	Ppm	Milliequivalents/100 grams of soil								Pct	Pct	Pct
Kirvin fine sandy loam:[5] (S83LA-31-11)	0-3	A	5.7	2.18	5	4.1	0.8	0.2	<0.1	0.0	0.0	4.5	9.3	53.1	0.0	0.0
	3-7	E	5.6	0.77	5	2.8	0.6	0.2	<0.1	0.0	0.0	4.5	8.1	44.4	0.0	0.0
	7-20	Bt1	4.8	0.19	5	3.4	3.9	0.4	0.1	3.8	0.0	8.4	26.2	29.8	32.8	0.4
	20-32	Bt2	4.8	0.24	5	2.0	3.2	0.3	0.1	4.1	0.4	9.0	14.8	39.2	39.8	2.0
	32-48	BC	4.6	0.06	5	1.1	3.0	0.3	0.1	7.0	2.9	12.9	17.4	25.9	48.6	0.6
	48-60	C	4.6	0.01	5	1.0	1.9	0.2	0.1	4.3	1.4	8.4	11.6	27.6	48.3	0.9
Kolin silt loam:[1] (S85LA-31-1)	0-5	A	---	1.78	7	2.2	0.7	0.2	0.0	0.5	0.3	6.8	9.9	31.0	13.0	0.0
	5-10	E	---	0.90	5	1.5	0.5	0.1	0.0	3.2	0.2	8.0	10.1	21.0	57.8	0.0
	10-14	Bt1	---	0.68	5	1.9	0.8	0.1	0.0	4.8	0.5	11.5	14.3	19.8	59.0	0.0
	14-20	Bt2	---	0.59	5	1.3	0.8	0.1	0.0	6.3	0.2	11.5	13.7	16.3	72.1	0.0
	20-27	Bt3	---	0.50	5	1.0	0.8	0.1	0.0	5.8	0.0	10.5	12.4	15.5	75.1	0.0
	27-38	B/E	---	0.46	5	0.8	0.8	0.1	0.1	5.4	0.0	9.5	11.3	15.9	75.1	0.7
	38-63	2Bt1	---	0.41	5	2.9	3.4	0.3	0.5	12.6	0.0	19.5	26.6	26.8	63.9	2.0
	63-85	2Bt2	---	0.37	5	4.2	4.3	0.3	0.6	8.2	0.0	13.5	22.9	41.1	46.6	2.8
Metcalf silt loam:[1] (S82LA-31-18)	0-6	Ap	6.0	1.85	48	4.1	0.8	<0.1	0.3	0.0	0.2	2.5	7.7	67.5	0.0	3.9
	6-11	Bt1	5.0	0.41	<5	2.9	1.3	<0.1	0.6	1.9	0.0	3.2	8.0	60.0	28.4	7.5
	11-24	Bt2	5.1	0.33	<5	2.0	1.3	<0.1	0.7	2.0	0.4	4.3	8.3	48.2	31.3	8.4
	24-27	B/E	5.2	0.27	<5	1.6	1.0	0.1	0.8	3.0	0.5	5.4	8.9	39.3	42.9	9.0
	27-40	2Bt3	5.1	0.23	<5	2.6	6.3	2.5	2.1	9.3	0.0	15.1	28.6	47.2	40.8	7.3
	40-60	2Bt4	4.9	0.35	<5	3.7	8.6	2.1	2.9	6.4	0.4	12.6	29.9	57.9	26.6	9.7
Meth fine sandy loam:[1,6] (S82LA-31-21)	0-8	Ap	5.1	0.94	46	1.6	0.5	0.1	0.3	0.2	0.2	1.1	3.6	69.4	6.9	8.3
	8-13	E	5.8	0.41	24	0.7	0.2	0.1	0.4	0.2	0.1	0.7	2.1	66.7	11.8	19.0
	13-20	Bt1	5.6	0.27	<5	1.6	0.5	0.1	0.3	0.0	0.2	0.4	2.9	86.2	0.0	10.3
	20-31	Bt2	5.9	0.33	<5	3.3	1.4	0.2	0.3	0.0	0.2	0.4	5.6	92.9	0.0	5.4
	31-47	Bt3	5.9	0.27	<5	4.2	1.9	0.2	0.3	0.0	0.2	1.4	8.0	82.5	0.0	3.8
	47-62	BC	6.1	0.33	<5	4.1	2.8	0.2	0.3	0.0	0.3	2.2	9.6	77.1	0.0	3.1

See footnotes at end of table.

TABLE 17.--FERTILITY TEST DATA FOR SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	pH 1:1 H_2O	Organic carbon	Extractable phosphorus	Exchangeable cations: Ca	Mg	K	Na	Al	H	Total acidity	Cation-exchange capacity (sum)	Base saturation (sum)	Saturation: Sum of cation-exchange capacity Na	Saturation: Effective cation-exchange capacity Al
	In			Pct	Ppm	Milliequivalents/100 grams of soil								Pct	Pct	Pct
Meth fine sandy loam:[7]																
(S82LA-31-7)	0-3	Ap	5.8	1.56	5	1.8	0.4	0.1	0.2	0.0	0.2	5.0	7.5	33.5	0.0	2.1
	3-11	E	6.2	0.32	5	1.1	0.3	0.1	0.2	0.0	0.4	4.3	6.0	27.7	0.0	2.8
	11-22	Bt1	6.0	0.19	5	4.0	1.6	0.2	0.2	0.0	0.2	3.7	9.7	61.8	0.0	1.9
	22-35	Bt2	5.8	0.02	5	4.1	2.2	0.2	0.2	0.0	0.1	4.1	10.7	61.8	0.0	1.6
	35-44	Bt3	5.6	0.01	5	1.5	0.8	0.1	0.1	0.0	0.0	2.9	5.4	46.3	0.0	2.6
	44-60	BC	5.5	0.01	5	2.2	1.8	0.1	0.2	0.2	0.2	3.9	8.2	52.4	4.3	2.2
Moreland clay:[1]																
(S82LA-31-19)	0-5	Ap	6.7	2.12	56	15.0	14.8	0.8	0.6	0.0	0.2	6.5	37.7	82.8	0.0	1.6
	5-16	A	7.5	0.97	110	19.5	26.8	0.1	1.3	0.0	0.0	4.3	52.0	91.7	0.0	2.5
	16-31	Bw	8.5	0.72	120	48.8	30.0	0.1	3.2	0.0	0.0	1.8	83.9	97.9	0.0	3.8
	31-46	Bk1	8.2	0.56	164	52.0	30.0	0.1	4.8	0.0	0.0	2.5	89.4	97.2	0.0	5.4
	46-60	Bk2	8.1	0.50	236	52.0	30.0	0.1	5.1	0.0	0.0	2.2	89.4	97.5	0.0	5.7
Ochlockonee silt loam:[1,8]																
(S84LA-31-2)	0-6	A	5.5	0.65	36	2.6	1.1	0.2	0.0	0.0	0.0	4.6	8.5	45.9	0.0	0.0
	6-33	C1	4.5	0.17	13	1.6	0.6	0.1	0.0	0.7	0.4	4.8	7.1	32.4	20.6	0.0
	33-60	C2	4.4	0.03	5	0.7	1.3	0.1	0.1	2.5	0.9	7.0	9.2	23.9	44.6	1.1
	60-70	C3	4.5	0.04	5	0.4	1.3	0.1	0.1	3.1	0.7	7.4	9.3	20.4	54.4	1.1
Perry clay:[1]																
(S82LA-31-20)	0-6	Ap	6.1	2.47	86	16.3	13.6	0.5	0.5	0.0	0.2	9.0	39.9	77.4	0.0	1.3
	6-23	Bg1	6.5	1.25	16	16.6	15.6	0.4	1.0	0.0	0.2	7.9	41.5	81.0	0.0	2.4
	23-35	Bg2	7.2	1.19	44	15.6	16.2	0.4	2.1	0.0	0.0	6.1	40.4	84.9	0.0	5.2
	35-45	2BC	7.7	0.69	66	19.5	26.8	0.1	3.5	0.0	0.0	4.3	54.2	92.1	0.0	6.5
	45-60	2Ck	8.2	0.56	160	52.0	26.8	0.1	3.7	0.0	0.0	2.9	85.5	96.6	0.0	4.3
Wrightsville silt loam:[1]																
(S83LA-31-10)	0-1	A	4.3	2.49	5	1.6	0.8	0.1	0.1	1.6	0.7	8.4	11.0	23.6	32.7	0.9
	1-10	Eg	4.5	0.85	5	1.2	0.8	0.1	0.1	2.2	0.5	5.6	7.8	28.2	44.9	1.3
	10-22	B/E	4.8	0.15	5	5.1	3.0	0.1	1.0	3.2	0.5	6.7	15.9	57.9	24.8	6.3
	22-29	Btg1	4.7	0.19	5	9.0	5.4	0.2	4.4	1.2	0.6	5.6	24.6	77.2	5.8	17.9
	29-46	Btg2	4.9	0.01	5	9.0	6.3	0.2	5.7	0.9	0.1	3.9	25.1	84.5	4.1	22.7
	46-52	Btg3	5.1	0.01	5	9.8	6.1	0.2	5.8	0.3	0.5	4.8	26.7	82.0	1.3	21.7
	52-61	Cg	5.3	0.01	5	9.4	6.0	0.2	5.8	0.2	0.3	3.9	25.3	84.6	0.9	22.9

See footnotes at end of table.

TABLE 17.--FERTILITY TEST DATA FOR SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	pH 1:1 H_2O	Organic carbon	Extractable phosphorus	Exchangeable cations: Ca	Mg	K	Na	Al	H	Total acidity	Cation-exchange capacity (sum)	Base saturation (sum)	Saturation: Sum of cation-exchange capacity Na	Saturation: Effective cation-exchange capacity Al
	In			Pct	Ppm	----Milliequivalents/100 grams of soil-----								Pct	Pct	Pct
Yorktown clay:[1]																
(S84LA-31-1)	0-2	Oi	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	2-9	A	---	1.79	121	16.1	16.0	0.6	1.0	0.0	0.0	14.4	48.1	70.1	0.0	2.1
	9-17	Bg1	---	1.34	67	13.9	14.9	0.3	2.0	0.2	0.1	12.6	43.7	71.2	0.6	4.6
	17-28	Bg2	5.7	0.85	20	14.9	20.0	0.3	3.6	0.0	0.0	8.1	46.9	82.7	0.0	7.7
	28-43	Bg3	6.9	0.32	17	15.6	24.7	0.4	4.6	0.0	0.0	4.8	50.1	90.4	0.0	9.2
	43-65	BC	7.5	0.19	153	15.6	24.7	0.5	4.7	0.0	0.0	4.2	49.7	91.5	0.0	9.5

1 Pedon is the same as typical pedon for the series. For the description and location of the soil, see the section "Soil Series and Their Morphology."

2 This pedon is a taxadjunct to the Armistead series because the reaction of the A1, 2A2, 2Bt1, and 2Bt2 horizons is too low.

3 The location of this pedon, in map unit Fc, is about 4.2 miles south of Naborton along the parish road, 0.2 mile east along a private road, and 300 feet south of road; NW1/4SW1/4 sec. 35, T. 12 N., R. 12 W.

4 The reaction of the Ap and C horizons is slightly lower than is typical for the Gallion series, but the difference is within the normal error of observation.

5 The location of this pedon, in map unit Kn, is about 5 miles southeast of Evelyn and 50 feet north of access road; NW1/4SE1/4 sec. 16, T. 11 N., R. 11 W.

6 The reaction of the BC horizon is slightly higher than is typical for the series, but the difference is within the normal error of observation.

7 The reaction of the E horizon is slightly higher than is typical for the series, but the difference is within the normal error of observation. The location of this pedon is about 3.5 miles southwest of Evelyn, 1.5 miles west of the Rambin Store, 0.6 mile south on access road, and 1,000 feet east of road; NW1/4NW1/4 sec. 14, T. 11 N., R. 11 W.

8 The reaction of the C2 horizon is slightly lower than is typical for the series, but the difference is within the normal error of observation.

TABLE 18.--PHYSICAL TEST DATA FOR SELECTED SOILS

(TR means trace. Dashes indicate analyses not made)

Soil name and sample number	Horizon	Depth	Particle-size distribution: Sand: Very coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	Total (2.0-0.5 mm)	Silt (0.25-0.002 mm)	Clay (<0.002 mm)	Fine clay (<0.0002 mm)	Water content: 1/3 bar	15 bar	Water retention	Bulk density: 1/3 bar	Air-dry	Oven-dry	Field moisture
		In	Pct									Pct (wt)			g/cm^3	g/cm^3	g/cm^3	g/cm^3
Bonn silt loam:[1,2] (S82LA-31-5)	A	0-2	---	---	---	---	---	47.0	44.2	8.8	---	17.6	5.8	11.8	---	---	---	---
	E	2-9	---	---	---	---	---	46.3	42.8	10.9	---	17.1	4.2	12.9	---	---	---	---
	E/B	9-15	---	---	---	---	---	48.8	34.7	16.5	---	18.3	5.9	12.4	---	---	---	---
	B/E	15-26	---	---	---	---	---	19.8	51.7	28.5	---	20.4	11.6	8.8	---	---	---	---
	Btng	26-43	---	---	---	---	---	13.8	46.9	39.3	---	21.0	15.9	5.1	---	---	---	---
	BCg	43-66	---	---	---	---	---	11.1	45.1	43.8	---	24.9	18.2	6.7	---	---	---	---
Bowie fine sandy loam:[3,4,5] (S80LA-31-1)	A	0-5	0.3	0.1	1.7	33.8	30.6	66.5	29.9	3.6	1.2	6.4	1.3	0.08	1.66	---	1.66	---
	E	5-11	0.3	0.3	1.5	30.2	27.7	60.0	34.0	6.0	3.6	7.7	1.9	0.10	1.66	---	1.66	---
	Bt1	11-16	0.3	0.2	1.3	24.5	23.6	49.9	30.6	19.5	15.4	11.0	7.7	0.05	1.60	---	1.64	---
	Bt2	16-23	0.3	0.2	1.2	23.0	20.7	45.4	28.6	26.0	20.3	16.1	9.8	0.10	1.62	---	1.67	---
	Bt3	23-33	0.2	0.1	1.1	21.0	19.4	41.8	30.2	28.0	21.9	17.7	10.5	0.12	1.66	---	1.73	---
	[6]	33-40	0.2	0.2	1.0	21.6	20.3	43.3	28.4	28.3	19.8	16.0	10.0	0.10	1.72	---	1.78	---
	Btv1	40-58	0.1	0.1	1.3	25.4	22.2	49.1	27.9	23.0	17.0	15.4	9.1	0.11	1.74	---	1.80	---
	Btv2	58-70	0.1	0.2	2.1	32.4	20.8	55.6	23.0	21.4	14.5	14.3	8.4	0.10	1.76	---	1.79	---
Bowie fine sandy loam:[4,7] (S80LA-31-2)	A	0-7	0.1	0.4	2.8	30.0	28.7	62.0	35.2	2.8	0.8	9.0	1.6	0.13	1.73	---	1.73	---
	E	7-11	0.1	0.4	1.8	23.3	24.8	50.4	41.6	8.0	2.4	10.0	2.4	0.13	1.66	---	1.66	---
	BE	11-15	0.1	0.3	1.6	21.6	24.5	48.1	40.6	11.3	6.5	11.5	4.0	0.12	1.60	---	1.65	---
	Bt1	15-24	0.2	0.2	1.5	18.9	20.4	41.2	35.3	23.5	16.2	14.3	8.3	0.10	1.60	---	1.67	---
	Bt2	24-38	0.2	0.2	1.5	19.0	21.3	42.2	37.2	20.6	15.4	15.9	8.1	0.13	1.69	---	1.76	---
	Btv	38-46	0.1	0.2	1.3	20.5	22.9	45.0	37.7	17.3	11.7	12.7	6.6	0.11	1.74		1.79	
	[6]	46-61	TR	0.2	1.5	22.2	23.9	47.8	35.3	16.9	12.9	12.8	6.5	0.11	1.80	---	1.90	---
	B/E	61-83	TR	0.1	1.4	24.1	23.4	49.0	35.7	15.3	10.9	13.8	6.1	0.14	1.79	---	1.84	---
Keithville very fine sandy loam:[1,3,8] (S83LA-31-2)	A	0-4	1.1	1.2	2.5	19.4	29.6	53.8	42.3	3.9	---	22.5	11.7	10.8	---	1.60	1.62	1.43
	E	4-11	3.3	1.2	1.5	19.0	29.4	54.4	39.7	5.9	---	29.2	5.6	23.6	---	1.63	1.63	1.58
	Bt1	11-17	2.9	1.2	1.1	12.9	20.7	38.8	38.8	22.4	---	26.0	11.7	14.3	---	1.69	1.74	1.53
	Bt2	17-24	1.5	0.6	0.9	11.8	19.9	34.7	39.2	26.1	---	27.4	12.5	14.9	---	1.76	1.83	1.66
	Bt3	24-34	1.1	0.5	0.9	12.3	18.7	35.5	37.5	29.0	---	29.1	15.0	14.1	---	1.85	1.88	1.66
	B/E	34-39	0.7	0.4	0.8	11.3	17.6	30.8	35.9	33.3	---	29.1	13.5	15.6	---	1.87	1.91	1.64
	2Bt	39-55	0.7	0.3	0.6	8.3	13.2	23.1	34.3	42.6	---	33.6	19.4	14.2	---	1.91	1.94	1.63
	2BC	55-67	0.3	0.5	0.8	6.7	11.7	20.0	41.8	38.2	---	35.3	20.5	14.5	---	1.93	1.95	1.71
	[6]	67-75	0.4	0.3	0.6	4.1	7.1	12.5	46.5	41.0	---	37.5	21.3	16.2	---	1.89	1.91	1.65

See footnotes at end of table.

TABLE 18.--PHYSICAL TEST DATA FOR SELECTED SOILS--Continued

Soil name and sample number	Horizon	Depth	Particle-size distribution: Sand: Very coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	Total (2.0-0.5 mm)	Silt (0.25-0.002 mm)	Clay (0.002 mm)	Fine clay (0.0002 mm)	Water content: 1/3 bar	15 bar	Water retention	Bulk density: 1/3 bar	Air-dry	Oven-dry	Field moisture
		In	Pct									Pct (wt)			g/cm^3	g/cm^3	g/cm^3	g/cm^3
Kirvin fine sandy loam:[1,3] (S82LA-31-3)	Ap	0-6	0.3	0.2	0.4	39.9	28.9	69.7	25.2	5.1	---	11.2	2.2	9.0	---	1.52	1.58	1.48
	E	6-13	0.1	0.2	0.3	38.4	28.3	67.3	26.2	6.5	---	10.3	1.7	8.6	---	1.57	1.62	1.55
	Bt1	13-21	0.2	0.1	0.2	17.8	16.7	35.0	20.1	44.9	---	29.7	15.9	13.8	---	1.65	1.71	1.58
	Bt2	21-37	0.4	0.5	0.6	12.5	14.7	28.7	22.8	48.5	---	30.6	17.8	12.8	---	1.67	1.76	1.61
	Bt3	37-50	0.4	0.7	0.8	14.5	20.8	37.2	28.7	34.1	---	28.0	12.9	15.1	---	1.73	1.77	1.66
	C	50-65	0.1	0.3	0.4	24.6	19.4	44.8	26.2	29.0	---	26.2	11.3	14.9	---	1.65	1.71	1.63
Mahan fine sandy loam:[1,3] (S84LA-31-6)	A	0-5	0.0	2.0	4.9	38.9	15.9	61.7	34.0	4.3	---	38.5	11.6	26.9	---	1.62	1.63	1.61
	E	5-9	0.0	1.0	3.2	37.8	16.7	58.7	34.5	6.8	---	27.5	3.5	24.0	---	1.72	1.77	1.71
	Bt1	9-13	0.0	2.0	2.6	30.1	13.8	48.5	30.1	21.4	---	35.0	8.3	26.7	---	1.73	1.75	1.72
	Bt2	13-25	0.0	0.5	1.7	21.7	9.5	33.4	24.2	42.4	---	42.0	15.2	26.8	---	1.73	1.75	1.63
	Bt3	25-50	0.0	2.0	2.1	24.5	9.7	38.3	19.7	42.0	---	42.6	16.6	26.0	---	1.77	1.79	1.68
	BC	50-63	0.0	0.8	3.2	31.8	9.3	45.1	21.0	33.9	---	35.7	14.2	21.5	---	1.87	1.89	1.80
	C	63-75	0.0	2.3	5.3	35.7	8.0	51.3	18.9	29.8	---	34.0	12.5	21.5	---	---	---	---
Metcalf silt loam:[1,3] (S74LA-31-1)	Ap	0-6	0.3	0.5	0.5	14.4	25.3	41.0	59.4	7.6	---	18.1	5.4	0.20	---	---	1.59	1.59
	Bt1	6-11	0.5	0.8	0.8	14.4	25.5	42.0	45.3	12.7	---	14.9	5.1	0.15	---	---	1.58	1.57
	Bt2	11-24	0.5	2.8	4.1	6.5	6.9	20.8	57.6	21.6	---	15.3	6.1	0.15	---	---	1.62	1.60
	B/E	24-27	1.8	0.9	0.8	14.8	22.0	40.3	41.8	17.9	---	17.0	7.2	0.16	---	---	1.60	1.59
	2Bt3	27-40	0.3	0.8	0.7	11.1	15.5	28.4	29.4	42.2	---	34.8	20.9	0.20	---	---	1.81	1.46
	2Bt4	40-60	---	TR	0.3	8.6	18.0	26.9	32.5	40.6	---	36.1	18.0	0.29	---	---	1.94	1.60
Ruston fine sandy loam:[1,9] (S82LA-31-7)	A	0-4	---	---	---	---	---	67.2	29.5	3.3	---	11.3	2.2	9.1	---	---	---	---
	E	4-15	---	---	---	---	---	65.5	30.5	4.0	---	10.3	1.5	8.8	---	---	---	---
	Bt1	15-22	---	---	---	---	---	55.7	31.2	13.1	---	15.0	4.1	10.9	---	---	---	---
	Bt2	22-34	---	---	---	---	---	50.5	28.1	21.4	---	19.2	6.7	12.5	---	---	---	---
	B/E	34-40	---	---	---	---	---	48.9	27.6	23.5	---	22.9	8.1	14.8	---	---	---	---
	B't1	40-50	---	---	---	---	---	48.1	26.8	25.1	---	21.9	9.0	12.1	---	---	---	---
	B't2	50-65	---	---	---	---	---	50.3	27.8	21.9	---	17.3	7.4	9.9	---	---	---	---
	BC	65-85	---	---	---	---	---	54.2	20.8	25.0	---	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 18.--PHYSICAL TEST DATA FOR SELECTED SOILS--Continued

Soil name and sample number	Horizon	Depth	Particle-size distribution: Sand: Very coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	Total (2.0-0.5 mm)	Silt (0.25-0.002 mm)	Clay (0.002 mm)	Fine clay (0.0002 mm)	Water content: 1/3 bar	15 bar	Water retention	Bulk density: 1/3 bar	Air-dry	Oven-dry	Field moisture
		In	Pct									Pct (wt)			g/cm^3	g/cm^3	g/cm^3	g/cm^3
Sacul fine sandy loam:[1,3] (S84LA-31-7)	A	0-4	0.0	2.0	6.3	62.1	5.7	76.1	18.2	5.7	---	38.6	7.4	31.2	---	1.60	1.61	1.59
	E	4-9	0.0	0.8	2.6	61.8	7.5	72.7	19.5	7.8	---	28.1	4.1	24.0	---	1.67	1.69	1.66
	Bt1	9-21	0.0	1.0	1.3	22.4	3.0	27.7	13.8	58.5	---	43.1	24.1	19.0	---	1.71	1.72	1.70
	Bt2	21-31	0.0	0.9	1.6	31.9	3.6	38.0	17.3	44.7	---	41.9	19.1	12.8	---	1.81	1.85	1.55
	Bt3	31-47	0.0	1.1	1.6	42.3	4.0	49.0	15.7	35.3	---	38.3	15.9	22.4	---	1.89	1.90	1.69
	Bt4	47-52	0.0	0.9	1.1	43.1	5.1	50.1	16.1	33.7	---	33.3	16.1	17.2	---	1.88	1.89	1.71
	BC	52-60	0.0	0.7	0.7	45.5	5.4	52.3	15.3	32.4	---	33.3	16.0	17.3	---	1.93	1.94	1.67
	C	60-70	0.2	10.9	5.5	29.3	5.4	51.3	33.7	15.0	---	38.5	11.7	16.8	---	1.97	1.98	1.90

1 Analyses by Louisiana Agricultural Experiment Station Laboratory, Baton Rouge, Louisiana.

2 This pedon was sampled in a pit about 2.0 miles southwest of Longstreet on Louisiana State Highway 5 and 0.5 mile west of highway on private road, SW1/4SW1/4 sec. 36, T. 13 N., R. 16 W. The pedon is a taxadjunct to the Bonn series because the clay content in the Btg1 and Btg2 horizons is too high and the loam texture in the A and E horizons is not within the range of characteristics for the Bonn series.

3 This is the typical pedon for the series in De Soto Parish. For the description and location of the soil, see the section "Soil Series and Their Morphology."

4 Analyses by Soil Survey Investigations Staff, Lincoln, Nebraska.

5 This pedon has 0.6 percent more very fine sand in the A horizon than is tyical for the Bowie series. This difference is within the normal error of observation.

6 Horizon was split for sampling purposes.

7 This pedon has slightly less clay in the A horizon than is typical for the Bowie series. Also, the bulk density of the A and E horizons is slightly higher than is typical for the series. These differences are within the normal error of observation. The pedon is 647 feet south and 1,625 feet east of the northwest corner of the NE1/4 of sec. 35, T. 12 N., R. 16 W.

8 This pedon contains slightly more sand that is coarser than very fine sand in the particle-size control section than is typical for the Keithville series. This difference is within the normal error of observation.

9 This Ruston pedon is a taxadjunct to the Ruston series because the clay content in the A, E, and Bt1 horizons is slightly less than is typical for the series. The pedon is about 0.6 mile south of Hunter, 0.8 mile west of Highway 174 on dirt road, about 350 feet north on pipeline and 60 feet east; NE1/4NE1/4 sec. 1, T. 10 N., R. 15 W.

TABLE 19.--CHEMICAL TEST DATA FOR SELECTED SOILS

(Dashes indicate analyses not made. The symbol < means less than. TR means trace)

Soil name and sample number	Horizon	Depth	Extractable cations: Ca	Extractable cations: Mg	Extractable cations: K	Extractable cations: Na	Extractable acidity	Cation-exchange capacity NH$_4$OAc	Base saturation NH$_4$OAc	Organic carbon	pH 1:1 H$_2$O	pH 1:1 KCl	pH 1:2 CaCl$_2$	Extractable iron	Extractable aluminum	Extractable hydrogen	Extractable phosphorus: Bray 1	Extractable phosphorus: Bray 2
		In	Meq/100g				Pct	Pct		Pct				Pct	Meq/100g		Ppm	
Bonn silt loam:[1,2] (S82LA-31-5)	A	0-2	4.2	1.4	0.1	0.1	9.0	12.1	39.2	---	5.7	4.3	4.8	0.2	0.0	0.4	---	19
	E	2-9	1.6	1.1	0.1	0.2	14.0	7.2	17.6	---	5.4	4.0	4.5	0.2	0.6	0.2	---	<1
	E/B	9-15	1.6	1.8	<0.1	1.3	3.0	7.3	61.0	---	5.6	4.3	5.2	0.2	0.0	0.2	---	<1
	B/E	15-26	2.1	3.0	0.1	3.2	1.5	8.4	84.7	---	7.8	6.6	7.7	0.2	0.0	0.2	---	41
	Btng	26-43	2.8	5.0	0.1	4.9	2.6	15.5	83.1	---	8.3	7.1	8.1	0.2	0.0	0.2	---	82
	BCg	43-66	3.4	6.3	<0.1	6.3	2.6	19.5	86.7	---	8.4	7.3	8.2	0.1	0.0	0.2	---	123
Bowie fine sandy loam:[3,4] (S80LA-31-1)	A	0-5	0.7	0.3	0.1	---	1.1	2.1	52.0	0.57	5.3	---	4.5	0.2	0.2	---	---	---
	E	5-11	0.5	0.4	0.4	---	0.5	1.7	76.0	0.19	5.4	---	4.6	0.3	0.2	---	---	---
	Bt1	11-16	1.9	1.6	0.4	---	3.7	5.8	67.0	0.30	5.3	---	4.5	1.3	0.5	---	---	---
	Bt2	16-23	2.0	2.1	0.4	---	3.7	7.1	63.0	0.20	5.3	---	4.4	1.5	0.8	---	---	---
	Bt3	23-33	0.9	2.0	0.2	---	5.8	7.2	43.0	0.13	4.9	---	4.1	2.0	1.7	---	---	---
	[5]	33-40	0.3	1.8	0.1	---	5.7	6.4	34.0	0.06	4.8	---	4.0	1.6	2.0	---	---	---
	Btv1	40-58	0.2	1.4	0.1	---	5.4	6.0	28.0	0.05	4.7	---	4.1	1.5	2.3	---	---	---
	Btv2	58-70	0.1	1.0	0.1	---	5.2	5.4	22.0	0.04	4.7	---	3.9	1.4	2.6	---	---	---
Bowie fine sandy loam:[4,6] (S80LA-31-2)	A	0-7	0.4	0.1	TR	---	1.0	1.5	33.0	0.33	5.1	---	4.4	0.3	0.3	---	---	---
	E	7-11	0.8	0.2	TR	---	1.5	2.0	50.0	0.17	5.2	---	4.5	0.4	0.2	---	---	---
	BE	11-15	1.5	0.6	0.1	---	2.0	3.3	67.0	0.20	5.3	---	4.6	0.6	0.2	---	---	---
	Bt1	15-24	2.7	1.9	0.1	TR	3.9	6.8	69.0	0.18	5.3	---	4.6	1.2	0.4	---	---	---
	Bt2	24-38	1.9	1.8	0.1	TR	4.5	5.9	64.0	0.06	5.1	---	4.4	1.2	0.6	---	---	---
	Btv	38-46	1.5	1.4	0.1	0.1	2.7	4.5	69.0	0.04	5.0	---	4.4	1.0	0.5	---	---	---
	[5]	46-61	1.2	1.4	0.1	---	3.2	4.6	59.0	0.03	4.9	---	4.2	1.1	0.7	---	---	---
	B/E	61-83	0.4	0.9	0.1	---	3.2	4.1	34.0	0.04	4.7	---	4.0	1.0	1.6	---	---	---
Keithville very fine sandy loam:[1,3] (S83LA-31-2)	A	0-4	2.8	0.8	0.1	<0.1	8.2	8.5	43.0	4.17	5.4	4.4	4.7	0.26	0.3	0.1	---	7.6
	E	4-11	0.7	0.4	<0.1	<0.1	1.8	2.5	44.0	<0.01	5.5	4.3	4.6	0.23	0.3	0.1	---	0.4
	Bt1	11-17	0.9	1.3	0.1	<0.1	6.6	7.8	29.0	<0.01	5.1	3.7	4.1	0.61	3.8	0.0	---	<0.1
	Bt2	17-24	1.3	2.0	0.1	<0.1	6.6	9.8	34.0	<0.01	5.2	3.7	4.2	0.79	3.0	0.6	---	<0.1
	Bt3	24-34	1.1	2.2	0.1	<0.1	7.8	11.1	30.0	<0.01	4.9	3.6	4.1	0.87	4.0	0.4	---	<0.1
	B/E	34-39	1.1	2.7	0.1	<0.1	9.9	13.1	29.0	<0.01	4.9	3.5	4.1	0.93	5.6	0.3	---	<0.1
	2Bt	39-55	2.2	5.8	0.1	0.4	13.2	19.6	43.0	<0.01	4.9	3.4	4.1	1.38	7.8	0.3	---	<0.1
	2BC	55-67	2.8	7.6	0.1	0.5	11.4	21.5	51.0	<0.01	4.8	3.3	4.0	0.86	7.2	0.0	---	<0.1
	[5]	67-75	2.4	6.5	0.1	0.6	10.3	29.2	32.0	<0.01	4.7	3.1	4.0	0.75	6.4	0.0	---	<0.1

See footnotes at end of table.

TABLE 19.--CHEMICAL TEST DATA FOR SELECTED SOILS--Continued

Soil name and sample number	Horizon	Depth	Extractable cations: Ca	Extractable cations: Mg	Extractable cations: K	Extractable cations: Na	Extractable acidity	Cation-exchange capacity NH$_4$OAc	Base saturation NH$_4$OAc	Organic carbon	pH 1:1 H$_2$O	pH 1:1 KCl	pH 1:2 CaCl$_2$	Extractable iron	Extractable aluminum	Extractable hydrogen	Extractable phosphorus: Bray 1	Extractable phosphorus: Bray 2
		In	Meq/100g				Pct	Pct		Pct				Pct	Meq/100g		Ppm	
Kirvin fine sandy loam:[1,3] (S82LA-31-3)	Ap	0-6	0.8	0.2	<0.1	<0.1	4.2	4.2	23.8	1.9	5.3	4.2	4.6	0.3	0.2	0.2	---	13.4
	E	6-13	0.2	0.2	<0.1	<0.1	2.0	4.1	9.8	0.1	5.2	4.0	4.3	0.3	0.6	0.2	---	12.4
	Bt1	13-21	0.4	1.8	0.2	<0.1	8.3	12.3	19.5	0.1	5.1	3.5	4.1	2.5	4.6	0.8	---	12.1
	Bt2	21-37	0.1	2.0	0.2	<0.1	14.6	15.0	15.3	<0.1	5.0	3.5	4.1	3.2	6.2	1.0	---	11.2
	Bt3	37-50	<0.1	1.2	0.1	<0.1	11.4	11.1	11.7	<0.1	5.0	3.4	3.9	2.4	7.1	1.2	---	12.5
	C	50-65	<0.1	0.8	<0.1	<0.1	8.8	8.6	9.3	<0.1	4.9	3.4	3.8	1.0	6.6	1.5	---	12.2
Mahan fine sandy loam:[1,3] (S84LA-31-6)	A	0-5	3.0	0.8	0.2	0.1	9.0	9.7	42.3	1.85	5.8	4.6	5.4	0.60	0.0	0.0	18	23
	E	5-9	0.7	0.4	0.1	0.1	5.0	5.6	23.2	0.40	6.0	4.6	5.2	0.59	0.2	0.1	0	4
	Bt1	9-13	1.6	1.4	0.2	0.2	5.2	7.6	44.7	0.31	5.6	4.2	4.7	0.99	0.9	0.1	0	2
	Bt2	13-25	2.1	2.5	0.3	0.1	9.0	12.0	41.7	0.22	5.8	4.1	4.6	2.00	1.4	0.2	0	1
	Bt3	25-50	0.3	1.3	0.2	0.1	10.1	10.8	17.6	0.14	5.4	3.9	4.3	2.78	2.9	0.3	1	8
	BC	50-63	0.1	0.8	0.2	0.1	8.3	8.6	14.0	0.11	5.2	3.8	4.1	2.78	2.9	0.3	0	2
	C	63-75	0.1	0.5	0.2	0.1	8.6	9.0	10.0	0.11	5.1	3.8	4.1	2.52	2.7	0.2	0	2
Metcalf silt loam:[1,3] (S74LA-31-1)	Ap	0-6	2.7	0.7	0.1	0.3	5.1	5.7	67.0	1.08	5.1	4.4	4.4	1.1	0.0	0.4	---	27
	Bt1	6-11	1.5	0.9	0.1	0.1	4.5	5.7	46.0	0.21	5.2	4.0	4.1	1.0	0.1	1.4	---	2
	Bt2	11-24	1.1	1.0	0.1	0.2	6.2	5.7	42.0	0.21	5.2	3.9	4.0	1.5	2.0	0.8	---	2
	B/E	24-27	0.8	1.4	0.1	0.4	6.9	7.5	36.0	0.14	5.4	3.9	3.9	1.1	2.7	0.5	---	1
	2Bt3	27-40	2.0	6.2	0.2	1.8	16.3	22.1	46.0	0.11	4.9	3.6	3.6	1.5	7.3	0.7	---	1
	2Bt4	40-60	2.7	7.1	0.2	2.0	13.0	21.1	57.0	0.13	4.9	3.6	3.7	1.0	5.4	0.8	---	2
Ruston fine sandy loam:[1,7] (S82LA-31-4)	A	0-4	1.4	0.3	0.1	<0.1	4.0	5.1	7.8	1.1	5.6	4.3	4.6	0.1	0.1	0.3	---	11.1
	E	4-15	0.3	0.1	0.1	<0.1	1.0	2.2	22.7	0.1	5.7	4.3	4.7	0.2	0.2	0.2	---	7.8
	Bt1	15-22	1.6	0.4	0.1	<0.1	1.6	3.8	55.3	<0.1	5.9	4.5	5.2	0.5	0.2	0.1	---	9.6
	Bt2	22-34	2.6	1.2	0.1	<0.1	2.6	6.6	59.1	<0.1	5.8	4.6	5.1	0.9	0.1	0.3	---	10.0
	B/E	34-40	2.2	1.3	0.1	<0.1	2.0	6.5	55.4	<0.1	5.6	4.1	4.8	1.0	0.2	0.4	---	9.8
	B't1	40-50	2.0	1.4	0.1	<0.1	3.7	6.5	53.8	<0.1	5.4	4.0	4.6	1.0	0.6	0.5	---	11.7
	B't2	50-65	1.2	1.1	0.1	<0.1	3.1	6.2	38.7	<0.1	5.6	3.9	4.6	0.8	1.1	0.5	---	13.7
	BC	65-85	1.1	1.5	0.1	<0.1	4.2	7.0	38.6	<0.1	5.3	3.7	4.3	0.8	2.9	0.7	---	10.3

See footnotes at end of table.

TABLE 19.--CHEMICAL TEST DATA FOR SELECTED SOILS--Continued

Soil name and sample number	Horizon	Depth	Extractable cations: Ca	Extractable cations: Mg	Extractable cations: K	Extractable cations: Na	Extractable acidity	Cation-exchange capacity (NH_4OAc)	Base saturation (NH_4OAc)	Organic carbon	pH 1:1 H_2O	pH 1:1 KCl	pH 1:2 $CaCl_2$	Extractable iron	Extractable aluminum	Extractable hydrogen	Extractable phosphorus: Bray 1	Extractable phosphorus: Bray 2
		In	Meq/100g	Meq/100g	Meq/100g	Meq/100g	Pct	Pct	Pct	Pct				Pct	Meq/100g	Meq/100g	Ppm	Ppm
Sacul fine sandy loam:[3,8] (S84LA-31-7)	A	0-4	6.6	0.7	0.1	0.1	3.2	9.8	76.5	1.15	6.4	5.5	6.1	0.37	0.0	0.0	8	10.3
	E	4-9	2.2	0.8	0.1	0.1	2.5	5.0	64.0	0.37	6.5	5.2	5.8	0.38	0.0	0.0	5	7.0
	Bt1	9-21	0.5	2.7	0.2	0.1	18.8	20.2	17.3	0.30	5.0	3.5	4.1	2.49	8.0	0.6	0	1.0
	Bt2	21-31	0.3	1.8	0.2	0.2	16.8	19.2	13.0	0.15	5.0	3.5	4.0	2.04	8.0	0.6	0	2.0
	Bt3	31-47	0.2	1.6	0.1	0.2	13.6	14.3	14.7	0.07	4.8	3.6	4.0	1.94	6.9	0.8	0	1.0
	Bt4	47-52	0.3	1.6	0.1	0.3	15.7	17.7	13.0	0.11	5.1	3.4	3.9	1.57	8.2	0.8	0	1.0
	BC	52-60	0.3	2.0	0.1	0.5	16.2	18.5	15.7	0.08	4.8	3.8	4.3	0.94	9.1	0.5	0	2.0
	C	60-70	0.4	2.4	0.1	0.9	14.8	18.2	20.9	0.04	4.8	3.5	4.0	0.51	6.7	1.1	0	3.0

1 Analyses by the Louisiana Agricultural Experiment Station Laboratory, Baton Rouge, Louisiana.

2 This pedon was sampled in a pit about 2.0 miles southwest of Longstreet on Louisiana State Highway 5 and 0.5 mile west of highway on private road, SW1/4SW1/4 sec. 36, T. 13 N., R. 16 W.

3 This is the typical pedon for the series in De Soto Parish. For the description and location of the soil, see the section "Soil Series and Their Morphology."

4 Analyses by the Soil Survey Investigations Staff, Lincoln, Nebraska

5 Horizon was split for sampling purposes.

6 This Bowie pedon is 647 feet south and 1,625 feet east of the northwest corner of the NE1/4 of sec. 35, T. 12 N., R. 16 W.

7 This Ruston pedon is about 0.6 mile south of Hunter, 0.8 mile west of Highway 174 on dirt road, about 350 feet north on pipeline, 60 feet east; NE1/4NE1/4 sec. 1, T. 10 N., R. 15 W. It is a taxadjunct to the Ruston series because the base saturation is slightly higher than is typical for the series.

8 This Sacul pedon is a taxadjunct to the Sacul series because the reaction of the E horizon is slightly higher than is typical for the series.

TABLE 20.--MINERALOGY DATA OF VERY FINE SAND, SILT, AND CLAY FRACTIONS OF SELECTED SOILS

(The symbol < means less than. TR means trace)

Soil name and sample number	Depth	Horizon	Very fine sand and silt fraction* 100-50, 50-2	Clay fraction* 0.2-2.0	Clay fraction* <0.2
	In		Microns	Microns	Microns
Bonn silt loam:** (S82LA-31-5)	9-15	E/B	QZ1a, MI3, FF3	---	---
	15-26	B/E	QZ1a, MI3, FF3, CC3		
	26-43	Btng	QZ1a, MI3, FF3, CC3		
	43-66	BCg	QZ1a, MI3, FF3, CC3		
Bowie fine sandy loam:*** (S80LA-31-1)	16-23	Bt2	FK3, RM1a	KH2, VR3, MI3, GE3	---
	58-70	Btv2	FK3, RM1a	KH2, GE3, VR3, MI3	
Bowie fine sandy loam:*** (S80LA-31-2)	15-24	Bt1	FK3, RM1a	KH2, VR3, MI3, GE3	---
	46-61	Btv	FK3, RM1a	KH1, VR3, GE3, MI3	
Keithville very fine sandy loam:** (S83LA-31-2)	11-17	Bt1	QZ1a, FF3, MI3	---	---
	17-24	Bt2	QZ1a, FF3, MI3		
	24-34	Bt3	QZ1a, FF3, MI3		
Kirvin fine sandy loam:** (S82LA-31-3)	0-6	Ap	---	KK1, VR2, MI2, IT3, QZ3, FF3	---
	6-13	E		KK1, VR2, MI2, IT3, QZ3, FF3	
	13-21	Bt1		KK1, VR2, IT3, QZ3	
	21-37	Bt2		KK1, VR2, IT3, QZ3	
	37-50	Bt3		KK1, MI2, MT3, IT3, QZ3	
	50-65	C		KK1, MI2, MT3, IT3, QZ3	
Mahan fine sandy loam:** (S84LA-31-6)	9-13	Bt1	---	KK1, VR2, C+M2, MT3, MI3	---
	13-25	Bt2		KK1, VR2, C+M2, MT3, MI3	
	25-50	Bt3		KK1, VR2, C+M2, MT3, MI3	
Metcalf silt loam:** (S74LA-31-1)	0-6	Ap	QZ1	QZ1, KK2, IT2, FF3, MT3, VR3	KK2, C+M2, CL2, MT2
	27-40	2Bt3	QZ1, FF3	QZ2, KK2, IT2, FF3, MI3, C+M	MT1, KK2, FF2
Ruston fine sandy loam:** (S82LA-31-4)	0-4	A	QZ1a	---	---
	4-15	E	QZ1a		
	15-22	Bt1	QZ1a		
	22-34	Bt2	QZ1a		
	34-40	B/E	QZ1a		
	40-50	B't1	QZ1a		
	50-65	B't2	QZ1a		
	65-85	BC	QZ1a		

See footnotes at end of table.

TABLE 20.--MINERALOGY DATA OF VERY FINE SAND, SILT, AND CLAY FRACTIONS OF SELECTED SOILS--Continued

Soil name and sample number	Depth	Horizon	Very fine sand and silt fraction*	Clay fraction*	
			100-50, 50-2	0.2-2.0	<0.2
	In		--------Microns--------	------------Microns------------	-----Microns-------
Sacul fine sandy loam:**					
(S84LA-31-7)	9-21	Bt1	---	KK1, MT2, MI2, VR2, C+M2	---
	21-31	Bt2		KK1, MT2, MI2, VR2, C+M2	
	31-47	Bt3		KK1, MT2, MI2, VR2, C+M2	

* Code for mineralogical data in very fine sand and silt fraction and clay fraction columns: The letters represent the kind of mineral; the combination of letters represents the stratification of minerals; and the number represents the quantity of mineral. Minerals are listed in the table in order of abundance, decreasing from left to right.

Kind of mineral:
- CC--calcite
- CL--chlorite
- FF--feldspars
- IT--illite
- KK--kaolinite
- MT--montmorillonite
- QZ--quartz
- VR--vermiculite
- MI--mica
- KH--halloysite
- GE--geothite
- FK--potash--feldspars
- RM--minerals resistant to weathering

Stratification:
- C+M--interstratified (regular) chlorite and montmorillonite

Quantity of mineral
- 1a--Dominant--greater than 90 percent
- 1--Abundant--greater than 40 percent
- 2--Moderate--10 to 40 percent
- 3--Slight--less than 10 percent

** Analyses by the Louisiana Agricultural Experiment Station Laboratory, Baton Rouge, Louisiana.

*** Analyses by the Soil Survey Investigations Staff, Lincoln, Nebraska.

TABLE 21.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
*Armistead	Fine-silty, mixed, thermic Aquic Argiudolls
Beauregard	Fine-silty, siliceous, thermic Plinthaquic Paleudults
Bienville	Sandy, siliceous, thermic Psammentic Paleudalfs
Bonn	Fine-silty, mixed, thermic Glossic Natraqualfs
Bowie	Fine-loamy, siliceous, thermic Plinthic Paleudults
Buxin	Fine, mixed, thermic Vertic Hapludolls
Cahaba	Fine-loamy, siliceous, thermic Typic Hapludults
Caspiana	Fine-silty, mixed, thermic Typic Argiudolls
Eastwood	Fine, montmorillonitic, thermic Vertic Hapludalfs
Elysian	Coarse-loamy, siliceous, thermic Haplic Glossudalfs
Flo	Sandy, siliceous, thermic Psammentic Paleudalfs
Forbing	Very fine, montmorillonitic, thermic Vertic Paleudalfs
Gallion	Fine-silty, mixed, thermic Typic Hapludalfs
Gore	Fine, mixed, thermic Vertic Paleudalfs
Guyton	Fine-silty, siliceous, thermic Typic Glossaqualfs
Iuka	Coarse-loamy, siliceous, acid, thermic Aquic Udifluvents
Keithville	Fine-silty, siliceous, thermic Glossaquic Paleudalfs
Kirvin	Clayey, mixed, thermic Typic Hapludults
Kolin	Fine-silty, siliceous, thermic Glossaquic Paleudalfs
Larue	Loamy, siliceous, thermic Arenic Paleudalfs
Mahan	Clayey, kaolinitic, thermic Typic Hapludults
Metcalf	Fine-silty, siliceous, thermic Aquic Glossudalfs
Meth	Fine, mixed, thermic Ultic Hapludalfs
Moreland	Fine, mixed, thermic Vertic Hapludolls
Ochlockonee	Coarse-loamy, siliceous, acid, thermic Typic Udifluvents
Perry	Very fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts
Ruston	Fine-loamy, siliceous, thermic Typic Paleudults
*Sacul	Clayey, mixed, thermic Aquic Hapludults
Wrightsville	Fine, mixed, thermic Typic Glossaqualfs
Yorktown	Very fine, montmorillonitic, nonacid, thermic Typic Fluvaquents

* The soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

* U.S. Government Printing Office: 1991-311-694/40033

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