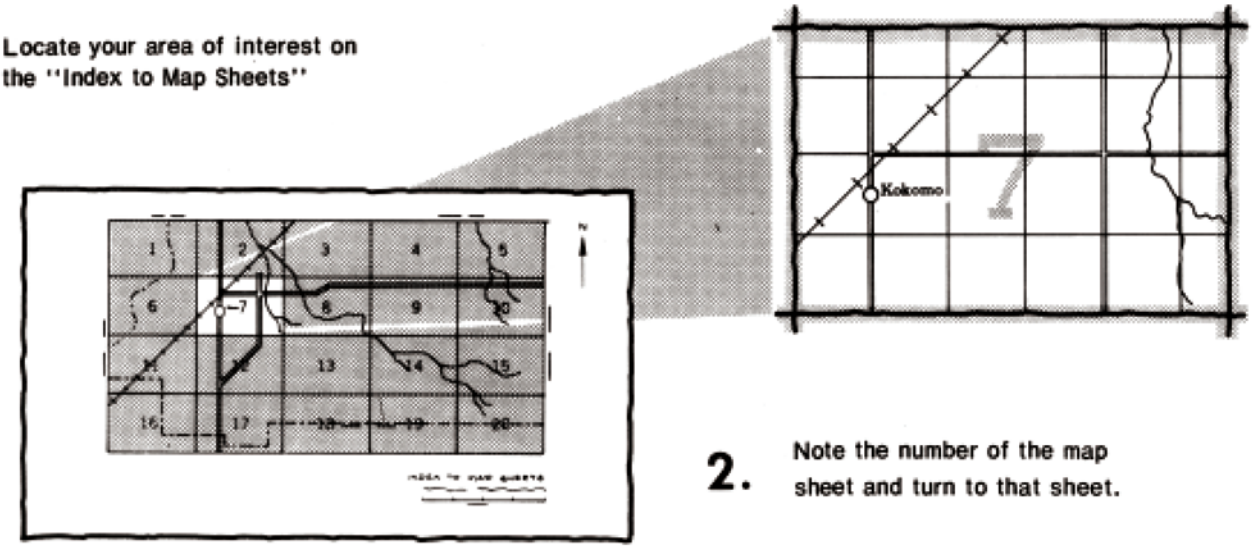
Soil Survey Of

Cooke County, Texas

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

HOW TO USE

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



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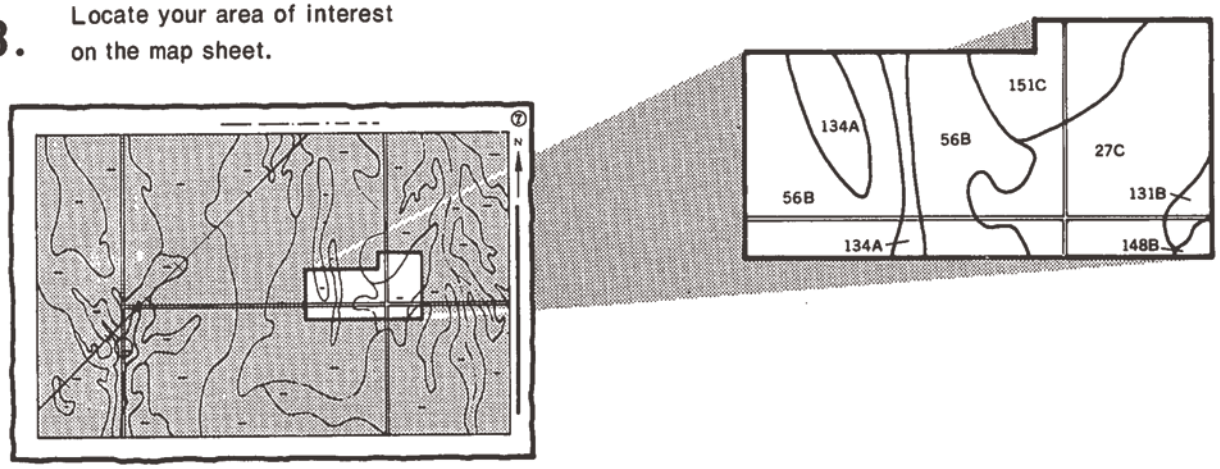

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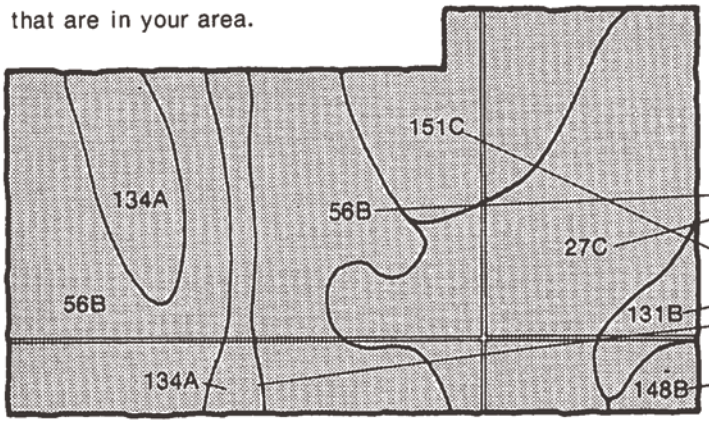

Symbols

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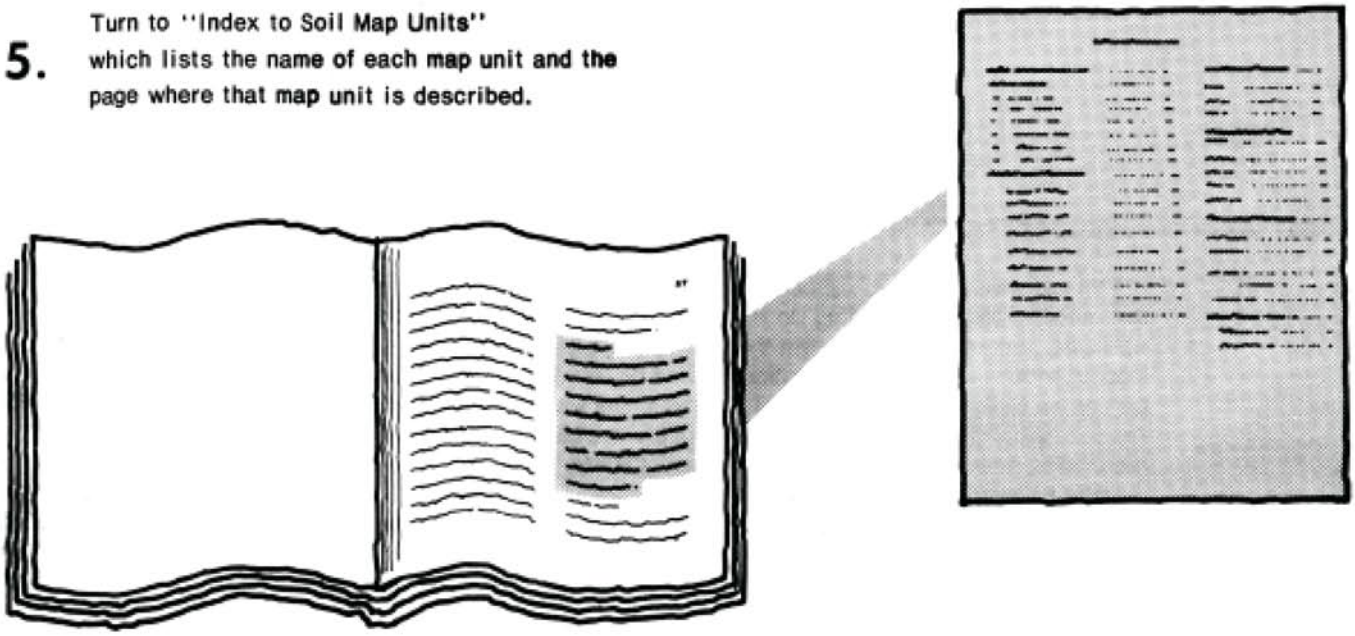
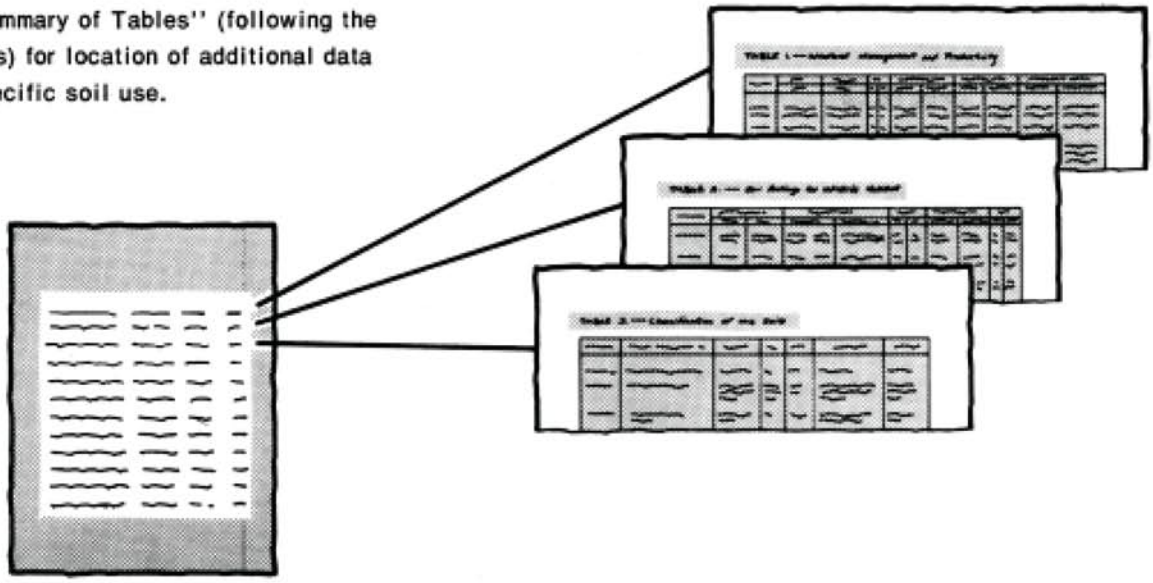
THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1960-73. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1975. This survey was made cooperatively by the Soil Conservation Service and the Texas Agricultural Experiment Station. It is part of the technical assistance furnished to the Upper Elm-Red Soil and Water Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Wheat and grain sorghum on Slidell-San Saba complex, 1 to 3 percent slopes.

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Foreword

The Soil Survey of Cooke County, Texas, contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

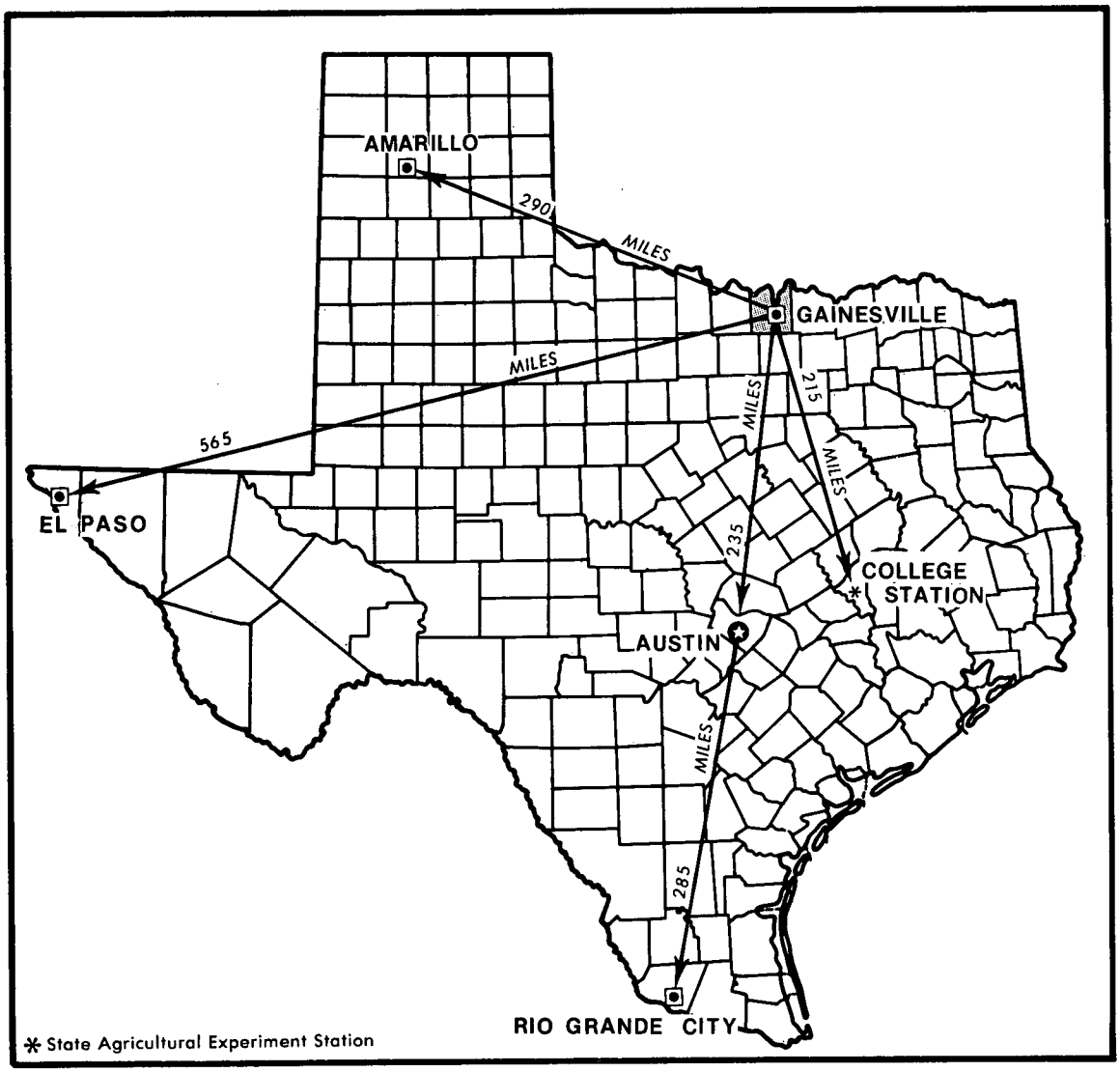
This soil survey has been prepared for many different users. Farmers, ranchers, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

George C. Marks
State Conservationist
Soil Conservation Service



Location of Cooke County in Texas.

SOIL SURVEY OF COOKE COUNTY, TEXAS

By Lee A. Putnam, Charles R. Cail, Rex A. Cochran, William J. Guckian,
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Soil Conservation Service

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

COOKE COUNTY is in the northern part of north-central Texas. It is bordered on the north by the Red River and the State of Oklahoma, on the east by Grayson County, on the south by Denton and Wise Counties, and on the west by Montague County. The total land area of the county is 581,760 acres, or 909 square miles.

Cooke County is in the Grand Prairie and the Cross Timbers Land Resource Areas. The soils of the Grand Prairie formed under grass and are mainly dark colored and loamy and clayey. The soils of the Cross Timbers formed under post oak savannah and are mainly light colored and sandy and loamy.

General nature of the county

The paragraphs that follow provide general information on the history of the county, the natural resources, the ranching and farming, the geology, and the climate.

History

Cooke County was created and organized from Fannin County in 1848. It was named for Captain W. G. Cooke, a hero of the Battle of San Jacinto during the Texas Revolution.

Gainesville, the county seat and largest town, is located near the center of the county about 7 miles south of the Red River. The population of Gainesville in 1970 was 13,830. The population of the county totaled 23,471. Other towns in the county are Muenster, Lindsay, Valley View, Myra, Era, and Callisburg.

Natural resources

Soil is the most important natural resource in the county. The economy is based on the production of forage, livestock, and food and fiber for market and home.

Oil and gas provide a source of income to some landowners.

Water is another natural resource. Lake Texoma, Lake Hubert H. Moss, and Lake Kiowa provide recreation. Most lakes in the county also provide water for livestock.

Wildlife produced on farms and ranches provides recreation and a source of income for many residents.

Ranching and farming

Cattle ranching, the first agricultural enterprise in the county, is still the main enterprise. Also raised are dairy cattle, hogs, horses, and poultry.

Crop production was once a major enterprise in the county, but much of the cropland has been converted to improved pasture. The main crops are grain sorghum, small grain, cotton, soybeans, and peanuts. Pecan orchards do well on some soils in the county.

Geology

The soils of Cooke County developed from parent materials ranging from Cretaceous to Recent in geologic age (*3*). The oldest strata are exposed in the western part of the county. Younger bedrock units are exposed in sequence toward the east. Alluvium and terrace deposits overlap the bedrock along streams and rivers.

The outstanding geologic event in Cooke County was the encroachment of the Comanchean Sea. This Early Cretaceous sea moved slowly from the Gulf of Mexico to cover all of Texas. It extended northward to cover the Arbuckle uplift in southern Oklahoma and then gradually receded (*4*). After a period of exposure and erosion, sediments from this period were covered by the less extensive sea of the Gulfian Epoch.

Comanchean Series rocks of the Cretaceous System are divided into three major divisions, the Trinity, the Fredericksburg, and the Washita Groups.

The Trinity Group is represented by the Antlers Sand Formation, which is exposed in the western and northwestern parts of the county. This unit is dominantly poorly cemented sandstone and scattered lentils of clay, which vary in thickness. Locally, some indurated sandstone layers project as massive ledges, forming hills and escarpments. Formed on the Antlers Sand are Duffau, Windthorst, and associated soils.

The Antlers Sand is overlain by the Walnut Clay and Goodland Limestone Formations of the Fredericksburg Group. The Walnut Clay consists of interbedded oyster shells and shale grading upward to hard, massive beds of Goodland Limestone. These formations cover a large part of western Cooke County and frequently cap high escarpments overlooking the Antlers Sand outcrop. Formed over the Fredericksburg strata are Maloterre, Purves, and associated soils.

Stratigraphic units of the Washita Group crop out throughout the central part of the county. These formations, from oldest to youngest, are the Kiamichi, Duck Creek, Fort Worth Limestone, Denton Clay, Weno Limestone, Pawpaw, Main Street Limestone, and Grayson Marl. The rock units consist of marine shaly clays, marls, and subordinate limestone. Formed on the shale and marl strata are Sanger, Wilson, Crockett, and associated soils, and on the limestone beds are San Saba, Bolar, Maloterre, and associated soils.

The Woodbine Formation of the Gulfian Series (Cretaceous System) is exposed in an outcrop about 6 to 8 miles wide along the eastern edge of the county. The Woodbine is subdivided into four stratigraphic units. From oldest to youngest are the Dexter, the Red Branch, the Lewisville, and the Templeton Members. These stratigraphic units are largely sandstone and shale. The topography is hilly. The tops of many hills are covered with ferruginous sandstone fragments and boulders. Formed over the Woodbine strata are Gasil, Callisburg, and associated soils. Surficial materials include sand, gravel, silt, and clay fluvial deposits of Pleistocene age and flood plain deposits of Recent age. The alluvium of streams draining southward into the Trinity River system is generally erosional debris from nearby Cretaceous Formations. Alluvium in the Red River valley is mainly of sediment transported long distances from the exposed Pennsylvanian and Permian Formations upstream. As a general rule, the high stream terrace deposits are sediments from Pennsylvanian Formations and the present flood plain deposits are derived from the more clayey Permian Formations.

Soils developed in these surficial deposits vary with the character of the sediment. On terraces along the Red River are Minco, Teller, and associated soils. On bottom land along the Red River are Miller, Yahola, and associated soils. Gowen and associated soils occur on bottom land where the Trinity River drains noncalcareous soils. The Trinity, Frio, and associated soils occur on bottom land where the Trinity River drains calcareous soils.

Along the contacts between geologic formations a mixing of sediments by erosion has occurred. It is most evident where the formations have widely different characteristics.

In the area between formations of the Fredericksburg and Trinity Groups, strongly calcareous materials of the higher lying Fredericksburg Group have moved downslope so as to cover the noncalcareous Trinity Group. Further movement downslope has mixed these sediments into material that differs from that in the original formations.

This same type of mixing has taken place in the contact area between the Woodbine Formation and the upper units of the Washita Group. In this area debris from the higher lying noncalcareous Woodhine Formation generally conceals the calcareous Washita Group.

In these areas of mixed parent materials, unlike soils occur in close association. Small areas of calcareous soils with grass cover occur in intricate patterns with acid soils and oak forest cover.

Climate

Cooke county is hot in summer but cool in winter when an occasional surge of cold air causes a sharp drop in otherwise mild temperatures. Rainfall is uniformly distributed throughout the year, reaching a slight peak in spring. Snowfalls are infrequent. Annual total precipitaton is normally adequate for cotton, feed grains, and small grains.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Gainesville, Texas, for the period 1951 to 1976. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 44 degrees F, and the average daily minimum temperature is 31 degrees. The lowest temperature on record, which occurred at Gainesville on January 14, 1966, is 0 degrees. In summer the average temperature is 82 degrees, and the average daily maximum temperature is 94 degrees. The highest recorded temperature, which occurred on August 5, 1956, is 112 degrees.

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

Of the total annual precipitation, 20 inches, or 60 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than

15 inches. The heaviest 1-day rainfall during the period of record was 5.50 inches at Gainesville on February 9, 1966. Thunderstorms occur on about 50 days each year, and most occur in spring.

Snowfall is rare; in 60 percent of the winters there is no measurable snowfall. In 20 percent, the snowfall, usually of short duration, is more than 2 inches. The heaviest 1-day snowfall on record was more than 6 inches.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The percentage of possible sunshine is 70 in summer and 60 in winter. The prevailing wind is from the south. Average windspeed is highest, 13 miles per hour, in spring.

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

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

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The soils in the survey area vary widely in their potential for major land uses. Table 4 shows the extent of the map units shown on the general soil map and gives general ratings of the potential of each, in relation to the other map units, for major land uses. Soil properties that

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

Each map unit is rated for *cultivated farm crops, range, improved pasture, urban uses,* and *recreation areas*. Cultivated farm crops are those grown extensively by farmers in the survey area. Range is land on which the native vegetation is used for grazing. Improved pasture is land on which improved grasses, such as improved bermudagrass, are planted and receive cultural treatments as needed. Urban uses include residential, commercial, and industrial developments. Recreation areas include campsites, picnic areas, ballfields, and areas used for nature study and as wilderness.

The nine soil units in Cooke County are described on the following pages.

Clayey and loamy soils of the prairies

This group of soils makes up about 59 percent of the county. The major soils are Sanger, Slidell, San Saba, Normangee, Wilson, Crockett, Maloterre, Venus, Purves, and Aledo. These are nearly level to hilly soils on uplands and terraces. They range from very shallow to deep.

The deep soils are used mainly for crops or improved pasture. The very shallow and shallow soils are used for range. The main crops are grain sorghum and small grain. The native plants are little bluestem, indiangrass, sideoats grama, switchgrass, and Texas needlegrass.

The potential for most urban and recreational uses is low. The shrinking and swelling with changes in moisture content, the depth to rock, the risk of corrosion to uncoated steel, and the slow percolation of water are the main limiting features.

1. Sanger-Slidell-San Saba

Clayey soils that are deep and moderately deep, nearly level to sloping; on uplands

This unit consists of soils on rolling hills where slopes are 0 to 8 percent. It makes up about 20 percent of the county. It is about 26 percent Sanger soils, 25 percent Slidell soils, 13 percent San Saba soils, and 36 percent other soils.

Sanger soils have a moderately alkaline clay surface layer about 40 inches thick. This layer is very dark grayish brown in the upper 15 inches and dark grayish brown in the lower 25 inches. Between 40 and 65 inches is moderately alkaline, light olive brown clay.

Slidell soils have a surface layer about 41 inches thick. This layer is moderately alkaline clay that is very dark gray in the upper 25 inches and dark gray in the lower 16 inches. From 41 to 50 inches is moderately alkaline, dark grayish brown clay. From 50 to 62 inches is moderately alkaline, grayish brown clay mottled with olive yellow. The underlying material to 68 inches is moderately alkaline, light brownish gray clay mottled with olive yellow and gray.

San Saba soils have a surface layer about 15 inches thick that is moderately alkaline, very dark gray clay. Between 15 and 25 inches is moderately alkaline, dark gray clay. From 25 to 33 inches is moderately alkaline, grayish brown clay. The underlying material is white indurated limestone.

Minor in this unit are Bolar and Purves soils. Bolar soils are in the more sloping areas. Purves soils are near the hilltops.

Most of this unit is used for crops, but some areas are used for range and improved pasture.

The potential for most crops is high. The main crops are grain sorghum and wheat. Some cotton is also grown. The potential is high for range and improved bermudagrass. The main range plants are mid and tall grasses.

The potential is low for most urban uses because of the shrinking and swelling of the soil with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel. The potential is low for recreational use because of the clay surface layer and the slow percolation of water.

2. Normangee-Wilson-Crockett

Loamy soils that are deep, nearly level to sloping; on uplands and terraces

This unit consists of soils on ancient terraces and residual uplands where slopes are 0 to 8 percent. It makes up about 16 percent of the county. It is about 26 percent Normangee soils, 22 percent Wilson soils, 20 percent Crockett soils, and 32 percent other soils.

Normangee soils have a surface layer of neutral, dark grayish brown clay loam about 7 inches thick. From 7 to 12 inches is slightly acid, brown clay mottled with dark reddish brown. From 12 to 20 inches is slightly acid, grayish brown clay mottled with dark reddish brown. Between 20 and 48 inches is olive clay that is neutral in the upper 15 inches and moderately alkaline in the lower 13 inches. From 48 to 59 inches is moderately alkaline, light olive brown clay. The underlying material to 65 inches is moderately alkaline, light olive brown shaly clay mottled with yellowish brown.

Wilson soils have a neutral, dark grayish brown clay loam surface layer about 7 inches thick. From 7 to 20 inches is slightly acid, dark gray clay. From 20 to 36 inches is mildly alkaline, dark grayish brown clay. Between 36 and 62 inches is mildly alkaline, grayish brown clay. The underlying material to 70 inches is moderately alkaline, olive gray clay.

The surface layer of Crockett soils is slightly acid, brown fine sandy loam about 5 inches thick. From 5 to

18 inches is medium acid, grayish brown clay mottled with red. From 18 to 32 inches is medium acid, light yellowish brown clay mottled with red and yellowish brown. Between 32 and 50 inches is slightly acid, light yellowish brown clay mottled with brownish yellow. The underlying material to 60 inches is moderately alkaline clay loam interbedded with shaly clay that is mottled with grayish brown, light olive brown, and brownish yellow.

Minor in this unit are Callisburg, Mabank, and Medlin soils. Callisburg and Mabank soils are on low terraces. Medlin soils are on erosional uplands.

This unit is used for crops, range, and improved pasture.

The potential is only medium for crops because the soils are droughty. The main crops are grain sorghum and small grain. The potential is only medium for range and improved bermudagrass because the soils are droughty. The main range plants are mid and tall grasses.

The potential is low for most urban uses. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel are the main limiting features. The potential is only medium for recreational use because of the slow percolation of water.

3. Sanger-Maloterre-Venus

Clayey and loamy soils that are deep and very shallow, gently undulating to hilly; on uplands and terraces

This unit consists of soils along the edge of limestone escarpments and on foot slopes where slopes range from 1 to 30 percent. It makes up about 14 percent of the county. It is about 29 percent Sanger soils, 18 percent Maloterre soils, 13 percent Venus soils, and 40 percent other soils.

Sanger soils have a surface layer about 40 inches thick. This layer is moderately alkaline clay that is very dark grayish brown in the upper 15 inches and dark grayish brown in the lower 25 inches. Between the depths of 40 and 65 inches is moderately alkaline, light olive brown clay.

Maloterre soils have a surface layer of moderately alkaline, grayish brown gravelly clay loam about 5 inches thick. The underlying material is platy limestone.

Venus soils have a surface layer of moderately alkaline, dark grayish brown loam about 12 inches thick. From 12 to 22 inches is moderately alkaline, brown loam. Between 22 and 46 inches is moderately alkaline, yellowish brown loam. The underlying material to 70 inches is moderately alkaline, brownish yellow loam.

Minor soils in this unit are Bolar, Purves, and Slidell soils. Bolar and Purves soils are on side slopes near the ridgetops. Slidell soils are on foot slopes.

Most of this unit is used for range. Some areas are used for crops and improved pasture.

The potential for range is low on the Maloterre soils but high on the rest of the unit. The main plants are mid and tall grasses.

The potential is only medium for crops because of the excess lime. Some of the soils are not suitable for cultivation because they are very shallow and sloping. The main crops are grain sorghum and small grain.

The potential is only medium for improved bermudagrass because of the excess lime. Maloterre soils are not suited to improved pasture because they are very shallow and sloping.

The potential is low for most urban uses. The risk of corrosion to uncoated steel and the low strength are the main limiting features. The shallowness over rock is also a limiting feature on Maloterre soils. The potential is low for recreational use because of the slope and the clayey surface layer.

4. Purves-Maloterre-Aledo

Loamy soils that are shallow and very shallow, gently sloping to strongly sloping; on uplands

This unit consists of soils on rolling limestone prairie hills where slopes range from 1 to 12 percent. It makes up about 9 percent of the county. It is about 43 percent Purves soils, 19 percent Maloterre soils, 18 percent Aledo soils, and 20 percent other soils.

Purves soils have a surface layer of moderately alkaline, very dark grayish brown clay loam about 8 inches thick. From 8 to 12 inches is moderately alkaline, brown very gravelly clay loam. The underlying material is coarsely fractured limestone.

Maloterre soils have a moderately alkaline, grayish brown clay loam surface layer about 5 inches thick. The underlying material is platy limestone.

The surface layer of Aledo soils is moderately alkaline, dark grayish brown gravelly clay loam about 7 inches thick. From 7 to 16 inches is moderately alkaline, brown very gravelly clay loam. The underlying material is white, coarsely fractured indurated limestone.

Minor in this unit are Bolar and San Saba soils and rock outcrop. Bolar soils and rock outcrop are near the top of the slope. San Saba soils are near the base of the slope.

This unit is used mainly for range. It is not suitable for cultivation or improved pasture because of the shallowness and stoniness. The potential is low for range because of the depth to rock. The main plants are mid and tall grasses.

The potential is only medium for most urban uses because of the shallowness over rock and the risk of corrosion to uncoated steel. The potential is low for recreational use because the soils are shallow over rock and the surface layer is too clayey.

Loamy and sandy soils of the savannahs

This group of soils makes up about 31 percent of the county. The major soils are Callisburg, Gasil, Aubrey, Duffau, Windthorst, Konsil, and Rayex. These are gently sloping to strongly sloping soils on uplands and terraces. They range from shallow to deep.

These soils are used mainly for range, but some areas are used for crops or improved pasture. The main crops are grain sorghum, small grain, and peanuts. The native plants are little bluestem, big bluestem, indiangrass, purpletop, post oak, and blackjack oak.

The potential is medium for most urban and recreational uses. The main limiting features are the shrinking and swelling with changes in moisture content, the low strength, the risk of corrosion to concrete and uncoated steel, the depth to rock, and the slow percolation of water.

5. Callisburg-Gasil-Aubrey

Loamy and sandy soils that are deep, gently sloping to strongly sloping; on uplands

This unit consists of soils on sandy, rolling hills where slopes are 1 to 12 percent. It makes up about 15 percent of the county. It is about 27 percent Callisburg soils, 25 percent Gasil soils, 14 percent Aubrey soils, and 34 percent other soils.

The surface layer of Callisburg soils is medium acid, yellowish brown fine sandy loam about 6 inches thick. Between 6 and 19 inches is strongly acid, reddish yellow sandy clay mottled with yellowish red. From 19 to 31 inches is strongly acid, brown sandy clay mottled with red, strong brown, and pale brown. From 31 to 44 inches is medium acid, reddish yellow sandy clay mottled with red, yellowish brown, and light gray. Between 44 and 65 inches is neutral sandy clay mottled with yellowish brown, red, and light gray.

Gasil soils have a surface layer of mildly alkaline, brown fine sandy loam or loamy fine sand about 8 inches thick. From 8 to 17 inches is neutral, very pale brown fine sandy loam. From 17 to 30 inches is strongly acid, reddish yellow sandy clay loam mottled with red. Between 30 and 75 inches is brownish yellow sandy clay loam that is strongly acid in the upper 23 inches and medium acid in the lower 22 inches.

Aubrey soils have a medium acid, yellowish brown fine sandy loam surface layer about 7 inches thick. From 7 to 26 inches is strongly acid, red sandy clay mottled with yellowish red and reddish yellow. Between 26 and 44 inches is strongly acid, reddish yellow sandy clay mottled with red. The underlying material to 60 inches is medium acid shale of sandy clay texture that is mottled with red, brownish yellow, and light olive brown.

Minor in this unit are Crosstell and Konsil soils, which are on the side slopes above drains.

This unit is used mainly for range. Some areas are used for crops or improved pasture.

The potential is only medium for range because of the low fertility. The main plants are mid and tall grasses. The potential is only medium for crops and improved bermudagrass because of the low fertility. The main crops are wheat, grain sorghum, and peanuts. Some soils are not suitable for crops because they are sloping and erodible.

The potential is only medium for most urban uses. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to concrete and uncoated steel are the main limitations. The potential is medium for recreational use because of the slope and the slow percolation of water.

6. Duffau-Windthorst

Loamy and sandy soils that are deep, gently sloping to sloping; on uplands and terraces

This unit consists of soils on rolling hills where slopes are 1 to 8 percent. It makes up about 8 percent of the county. It is about 42 percent Duffau soils, 18 percent Windthorst soils, and 40 percent other soils.

Duffau soils have a neutral, brown fine sandy loam or loamy fine sand surface layer about 8 inches thick. Between 8 and 70 inches is slightly acid, reddish yellow sandy clay loam.

The surface layer of Windthorst soils is 10 inches of slightly acid, brown fine sandy loam or loamy fine sand. From 10 to 26 inches is medium acid, reddish brown sandy clay. From 26 to 40 inches is medium acid, yellowish red sandy clay mottled with reddish yellow and red. The underlying material to 48 inches is medium acid clay mottled with red, yellowish red, and yellowish brown.

Minor in this unit are Arenosa and Aubrey soils. Arenosa soils are in long, narrow areas. Aubrey soils are on low ridges.

This unit is used mainly for range, but some areas are used for crops and improved pasture.

The potential is only medium for range and improved bermudagrass because the soils are droughty. The main range plants are mid and tall grasses. The potential is low for crops because the soils are erodible and droughty. The main crop is small grain.

The potential is high for most urban uses. The shrinking and swelling with changes in moisture content, the slow percolation of water, and the low strength limit some uses but can be easily overcome by careful planning and installation. The potential is high for recreational use.

7. Konsil-Aubrey-Birome

Loamy and sandy soils that are deep and moderately deep, gently sloping to strongly sloping; on uplands

This unit consists of soils on steep ridges capped by sandstone where slopes range from 1 to 12 percent. It makes up about 8 percent of the county. It is about 28 percent Konsil soils, 20 percent Aubrey soils, 20 percent Birome soils, and 32 percent other soils.

Konsil soils have a surface layer of neutral, reddish gray fine sandy loam or loamy fine sand about 9 inches thick. From 9 to 12 inches is slightly acid, light reddish brown fine sandy loam. Between 12 and 29 inches is strongly acid, red sandy clay loam. From 29 to 47 inches is strongly acid, red sandy clay loam. Between 47 and 71 inches is strongly acid, light red sandy clay loam. The underlying material is medium acid, yellowish red, weakly cemented sandstone.

The surface layer of Aubrey soils is medium acid, yellowish brown fine sandy loam about 7 inches thick. From 7 to 26 inches is strongly acid, red sandy clay mottled with yellowish red and reddish yellow. Between 26 and 44 inches is strongly acid, reddish yellow sandy clay mottled with red. The underlying material to 60 inches is medium acid shale of sandy clay texture that is mottled with red, brownish yellow, and light olive brown.

The surface layer of Birome soils is neutral, brown stony fine sandy loam about 6 inches thick. From 6 to 9 inches is medium acid, pale brown fine sandy loam. Between 9 and 30 inches is strongly acid, brownish clay in the upper part and yellowish red clay mottled with reddish brown in the lower part. From 30 to 36 inches is medium acid, red clay mottled with yellowish brown. The underlying material to 44 inches is weakly cemented, fractured sandstone.

Minor in this unit are Callisburg, Crosstell, Gasil, and Rayex soils. Callisburg soils, on foot slopes, are gullied in many places. Crosstell and Gasil soils are near the ridgetops. Rayex soils are on steep ridges.

This unit is used mainly for range, but some areas are used for crops or improved pasture.

The potential is only medium for range and improved bermudagrass because of the low fertility. The main range plants are mid and tall grasses and scattered oak trees. The potential is only medium for crops because of the low fertility and erodibility. The main crops are grain sorghum, small grain, and peanuts.

The potential is medium for most urban uses. The shrinking and swelling with changes in moisture content, the low strength, the risk of corrosion to concrete and uncoated steel, and the shallowness over rock are the main limiting features. The potential is high for most recreational uses. The shallowness over rock, the slope, and the slow percolation of water limit the use of some areas for playgrounds.

Clayey and loamy soils of the bottom lands and low terraces

This group of soils makes up about 10 percent of the county. The major soils are Tinn, Frio, Gaddy, Teller, and Miller. These are nearly level soils on bottom lands and low terraces. All are deep.

These soils are used for crops, improved pasture, and range. The main crops are grain sorghum, small grain, and alfalfa. The native plants are little bluestem, indiangrass, big bluestem, switchgrass, eastern gamagrass, and Texas needlegrass.

The potential is low for most urban and recreational uses because of the flooding, the shrinking and swelling with changes in moisture content, and the risk of corrosion to uncoated steel.

8. Tinn-Frio

Clayey and loamy soils that are deep, nearly level; on bottom lands

This unit consists of soils on flood plains of major streams in the county where slopes are 0 to 1 percent. It makes up about 6 percent of the county. It is about 75 percent Tinn soils, 10 percent Frio soils, and 15 percent other soils. These soils are flooded once in 3 years to 3 times each year.

Tinn soils have a surface layer about 38 inches thick. This layer is moderately alkaline, very dark gray clay. From 38 to 48 inches is moderately alkaline, dark gray clay. The underlying material to 60 inches is moderately alkaline, grayish brown silty clay.

The surface layer of Frio soils is moderately alkaline, very dark grayish brown clay loam about 18 inches thick. Between 18 and 42 inches is moderately alkaline, dark grayish brown clay loam. The underlying material to 60 inches is moderately alkaline, brown clay loam.

Minor in this unit are Gladewater and Gowen soils. Gladewater soils are in the lower, wetter areas of bottom lands. Gowen soils are in higher positions farther from the stream channels.

This unit is used mainly for crops and improved pasture. Some areas are used for range.

The potential is high for crops in areas that are flooded less often than once in 2 years. The main crops are grain sorghum, small grain, and alfalfa. The potential is high for range and improved bermudagrass.

The potential is low for most urban uses. Flooding, the shrinking and swelling with changes in moisture content, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of the flooding, the wetness, and the clayey surface layer.

9. Gaddy-Teller-Miller

Loamy, sandy, and clayey soils that are deep, nearly level; on bottom lands and low terraces

This unit consists of soils on flood plains and the adjacent low terraces where slopes are 0 to 1 percent. It makes up about 4 percent of the county. It is about 27 percent Gaddy soils, 23 percent Teller soils, 16 percent

Miller soils, and 34 percent other soils. Some areas are flooded up to 5 times each year.

Gaddy soils have a moderately alkaline, reddish brown fine sandy loam or loamy fine sand surface layer about 9 inches thick. From 9 to 22 inches is moderately alkaline, reddish yellow fine sandy loam. Between 22 and 65 inches is moderately alkaline, reddish yellow loamy fine sand.

The surface layer of Teller soils is about 22 inches of slightly acid fine sandy loam. It is brown in the upper 11 inches and dark reddish gray in the lower 11 inches. Between 22 and 68 inches is slightly acid, reddish brown sandy clay loam. The underlying material to 80 inches is neutral, pale brown fine sandy loam.

Miller soils have a surface layer of moderately alkaline, dark reddish brown clay about 18 inches thick. Between 18 and 42 inches is moderately alkaline, reddish brown clay. From 42 to 60 inches is moderately alkaline, dark reddish brown clay.

Minor in this unit are Mabank, Minco, and Yahola soils. Mabank and Minco soils are on the higher parts of terraces. Yahola soils are on flood plains in about the same position as Gaddy soils but slightly lower than Teller and Miller soils.

This unit is used for range and crops. There are some areas of improved pasture.

The potential is medium for range and crops. About 65 percent of this unit is subject to flooding. The rest is small areas that are slightly higher but are managed the same. The main range plants are mid and tall grasses. The main crops are small grain and alfalfa. The potential is high for improved bermudagrass.

The potential is low for most urban uses. The shrinking and swelling with changes in moisture content, the risk of corrosion to uncoated steel, and flooding are the main limiting factors. The potential is low for recreational use because of the flooding.

Land use considerations

The map units in Cooke County vary widely in their potential for major land uses, as indicated in table 4. For each land use, general ratings of the potential of each soil unit in relation to the other units are indicated. Kinds of soil limitations are also indicated in general terms. The ratings of soil potential reflect the relative cost of such practices and also the hazard of continuing soil related problems after such practices are installed. The ratings do not consider location in relation to existing transportation systems or other kinds of facilities.

Kinds of land uses considered include cultivated farm crops, range, improved pasture, urban uses, and recreation. Cultivated farm crops grown in the survey area include cotton, grain sorghum, and wheat. Range refers to land in native range plants. Improved pasture is land planted to improved bermudagrass or other improved grasses. Urban uses include land used for residential, commercial, and industrial sites. Recreation includes nature study areas, wilderness areas and parks, and other areas which are used for picnicking, camping, playgrounds, and paths and trails.

In general, the kinds of soil, rainfall, and market conditions are the most important factors that influence land use in Cooke County.

About 38 percent of the county is used for range, 33 percent for cropland, 21 percent for improved pasture, and 8 percent for urban land, small water areas, and federal land. Table 4 indicates that about 40 percent of the county has high potential for range, and about 51 percent has medium potential. The table also shows that about 26 percent of the county has high potential for cropland, and 57 percent has medium potential. Table 4 indicates that about 30 percent has high potential for improved pasture, and 61 percent has medium potential.

The general soils information in this section and more detailed information in the following sections can be used as a guide in planning the orderly growth and development in the county.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have a similar profile make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. The Callisburg series, for example, was named for the town of Callisburg in Cooke County.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Gasil fine sandy loam, 1 to 5 percent slopes, eroded, is one of several phases within the Gasil series.

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

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. San Saba-Slidell complex, 3 to 5 percent slopes, is an example.

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

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*. These areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 5, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

1—Arenosa fine sand, 1 to 5 percent slopes. This deep, gently sloping soil is on ridges in uplands. Areas are irregular in shape and are less than 15 acres.

The surface layer is neutral, dark grayish brown fine sand about 6 inches thick. The underlying material to a depth of 80 inches is neutral, very pale brown fine sand.

This soil is somewhat excessively drained. The available water capacity is low, and permeability is very rapid. Surface runoff is very slow. The hazard of soil blowing is severe, and the hazard of water erosion is moderate.

Included in mapping are small areas of Silstid and Konsil soils. Also included is a soil that is similar to this Arenosa soil but is up to 5 percent sandstone fragments. Included soils make up about 25 percent of any one mapped area.

This soil is used mainly for pasture. A few small areas are used for crops, mainly peanuts and grain sorghum.

The potential is low for improved bermudagrass and grain sorghum because of the low available water capacity. It is also low for range.

The potential is only medium for urban use because of seepage and the sandy surface layer. It is low for recreational use because of soil blowing and the sandy surface layer.

Capability subclass IVs; Deep Sand range site.

2—Aubrey fine sandy loam, 1 to 5 percent slopes. This deep, gently sloping soil is on ridges and low hills in uplands. Areas are irregular in shape and range from 8 to 85 acres.

The surface layer is medium acid, yellowish brown fine sandy loam about 7 inches thick. From 7 to 26 inches is strongly acid, red sandy clay mottled with yellowish red and reddish yellow. Between 26 and 44 inches is strongly acid, reddish yellow sandy clay mottled with red. The underlying material to 60 inches is medium acid shale of sandy clay texture that is mottled with red, brownish yellow, and light olive brown.

This soil is well drained. The available water capacity is medium, and permeability is slow. Runoff is medium. The hazard of water erosion is moderate.

Included in mapping are small areas of Callisburg, Crosstell, Konsil, and Gasil soils. Also included are areas of gullies 2 to 3 feet deep and areas where erosion has removed all of the original surface layer. Included soils make up about 30 percent of any one mapped area.

This soil is mainly abandoned cropland that has a low quality grass cover. Some areas are cultivated to grain sorghum and small grain. Some small areas are planted to improved bermudagrass.

The potential is medium for grain sorghum, improved bermudagrass, and small grain. The potential is medium for range.

The potential is medium for urban use because the soil shrinks and swells with changes in moisture content and is corrosive to concrete. The potential is medium for recreational use because of the slow percolation of water.

Capability subclass IIIe; Tight Sandy Loam range site.

3—Aubrey fine sandy loam, 5 to 12 percent slopes. This deep, sloping to strongly sloping soil is on ridges and low hills in uplands. Areas are irregular in shape and range from 10 to 60 acres.

The surface layer is medium acid, yellowish brown fine sandy loam about 7 inches thick. From 7 to 26 inches is strongly acid, red sandy clay mottled with yellowish red and reddish yellow. Between 26 and 44 inches is strongly acid, reddish yellow sandy clay mottled with red. The underlying material to 60 inches is medium acid shale of sandy clay texture that is mottled with red, brownish yellow, and light olive brown.

This soil is well drained. The available water capacity is medium, and permeability is slow. Runoff is medium. The hazard of water erosion is moderate.

Included in mapping are small areas of Callisburg, Crosstell, Gasil, and Konsil soils. Also included are some areas of stony Aubrey soils. Included soils make up about 30 percent of any one mapped area.

This soil is unsuitable for cultivation. It is used mainly for range. Some areas are abandoned cropland.

The potential is medium for range. The main plants are mid and tall grasses and scattered oak trees.

The potential is only medium for urban use because of the slope, the risk of corrosion to concrete, and the shrinking and swelling with changes in moisture content. The potential is medium for recreational use because of the slope and the slow percolation of water.

Capability subclass VIe; Tight Sandy Loam range site.

4—Bastrop fine sandy loam, 1 to 5 percent slopes. This deep, gently sloping soil is on stream terraces. Areas are long and range from 10 to 220 acres.

The surface layer is slightly acid, light reddish brown fine sandy loam about 6 inches thick. From 6 to 18 inches is slightly acid, yellowish red sandy clay loam. Between 18 and 80 inches is mildly alkaline, reddish yellow sandy clay loam.

This soil is well drained. The available water capacity is high, and permeability is moderate. Runoff is medium. The hazard of water erosion is slight.

Included in mapping are small areas of Minco and Teller soils. Also included is a soil that is similar to this Bastrop soil but is not so red. Included soils make up about 20 percent of any one mapped area.

This soil is used for crops, mainly grain sorghum and small grain. Some areas are used for improved bermudagrass and range.

The potential is medium for grain sorghum, improved bermudagrass, and range. It is high for small grain.

The potential is high for urban and recreational uses.

Capability subclass IIIe; Sandy Loam range site.

5—Bastrop fine sandy loam, 5 to 8 percent slopes. This deep, sloping soil is on convex stream terraces. Areas are long and range from 15 to 200 acres.

The surface layer is slightly acid, light reddish brown fine sandy loam about 6 inches thick. From 6 to 18 inches is slightly acid, yellowish red sandy clay loam. Between 18 and 80 inches is mildly alkaline, reddish yellow sandy clay loam.

This soil is well drained. The available water capacity is high, and permeability is moderate. Surface runoff is medium. The hazard of water erosion is slight.

Included in mapping are small areas of Minco and Teller soils and areas of a soil that is similar to this Bastrop soil but is not so red. Also included are some gullied areas. They are 2 to 5 feet deep and 300 to 400 feet apart. Included soils make up about 15 percent of any one mapped area.

This soil is used mainly for range. If well managed, it can be used for crops.

The potential is medium for range. Mid and tall grasses and scattered oak trees are in the plant community. The potential is low for grain sorghum and medium for improved bermudagrass.

The potential is high for urban and recreational uses.

Capability subclass IVe; Sandy Loam range site.

6—Birome-Aubrey-Rayex complex, 3 to 12 percent slopes. These shallow to deep, gently sloping to strongly sloping soils are on uplands. Areas are irregular in shape and range from 6 to 600 acres.

This unit is about 40 percent Birome soils, 30 percent Aubrey soils, 15 percent Rayex soils, and 15 percent other soils and rock outcrop. These soils are so intricately mixed that mapping them separately is not practical at the scale selected for mapping.

The surface layer of the Birome soil is neutral, brown stony fine sandy loam about 6 inches thick. From 6 to 9 inches is medium acid, pale brown fine sandy loam. Between 9 and 21 inches is strongly acid, brown clay. From 21 to 30 inches is strongly acid, yellowish red clay mottled with reddish brown. From 30 to 36 inches is medium acid, red clay mottled with yellowish brown. The underlying material to 44 inches is weakly cemented, fractured sandstone.

Birome soils are moderately deep and well drained. The available water capacity is low, and permeability is slow. Surface runoff is rapid. The hazard of water erosion is severe.

The surface layer of the Aubrey soil is medium acid, yellowish brown stony fine sandy loam about 7 inches thick. From 7 to 26 inches is strongly acid, red sandy clay mottled with yellowish red and reddish yellow. Between 26 and 44 inches is strongly acid, reddish yellow sandy clay mottled with red. The underlying material to 60 inches is medium acid shale of sandy clay texture that is mottled with red, brownish yellow, and light olive brown.

Aubrey soils are deep and are well drained. The available water capacity is medium, and permeability is slow. Runoff is medium. The hazard of water erosion is moderate.

The surface layer of the Rayex soil is neutral, brown stony fine sandy loam about 6 inches thick. From 6 to 13 inches is strongly acid, yellowish red clay. The underlying

material is fractured sandstone stratified with shale and clay.

Rayex soils are shallow and well drained. The available water capacity is very low, and permeability is moderately slow. Surface runoff is rapid. The hazard of water erosion is moderate.

Included in mapping are small areas of Crosstell soils and rock outcrop. Coarse fragments range from 1/2-inch gravel to boulders 15 feet across and 6 feet thick.

This unit is not suitable for crops. It is used mainly for range. The potential is medium for range. The vegetation is mid and tall grasses and scattered oak trees.

The potential is low for urban use because of the slope, the depth to rock, the risk of corrosion to concrete and uncoated steel, and the shrinking and swelling of the soil with changes in moisture content. The potential is medium for recreational use because of the slope, the large stones, and the slow percolation.

Capability subclass VIIs; Sandstone Hill range site.

7—Bolar clay loam, 1 to 5 percent slopes. This moderately deep, gently sloping soil is on uplands. Areas are long and narrow and range from 20 to 300 acres.

The surface layer is moderately alkaline, very dark gray clay loam about 14 inches thick. From 14 to 31 inches is moderately alkaline, pale brown clay loam. From 31 to 39 inches is moderately alkaline, very pale brown clay loam. The underlying material is coarsely fractured limestone.

This soil is well drained. The available water capacity is medium, and permeability is moderate. Surface runoff is medium. The hazard of water erosion is moderate.

Included in mapping are small areas of Maloterre, Purves, San Saba, and Slidell soils and areas of a soil that is similar to this Bolar soil but is more than 40 inches deep over limestone. Also included are shallow gullies. Included soils make up about 20 percent of any one mapped area.

This soil is used mainly for crops. The main crops are grain sorghum and small grain. Some areas are used for range, and some are used for improved bermudagrass.

The potential is low for grain sorghum. It is medium for improved bermudagrass and small grain. It is high for range. The main plants are mid and tall grasses.

The potential is only medium for urban use because of the low strength, the depth to rock, and the risk of corrosion to uncoated steel. The potential is medium for recreational use because the surface layer is too clayey.

Capability subclass IIIe; Clay Loam range site.

8—Bolar clay loam, 5 to 8 percent slopes. This moderately deep, sloping soil is on uplands. Areas are long and narrow and range from 15 to 160 acres.

The surface layer is moderately alkaline, very dark gray clay loam about 14 inches thick. From 14 to 31 inches is moderately alkaline, pale brown clay loam. From 31 to 39 inches is moderately alkaline, very pale brown clay loam. The underlying material is coarsely fractured limestone.

This soil is well drained. The available water capacity is medium, and permeability is moderate. Runoff is medium. The hazard of water erosion is moderate.

Included in mapping are small areas of Maloterre, Purves, Sanger, and San Saba soils. Also included are areas of a soil that is similar to this Bolar soil but is more than 40 inches deep over limestone. Included soils make up about 20 percent of any one mapped area.

This soil is used mainly for range. Some small areas are used for crops. Small grain is the main crop.

The potential is high for range. The main plants are mid and tall grasses. The potential is medium for small grain.

The potential is only medium for urban use because of the low strength, the depth to rock, and the risk of corrosion to uncoated steel. The potential is medium for recreational use because the surface layer is too clayey.

Capability subclass IVe; Clay Loam range site.

9—Bolar stony clay loam, 5 to 12 percent slopes. This moderately deep, sloping to strongly sloping soil is on uplands. Stones 10 inches to 6 feet across the long axis and 3 inches to 2 feet thick cover 5 to 15 percent of the surface. Areas are irregular in shape and range from 15 to 180 acres.

The surface layer is moderately alkaline, very dark gray stony clay loam about 12 inches thick. From 12 to 27 inches is moderately alkaline, pale brown stony clay loam. From 27 to 36 inches is moderately alkaline, very pale brown clay loam. The underlying material is coarsely fractured limestone.

This soil is well drained. The available water capacity is medium, and permeability is moderate. Surface runoff is rapid. The hazard of water erosion is moderate.

Included in mapping are small areas of Maloterre, Purves, and Sanger soils. Also included are areas of a soil that is similar to the Bolar soil but is more than 40 inches deep over limestone. Included soils make up about 30 percent of any one mapped area.

This soil is used only for range. It is not suitable for crops. The potential is high for range. The main plants are mid and tall grasses.

The potential is only medium for urban use. The main limiting features are the risk of corrosion to uncoated steel, the low strength, the depth to rock, and the slope. The potential is medium for recreational use because of the slope and the large stones.

Capability subclass VIs; Clay Loam range site.

10—Bolar-Maloterre-Aledo complex, 3 to 12 percent slopes. These very shallow through moderately deep, gently sloping to strongly sloping soils are on hillsides in uplands. The landscape is a series of narrow benches with steep edges. Areas are irregular in shape and range from 20 to 50 acres.

Bolar soils make up about 35 percent of this unit, Maloterre soils 25 percent, Aledo soils 25 percent, and other soils and rock outcrop the remaining 15 percent. These soils are so intricately mixed that mapping them separately is not practical at the scale selected for mapping.

Bolar soils are on the benches. The surface layer is moderately alkaline, very dark gray stony clay loam about 12 inches thick. From 12 to 27 inches is moderately alkaline, pale brown stony clay loam. From 27 to 36 inches is moderately alkaline, very pale brown clay loam. The underlying material is coarsely fractured limestone.

Bolar soils are well drained. The available water capacity is medium, and permeability is moderate. Runoff is rapid. The hazard of water erosion is moderate.

Maloterre soils are at the edge of benches. The surface layer is moderately alkaline, grayish brown gravelly clay loam about 5 inches thick. The underlying material is platy limestone.

Maloterre soils are somewhat excessively drained. The available water capacity is very low, and permeability is moderately slow. Runoff is rapid. The hazard of water erosion is slight.

Aledo soils also are at the edge of benches. The surface layer is moderately alkaline, dark grayish brown gravelly clay loam about 7 inches thick. From 7 to 16 inches is moderately alkaline, brown very gravelly clay loam. The underlying material to 24 inches is white, coarsely fractured indurated limestone.

Aledo soils are well drained. The available water capacity is very low, and permeability is moderate. Surface runoff is rapid. The hazard of water erosion is moderate.

Included in mapping are small areas of rock outcrop and Purves soils.

This unit is not suited to crops. It is used mainly for range. The potential is low for range because of the very low available water capacity. The main plants are mid and tall grasses.

The potential is low for urban use because of the slope, the depth to rock, the low strength, and the risk of corrosion to uncoated steel. It is medium for recreational use because of the large stones, the slope, the depth to rock, and the clayey surface layer.

Capability subclass VIs; Clay Loam range site, Bolar soils; Very Shallow range site, Maloterre soils; Shallow range site, Aledo soils.

11—Callisburg fine sandy loam, 1 to 3 percent slopes. This deep, gently sloping soil is on uplands. Areas are irregular in shape and range from 10 to 150 acres.

The surface layer is medium acid, yellowish brown fine sandy loam about 6 inches thick. Between 6 and 19 inches is strongly acid, reddish yellow sandy clay mottled with yellowish red. From 19 to 31 inches is strongly acid, brown sandy clay mottled with red, strong brown, and pale brown. From 31 to 44 inches is medium acid, reddish yellow sandy clay mottled with red, yellowish brown, and light gray. Between 44 and 65 inches is neutral sandy clay mottled with yellowish brown, red, and light gray.

This soil is well drained. The available water capacity is high, and permeability is moderately slow. Surface runoff is slow. The hazard of water erosion is severe.

Included in mapping are small areas of Aubrey, Crosstell, Gasil, and Konsil soils. These included soils make up about 20 percent of any one mapped area.

This soil is used mainly for range. Some small areas are used for crops or pasture of improved bermudagrass. The main crops are grain sorghum and wheat.

The potential is medium for range. The main plants are mid and tall grasses. The potential is also medium for improved bermudagrass, grain sorghum, and wheat.

This soil has only medium potential for most urban uses. The main limiting features are the low strength and the risk of corrosion to concrete. The potential is high for recreational use.

Capability subclass IIe; Sandy Loam range site.

12—Callisburg fine sandy loam, 1 to 5 percent slopes, eroded. This deep, gently sloping soil is on uplands. Gullies 2 to 3 feet deep and areas where erosion has removed all of the original surface layer make up about 15 percent of any one mapped area. Areas are irregular in shape and range from 15 to 150 acres.

The surface layer is medium acid, yellowish brown fine sandy loam about 6 inches thick. Between 6 and 19 inches is strongly acid, reddish yellow sandy clay mottled with yellowish red. From 19 to 31 inches is strongly acid, brown sandy clay mottled with red, strong brown, and pale brown. From 31 to 44 inches is medium acid, reddish yellow sandy clay mottled with red, yellowish brown, and light gray. Between 44 and 65 inches is neutral sandy clay mottled with yellowish brown, red, and light gray.

This soil is well drained. The available water capacity is high, and permeability is moderately slow. Surface runoff is slow. The hazard of water erosion is severe.

Included in mapping are small areas of Aubrey, Crosstell, Gasil, and Konsil soils. These included soils make up about 20 percent of any one mapped area.

This soil is mostly idle cropland. Some areas are planted to grain sorghum and wheat. Some are planted to improved bermudagrass.

The potential is medium for improved bermudagrass, grain sorghum, and wheat. It is also medium for range. The main plants are mid and tall grasses.

This soil has only medium potential for most urban uses. The main limiting features are the low strength and the risk of corrosion to concrete. The potential is high for recreational use.

Capability subclass IIIe; Sandy Loam range site.

13—Callisburg fine sandy loam, 3 to 8 percent slopes, severely eroded. This deep, gently sloping to sloping soil is on foot slopes in uplands. Straight walled gullies (fig. 1) 3 to 10 feet deep and 50 to 200 feet apart make up about 15 percent of the unit. Areas are irregular in shape and range from 15 to 125 acres.

The surface layer is medium acid, yellowish brown fine sandy loam about 6 inches thick. Between 6 and 19 inches is strongly acid, reddish yellow sandy clay mottled with yellowish red. From 19 to 31 inches is strongly acid, brown sandy clay mottled with red, strong brown, and pale brown. From 31 to 44 inches is medium acid, reddish yellow sandy clay mottled with red, yellowish brown, and light gray. Between 44 and 65 inches is neutral sandy clay mottled with yellowish brown, red, and light gray.

This soil is well drained. The available water capacity is high, and permeability is moderately slow. Runoff is medium. The hazard of water erosion is severe.

Included in mapping are small areas of Aubrey, Crosstell, Gasil, and Konsil soils. Included soils make up about 25 percent of any one mapped area.

Most of the acreage is idle cropland with a cover of low quality grasses. It is not suitable as cropland.

The potential is medium for range. It is low for improved bermudagrass.

The potential is only medium for urban use. The main limiting features are the low strength, the risk of corrosion to concrete, and the gullied areas. Gullies must be smoothed in areas of urban development. The potential is medium for recreational use because of the slope and the gullies.

Capability subclass VIe; Sandy Loam range site.

14—Crockett fine sandy loam, 0 to 1 percent slopes. This deep, nearly level soil is on uplands. Areas are irregular in shape and range from 5 to 100 acres.

The surface layer is slightly acid, brown fine sandy loam about 5 inches thick. From 5 to 18 inches is medium acid, grayish brown clay mottled with red. From 18 to 32 inches is medium acid, light yellowish brown clay mottled with red and yellowish brown. Between 32 and 50 inches is slightly acid, light yellowish brown clay mottled with brownish yellow. The underlying material to 60 inches is moderately alkaline clay loam interbedded with shaly clay that is mottled with grayish brown, light olive brown, and brownish yellow.

This soil is moderately well drained. The available water capacity is high. Permeability is very slow, and runoff is slow. The hazard of water erosion is severe.

Included in mapping are small areas of Callisburg, Crosstell, Mabank, and Normangee soils. Included soils make up about 15 percent of any one area mapped.

Most of the acreage is used for crops, mainly grain sorghum and small grain. Some areas are planted to improved bermudagrass. Some are idle cropland with low quality grasses.

This soil has high potential for small grain, grain sorghum, and improved bermudagrass and high potential for range. The main plants are mid and tall grasses.

The potential is low for most urban uses. The main limiting features are the low strength, the risk of corrosion to uncoated steel, and the shrinking and swelling with changes in moisture content. The potential is medium for recreational use because of the slow percolation.

Capability subclass IIIs; Claypan Prairie range site.

15—Crockett fine sandy loam, 1 to 3 percent slopes. This deep, gently sloping soil is on uplands. Areas are irregular in shape and range from 25 to 120 acres.

The surface layer is slightly acid, brown fine sandy loam about 5 inches thick. From 5 to 18 inches is medium acid, grayish brown clay mottled with red. From 18 to 32 inches is medium acid, light yellowish brown clay mottled with red and yellowish brown. Between 32 and 50 inches is slightly acid, light yellowish brown clay mottled with brownish yellow. The underlying material to 60 inches is moderately alkaline clay loam interbedded with shaly clay mottled with grayish brown, light olive brown, and brownish yellow.

This soil is moderately well drained. The available water capacity is high, and permeability is very slow. Surface runoff is medium. The hazard of water erosion is severe.

Included in mapping are small areas of Callisburg, Crosstell, Mabank, and Normangee soils. Also included is a soil that is similar to this Crockett soil but has a thicker, darker surface layer. Included soils make up about 20 percent of any mapped area.

This soil is used mainly for range. Some areas are used for improved bermudagrass pastures.

The potential is high for range. It is also high for improved bermudagrass and wheat but is only medium for grain sorghum.

This soil has low potential for most urban uses. The limiting features are the shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel. The potential is medium for recreational use because of the slow percolation of water.

Capability subclass IIIe; Claypan Prairie range site.

16—Crockett fine sandy loam, 1 to 5 percent slopes, eroded. This deep, gently sloping soil is on uplands. On about 20 to 30 percent of each area mapped, erosion has removed the original surface layer. Gullies 1 to 3 feet deep and 200 to 400 feet apart occur within the areas where the surface layer is eroded. Areas are irregular in shape and range from 15 to 300 acres.

The surface layer is slightly acid, brown fine sandy loam about 5 inches thick. From 5 to 18 inches is medium acid, grayish brown clay mottled with red. From

18 to 32 inches is medium acid, light yellowish brown clay mottled with red and yellowish brown. Between 32 and 50 inches is slightly acid, light yellowish brown clay mottled with brownish yellow. The underlying material to 60 inches is moderately alkaline clay loam interbedded with shaly clay that is mottled with grayish brown, light olive brown, and brownish yellow.

This soil is moderately well drained. The available water capacity is high, and permeability is very slow. Surface runoff is rapid. The hazard of water erosion is severe.

Included in mapping are small areas of Callisburg, Crosstell, Mabank, and Normangee soils. Also included is a soil that is similar to this Crockett soil but has a thicker, darker surface layer. These included soils make up about 35 percent of any one area mapped.

Most of the acreage is used for range. Some areas are idle cropland, some are improved bermudagrass pasture, and some are cropland. Grain sorghum and small grain are the main crops.

The potential is high for range. The main plants are mid and tall grasses. The potential is medium for improved bermudagrass, small grain, and grain sorghum.

The potential is low for most urban uses. The shrinking and swelling with changes in moisture content, the risk of corrosion to uncoated steel, the gullies, and the low strength are the limiting features. The potential is medium for recreational use because of the slow percolation and the gullies.

Capability subclass IVe; Claypan Prairie range site.

17—Crosstell fine sandy loam, 1 to 3 percent slopes. This deep, gently sloping soil is on uplands. Areas are irregular in shape and range from 5 to 110 acres.

The surface layer is medium acid, brown fine sandy loam about 5 inches thick. From 5 to 7 inches is medium acid, very pale brown fine sandy loam. From 7 to 16 inches is strongly acid, brown clay mottled with yellowish red. From 16 to 27 inches is neutral, reddish yellow clay mottled with reddish brown. Between 27 and 48 inches is moderately alkaline, reddish yellow clay mottled with brownish yellow. The underlying material to 80 inches is moderately alkaline, light gray shaly clay mottled with brownish yellow.

This soil is moderately well drained. The available water capacity is high, and permeability is very slow. Surface runoff is rapid. The hazard of water erosion is severe.

Included in mapping are small areas of Callisburg, Crockett, and Mabank soils. Also included are areas of Crosstell soils where slopes are less than 1 percent. These included soils make up about 15 percent of any one mapped area.

This soil is used mainly for pasture of improved bermudagrass. Some areas are range. Some areas are used for crops, mainly grain sorghum and small grain.

The potential is medium for improved bermudagrass and small grain but is low for grain sorghum. It is also low for range. The main plants are mid and tall grasses.

This soil has low potential for most urban uses. The low strength, the shrinking and swelling with changes in moisture content, and the risk of corrosion to uncoated steel are the main limiting features. The potential is medium for recreational use because of the slow percolation of water.

Capability subclass IIIe; Claypan Savannah range site.

18—Duffau loamy fine sand, 1 to 8 percent slopes. This deep, gently sloping to sloping soil is on high stream terraces in uplands. Areas are long and narrow and range from 20 to 400 acres.

The surface layer is neutral, light brown loamy fine sand about 15 inches thick. Below that is slightly acid, yellowish red sandy clay loam to 70 inches.

This soil is well drained. The available water capacity is medium, and permeability is moderate. Surface runoff is slow. The hazard of soil blowing is severe, and the hazard of water erosion is moderate.

Included in mapping are small areas of Arenosa and Windthorst soils and Duffau fine sandy loam. Also included are areas of a soil that is similar to Duffau loamy fine sand but has a surface layer more than 20 inches thick. Included soils make up about 15 percent of any one mapped area.

Most of this soil is used for range. Some areas are idle cropland. If well managed, this soil can be cultivated.

The potential is medium for range. The main plants are tall grasses and oak trees. The potential is low for grain sorghum. Using cover crops helps to control erosion.

This soil has only medium potential for most urban uses. The low strength is the most limiting feature. The potential is medium for recreational use because of soil blowing and the sandy surface layer.

Capability subclass IVe; Loamy Sand range site.

19—Duffau fine sandy loam, 2 to 5 percent slopes. This deep, gently sloping soil is on high stream terraces in uplands. Areas are long and narrow and range from 8 to 400 acres.

The surface layer is neutral, brown fine sandy loam about 8 inches thick. Between 8 and 70 inches is slightly acid, reddish yellow sandy clay loam.

This soil is well drained. The available water capacity is high, and permeability is moderate. Runoff is slow. The hazard of water erosion is severe.

Included in mapping are small areas of Windthorst soils and Duffau loamy fine sand. Also included are areas of Duffau fine sandy loam where slopes are less than 2 percent and some moderately eroded areas. Included soils make up about 20 percent of any one mapped area.

This soil is used for range, improved pasture, and cropland. The main crops are grain sorghum and small grains. There are also some areas of idle cropland with low quality grass cover.

The potential is medium for range. Mid and tall grasses are the main plants. The potential is medium for improved bermudagrass and small grain but is low for grain sorghum.

This soil has medium potential for most urban uses. The low strength is the most limiting feature. The potential is high for recreational use and is medium for playground use because of the slope.

Capability subclass IIIe; Sandy Loam range site.

20—Duffau fine sandy loam, 5 to 8 percent slopes. This deep, sloping soil is on high stream terraces in uplands. Areas are irregular in shape and range from 10 to 90 acres.

The surface layer is neutral, brown fine sandy loam about 8 inches thick. Between 8 and 70 inches is slightly acid, reddish yellow sandy clay loam.

This soil is well drained. The available water capacity is high, and permeability is moderate. Surface runoff is medium. The hazard of water erosion is severe.

Included in mapping are small areas of Windthorst soils and Duffau loamy fine sand. Also included are areas of Duffau fine sandy loam where slopes are more than 8 percent and some moderately eroded areas. Included soils make up about 20 percent of any one mapped area.

This soil is used mainly for range. Some areas are used for cropland and improved pasture. Some are idle cropland. The main crops are grain sorghum and small grain. If the soil is used for crops, management is needed to control erosion.

The potential is medium for range. The main plants are mid and tall grasses. The potential is low for grain sorghum and small grain.

The potential is only medium for most urban uses because of the low strength and the slope. It is high for most recreational uses, but it is low for playgrounds because of the slope.

Capability subclass IVe; Sandy Loam range site.

21—Duffau and Windthorst soils, 3 to 8 percent slopes, severely eroded. These deep, gently sloping to sloping soils are on high stream terraces in uplands. Gullies are 10 to 50 feet deep and have vertical sides. Areas are irregular in shape and range from 5 to 50 acres.

About 45 percent of this unit is Duffau soil, 25 percent is Windthorst soil, and 30 percent is other soils and gullies. These soils are not uniform and do not occur in a regular pattern.

The surface layer of the Duffau soil is neutral, brown fine sandy loam about 8 inches thick. Between 8 and 70 inches is slightly acid, reddish yellow sandy clay loam.

Duffau soils are well drained. The available water capacity is high, and permeability is moderate. Surface runoff is medium. The hazard of water erosion is severe.

The surface layer of the Windthorst soil is 10 inches of slightly acid, brown fine sandy loam. From 10 to 26 inches is medium acid, reddish brown sandy clay. From 26 to 40 inches is medium acid, yellowish red sandy clay mottled with reddish yellow and red. The underlying material to 48 inches is medium acid clay mottled with red, yellowish red, and yellowish brown.

Windthorst soils are somewhat poorly drained. The available water capacity is high, and permeability is very slow. Surface runoff is medium. The hazard of water erosion is severe.

Included in mapping are small areas of Aubrey and Arenosa soils. Also included are gullies and areas of Duffau and Windthorst soils where erosion has removed most of the original surface layer.

This unit is used for range and pasture. It is not suitable for crops. The potential is low for improved bermudagrass and range because of erosion.

This unit has only medium potential for most urban and recreational uses because of the slope, the slow percolation of water, the low strength, and the gullies. Gullies have to be shaped.

Capability subclass VIe; Sandy Loam range site.

22—Frio clay loam. This deep, nearly level soil is on bottom lands. Slopes range from 0 to 1 percent. This soil is flooded about once every 3 years for periods of 2 to 7 days. Areas are long and narrow and range from 15 to 75 acres.

The surface layer is moderately alkaline, very dark grayish brown clay loam about 18 inches thick. Between 18 and 42 inches is moderately alkaline, dark grayish brown clay loam. The underlying material to 60 inches is moderately alkaline, brown clay loam.

This soil is well drained. The available water capacity is high, and permeability is moderately slow. Surface runoff is slow.

Included in mapping are small areas of Tinn, Gladewater, and Gowen soils and a soil that is similar to this Frio soil but has a dark surface layer less than 20 inches thick. These included soils make up about 20 percent of any one mapped area.

This soil is used for crops, mainly small grain, grain sorghum, and alfalfa. There are also some areas of improved pasture.

The potential is high for grain sorghum, small grain, and improved bermudagrass. The potential is medium for range. The main plants are mid and tall grasses.

The potential is low for most urban uses because of the flooding and the risk of corrosion to uncoated steel. The potential is medium for recreational use because of the flooding and the clayey surface layer.

Capability subclass IIw; Loamy Bottomland range site.

23—Frio soils. These deep, nearly level soils are on bottom lands. Slope ranges from 0 to 1 percent. These soils are flooded 1 to 3 times each year for periods of 2 to 7 days. Areas are long and narrow and range from 20 to 125 acres.

These soils have variable surface textures. They are not uniform, and they do not occur in a regular pattern.

Typically, the surface layer is moderately alkaline, very dark grayish brown clay loam about 18 inches thick. Between 18 and 42 inches is moderately alkaline, dark grayish brown clay loam. The underlying material to 60 inches is moderately alkaline, brown clay loam.

Frio soils are well drained. The available water capacity is high, and permeability is moderately slow. Runoff is slow.

Included in mapping are small areas of Tinn and Gowen soils and areas of a soil that is similar to this Frio soil but has a dark surface layer less than 20 inches thick. These included soils make up about 30 percent of any one area mapped.

These soils are used mainly for improved pasture. Some areas are also used for crops and range. Wheat is the main crop because it is least likely to be damaged by flooding.

The potential is high for wheat and improved bermudagrass and is medium for range.

The potential is low for urban use because of the risk of corrosion to uncoated steel and the flooding. The potential is medium for most recreational uses because of flooding and the clayey surface layer.

Capability subclass Vw; Loamy Bottomland range site.

24—Gaddy fine sandy loam. This deep, nearly level soil is on bottom lands. Slope ranges from 0 to 1 percent. The soil is flooded about once every 3 years for periods of less than 2 days. Areas are long and narrow and range from about 30 to 300 acres.

The surface layer is moderately alkaline, reddish brown fine sandy loam about 9 inches thick. From 9 to 22 inches is moderately alkaline, reddish yellow fine sandy loam. Between 22 and 65 inches is moderately alkaline, reddish yellow loamy fine sand.

This soil is somewhat excessively drained. The available water capacity is low, and permeability is moderately rapid. Surface runoff is slow.

Included in mapping are small areas of Miller and Yahola soils. Included soils make up about 25 percent of any one mapped area.

This soil is used for improved pasture, range, and crops. Alfalfa and small grain are the main crops.

The potential is medium for improved bermudagrass. It is low for range and small grain.

The potential is low for most urban uses because of the flooding. It is medium for most recreational uses because of the flooding.

Capability subclass IIIs; Sandy Bottomland range site.

25—Gaddy soils, frequently flooded. These deep, nearly level soils are on flood plains. Slopes range from 0 to 1 percent. This unit is flooded 1 to 3 times per year for periods of less than 2 days. Areas are long and narrow and range from about 20 to 280 acres.

The surface texture varies. The soils are not uniform and do not occur in a regular pattern.

Typically, the surface layer is moderately alkaline, reddish brown fine sandy loam about 9 inches thick. From 9 to 22 inches is moderately alkaline, reddish yellow fine sandy loam. Between 22 and 65 inches is moderately alkaline, reddish yellow loamy fine sand.

Gaddy soils are somewhat excessively drained. The available water capacity is low, and permeability is moderately rapid. Surface runoff is slow.

Included in mapping are small areas of Miller and Yahola soils. These included soils make up about 25 percent of any one mapped area.

This unit is used for range and crops. The main crops are alfalfa and small grain because they are not damaged by flooding as much as are other crops.

The potential is low for small grain and range. It is medium for improved bermudagrass.

The potential is low for most urban and recreational uses. Flooding is the most limiting feature.

Capability subclass Vw; Sandy Bottomland range site.

26—Gasil loamy fine sand, 1 to 5 percent slopes. This deep, gently sloping soil is on uplands. Areas are irregular in shape and range from about 8 to 90 acres.

The surface layer is neutral, pale brown loamy fine sand about 11 inches thick. From 11 to 61 inches is strongly acid, reddish yellow sandy clay loam.

This soil is well drained. The available water capacity is medium, and permeability is moderate. Runoff is slow. The hazard of water erosion is slight.

Included in mapping are small areas of Arenosa, Heaton, and Silstid soils and some areas of Gasil fine sandy loam. Also included is a soil that is similar to this Gasil loamy fine sand but has more clayey lower layers. These included soils make up about 25 percent of any one mapped area.

This soil is used for improved pasture, range, and crops. Some areas are idle cropland. The main crops are peanuts and grain sorghum.

The potential is medium for improved bermudagrass and grain sorghum. It is also medium for range. The main plants are tall grasses.

The potential is only medium for most urban uses. The shrinking and swelling with changes in moisture content and the low strength are the main limiting features. The potential is medium for recreational use because of the sandy surface layer.

Capability subclass IIIe; Loamy Sand range site.

27—Gasil loamy fine sand, 5 to 8 percent slopes. This deep, sloping soil is on uplands. Areas are long and narrow and range from about 6 to 70 acres.

The surface layer is neutral, pale brown loamy fine sand about 10 inches thick. From 10 to 65 inches is medium acid, reddish yellow sandy clay loam.

This soil is well drained. The available water capacity is medium, and permeability is moderate. Surface runoff is slow. The hazard of water erosion is slight.

Included in mapping are small areas of Heaton and Silstid soils and Gasil fine sandy loam. Also included are areas of Gasil loamy fine sand where erosion has removed most of the surface layer. These included soils make up about 20 percent of any one mapped area.

This soil is used for range or pasture. Some areas are abandoned cropland.

The potential is medium for improved bermudagrass and is low for crops. The potential is also medium for range. The main plants are tall grasses.

The potential is only medium for most urban uses because of the low strength and the shrinking and swelling with changes in moisture content. The potential is medium for recreational use because of the sandy surface layer.

Capability subclass IVe; Loamy Sand range site.

28—Gasil fine sandy loam, 1 to 3 percent slopes. This deep, gently sloping soil is on uplands. Areas are irregular in shape and range from about 10 to 150 acres.

The surface layer is mildly alkaline, brown fine sandy loam about 8 inches thick. From 8 to 17 inches is neutral, very pale brown fine sandy loam. From 17 to 30 inches is strongly acid, reddish yellow sandy clay loam mottled with red. Between 30 and 75 inches is brownish yellow sandy clay loam that is strongly acid in the upper 23 inches and medium acid in the lower 22 inches.

This soil is well drained. The available water capacity is medium, and permeability is moderate. Surface runoff is slow. The hazard of water erosion is slight.

Included in mapping are small areas of Callisburg and Konsil soils and Gasil loamy fine sand. These included soils make up about 20 percent of any one area mapped.

This soil is used mainly for range or improved pasture. There are some small areas of cropland. The main crops are peanuts, grain sorghum, and small grain.

The potential is high for range (fig. 2). The main plants are tall grasses. The potential is medium for grain sorghum, small grain, and improved bermudagrass.

The potential is only medium for most urban uses. The shrinking and swelling with changes in moisture content and the low strength are the main limiting features. The potential is high for recreational use.

Capability subclass IIe; Sandy Loam range site.

29—Gasil fine sandy loam, 1 to 5 percent slopes, eroded. This deep, gently sloping soil is on uplands. Erosion has exposed the subsoil in rills and shallow gullies. Gullies are mainly less than 2 feet deep and 150 to 200 feet apart. Areas are irregular in shape and range from 15 to 200 acres.

The surface layer is mildly alkaline, brown fine sandy loam about 8 inches thick. From 8 to 17 inches is neutral, very pale brown fine sandy loam. From 17 to 30 inches is strongly acid, reddish yellow sandy clay loam mottled with red. Between 30 and 75 inches is brownish yellow sandy clay loam that is strongly acid in the upper 23 inches and medium acid in the lower 22 inches.

This soil is well drained. The available water capacity is medium, and permeability is moderate. Surface runoff is slow. The hazard of water erosion is moderate.

Included in mapping are small areas of Callisburg and Konsil soils and areas of Gasil loamy fine sand. These included soils make up about 15 percent of any one area mapped.

Most of the acreage has been cultivated but is now improved pastures or abandoned cropland. Some areas are range, and some are cropland. Peanuts and grain sorghum are the main crops.

The potential is high for range. Tall grasses are the main plants. The potential is medium for improved bermudagrass and grain sorghum. Good management is needed to control erosion.

The potential is medium for most urban uses. The low strength and the shrinking and swelling with changes in moisture content are the most limiting features. The potential is high for most recreational uses. Slope is a limitation for the use of some areas as playgrounds.

Capability subclass IVe; Sandy Loam range site.

30—Gasil fine sandy loam, 5 to 8 percent slopes, eroded. This deep, sloping soil is on uplands. Gullies 2 to 10 feet deep and about 50 to 300 feet apart have formed in parts of each area. Areas are irregular in shape and range from 8 to 70 acres.

The surface layer is mildly alkaline, brown fine sandy loam about 8 inches thick. From 8 to 17 inches is neutral, very pale brown fine sandy loam. From 17 to 30 inches is strongly acid, reddish yellow sandy clay loam mottled with red. Between 30 and 75 inches is brownish yellow sandy clay loam that is strongly acid in the upper 23 inches and medium acid in the lower 22 inches.

This soil is well drained. The available water capacity is medium, and permeability is moderate. Surface runoff is slow. The hazard of water erosion is severe.

Included in mapping are small areas of Callisburg and Konsil soils. Also included are areas of Gasil loamy fine sand and areas of Gasil fine sandy loam that are not so eroded. Included soils make up about 20 percent of any one mapped area.

This soil is not suited to crops because of erosion. Most of it was once cultivated but has now been abandoned or planted to improved bermudagrass. There are some areas of range.

The potential is low for improved bermudagrass. It is high for range. The main plants are tall grasses.

The potential is only medium for most urban uses. The low strength and the shrinking and swelling with changes in moisture content are the most limiting features. The potential is high for most recreational uses. Slope is a limitation for use of some areas as playgrounds.

Capability subclass VIe; Sandy Loam range site.

31—Gladewater clay, frequently flooded. This deep, nearly level soil is on bottom lands where slopes range from 0 to 1 percent. It is flooded 4 to 6 times each year for periods of 1 to 2 weeks. Areas are irregular in shape and range from 30 to 800 acres.

The surface layer is medium acid, dark grayish brown clay about 9 inches thick. From 9 to 40 inches is slightly acid, gray clay mottled with light olive brown. The underlying material to 60 inches is medium acid, gray clay mottled with yellowish brown.

This soil is poorly drained. The available water capacity is high. Permeability and surface runoff are very slow. The hazard of water erosion is moderate. The seasonal water table fluctuates between the surface and a depth of 3.5 feet.

Included in mapping are small areas of Gowen and Tinn soils. Also included are areas that differ in surface texture because of recent deposition. Included soils make up about 20 percent of any one mapped area.

This soil is used for range and improved pasture. Some areas are abandoned cropland with poor quality native grasses. The soil is unsuitable for cultivation because of flooding.

The potential is high for range and improved bermudagrass. The main range plants are mid and tall grasses.

This soil has low potential for urban use because of the flooding, the risk of corrosion to uncoated steel, and the clayey surface layer. The potential for recreational use is low because of the flooding and the clay surface layer.

Capability subclass Vw; Clayey Bottomland range site.

32—Gowen fine sandy loam. This deep, nearly level soil is on flood plains along small streams in uplands. It is seldom flooded. Slopes are 0 to 1 percent. Areas are long and narrow and range from 20 to 200 acres.

The surface layer is moderately alkaline, dark brown fine sandy loam about 28 inches thick. The underlying material to 60 inches is moderately alkaline, dark grayish brown loam.

This soil is well drained. The available water capacity is high, and permeability is moderate. Surface runoff is slow.

Included in mapping are small areas of Pulexas soils and Gowen clay loam. These included soils make up about 30 percent of any one area mapped.

This soil is used mainly for range and improved pasture. Some areas along streams are wooded.

The potential is high for range and improved bermudagrass. The main range plants are mid and tall grasses. The potential is also high for grain sorghum and is medium for wheat.

The potential is low for most urban uses. The risk of corrosion to uncoated steel, the shrinking and swelling with changes in moisture content, and the possibility of flooding are the most limiting features. The potential is high for recreational use.

Capability class I; Loamy Bottomland range site.

33—Gowen clay loam. This deep, nearly level soil is on flood plains in uplands. It is seldom flooded. Slopes are 0 to 1 percent. Areas are long and narrow and range from 20 to 400 acres.

The surface layer is moderately alkaline, dark grayish brown clay loam about 14 inches thick. Between 14 and 43 inches is mildly alkaline, dark gray clay loam. The underlying material to 65 inches is moderately alkaline, gray clay loam.

This soil is well drained. The available water capacity is high, and permeability is moderate. Surface runoff is moderate.

Included in mapping are small areas of Frio soils and Gowen fine sandy loam. These included soils make up about 30 percent of any one mapped area.

This soil is used mainly for pasture. Some areas are cropland, and some are range. The main crops are small grain and hay.

The potential is high for improved bermudagrass and grain sorghum and is medium for small grain. It is also high for range. The main plants are mid and tall grasses.

The potential is low for urban use because of the risk of corrosion to uncoated steel, the shrinking and swelling with changes in moisture content, and the possibility of flooding. The potential is medium for recreation because the surface layer is too clayey.

Capability class I; Loamy Bottomland range site.

34—Gowen soils, frequently flooded. These deep, nearly level soils are on flood plains in uplands. They are flooded up to 2 to 5 times each year for periods of 2 to 7 days. Slopes are 0 to 1 percent.

These soils have variable surface textures. They are not uniform and do not occur in a regular pattern.

Typically, the surface layer is moderately alkaline, dark grayish brown clay loam about 14 inches thick. Between 14 and 43 inches is mildly alkaline, dark gray clay loam. The underlying material to 65 inches is moderately alkaline, gray clay loam.

Gowen soils are well drained. The available water capacity is medium, and permeability is moderate. Surface runoff is slow.

Included in mapping are small areas of Frio soils. Included soils make up about 30 percent of any one mapped area.

This unit is unsuitable for crops because of the flooding. It is used mainly for range and improved pasture. The potential is high for range and improved bermudagrass. The main range plants are mid and tall grasses.

The potential is low for urban and recreational uses because of the flooding.

Capability subclass Vw; Loamy Bottomland range site.

35—Heaton loamy fine sand, 1 to 8 percent slopes. This deep, gently sloping to sloping soil is on uplands. Areas are irregular in shape and range from 8 to 75 acres.

The surface layer is neutral, brown loamy fine sand about 11 inches thick. From 11 to 35 inches is slightly acid, very pale brown loamy fine sand. Between 35 and 70 inches is medium acid sandy clay loam that is yellowish red in the upper 11 inches, reddish yellow in the next 10 inches, and reddish brown in the lower 14 inches.

This soil is well drained. The available water capacity is low, and permeability is moderate. Surface runoff is slow. The hazard of water erosion is slight. The hazard of soil blowing is severe.

Included in mapping are small areas of Arenosa, Gasil, Konsil, and Silstid soils. Also included is a soil that is similar to this Heaton soil but is less than 60 inches deep. These included soils make up about 20 percent of any one mapped area.

This soil is used mainly for range. Some areas are used for crops, mainly peanuts, grain sorghum, and small grain.

The potential is medium for range. The main plants are mid and tall grasses and scattered oak trees. The potential is low for grain sorghum and small grain because of the low available water capacity. It is medium for improved bermudagrass.

The potential is high for most urban uses. It is medium for recreational use because of the sandy surface layer and the risk of soil blowing.

Capability subclass IVe; Sandy range site.

36—Hensley loam, 1 to 5 percent slopes. This shallow, gently sloping soil is on uplands. Areas are irregular in shape and range from 15 to 50 acres.

The surface layer is neutral, brown loam about 4 inches thick. From 4 to 13 inches is moderately alkaline, dark reddish brown clay loam. The underlying material is indurated limestone.

This soil is well drained. The available water capacity is very low, and permeability is slow. Surface runoff is medium. The hazard of water erosion is severe.

Included in mapping are small areas of Crockett and Lindy soils and areas of a soil that is similar to this Hensley soil but that is less than 10 inches deep over limestone. These included soils make up about 15 percent of any one mapped area.

Most of the acreage is used for crops. Wheat is the main crop. Areas cropped are usually small areas in fields of deeper soils. Some areas are used for range.

The potential is low for wheat because of the very low available water capacity and the shallowness over limestone. It is medium for range. The main plants are mid and tall grasses.

This soil has low potential for most urban uses because of the depth to rock and the risk of corrosion to uncoated steel. The potential is medium for recreational use because of the depth to rock and the slow percolation of water.

Capability subclass IVe; Redland range site.

37—Konsil loamy fine sand, 1 to 5 percent slopes. This deep, gently sloping soil is on uplands. Areas are irregular in shape and range from 10 to 200 acres.

The surface layer is neutral, brown loamy fine sand about 10 inches thick. From 10 to 71 inches is strongly acid, yellowish red sandy clay loam. The underlying material is weakly cemented sandstone.

This soil is well drained. The available water capacity is medium, and permeability is moderate. Surface runoff is slow. The hazard of water erosion is slight.

Included in mapping are small areas of Arenosa, Gasil, and Heaton soils. Included soils make up about 20 percent of any one mapped area.

This soil is used for improved pasture, crops, and range. There are some areas of idle cropland. The main crops are peanuts and grain sorghum.

The potential is medium for improved bermudagrass and grain sorghum. It is also medium for range. The main plants are tall grasses and scattered oak trees.

This soil has medium potential for most urban uses. The low strength is the most limiting feature. The potential is medium for recreational use because the surface layer is too sandy.

Capability subclass IIIe; Loamy Sand range site.

38—Konsil loamy fine sand, 5 to 8 percent slopes, eroded. This deep, sloping soil is on uplands. Gullies are 2 to 10 feet deep and 100 to 200 feet apart. Areas are irregular in shape and range from 10 to 115 acres.

The surface layer is neutral, brown loamy fine sand about 10 inches thick. From 10 to 71 inches is strongly acid, yellowish red sandy clay loam. The underlying material is weakly cemented sandstone.

This soil is well drained. The available water capacity is medium, and permeability is moderate. Surface runoff is slow. The hazard of water erosion is slight.

Included in mapping are small areas of Gasil, Heaton, and Silstid soils. Also included are small areas of a soil that is similar to this Konsil soil but has more gravel and stones than this soil. These included soils make up about 20 percent of any one mapped area.

Most of the acreage is used for range. There are some areas of abandoned cropland and some of improved pasture. The soil is unsuitable as cropland.

The potential is medium for range. The main plants are tall grasses and scattered oak trees. The potential is low for improved bermudagrass.

The potential is only medium for most urban uses because of the low strength. It is also medium for recreational use because of the sandy surface layer.

Capability subclass VIe; Loamy Sand range site.

39—Konsil fine sandy loam, 2 to 5 percent slopes. This deep, gently sloping soil is on uplands. Areas are irregular in shape and range from 15 to 120 acres.

The surface layer is neutral, reddish gray fine sandy loam about 9 inches thick. From 9 to 12 inches is slightly acid, light reddish brown fine sandy loam. Between 12 and 29 inches is strongly acid, red sandy clay loam. From 29 to 47 inches is strongly acid, red sandy clay loam. Between 47 and 71 inches is strongly acid, light red sandy clay loam. The underlying material is medium acid, yellowish red, weakly cemented sandstone.

This soil is well drained. The available water capacity is medium, and permeability is moderate. Surface runoff is slow. The hazard of water erosion is slight.

Included in mapping are small areas of Callisburg and Gasil soils and Konsil loamy fine sand. These included soils make up about 15 percent of any one mapped area.

This soil is used for range, crops, and improved pastures. Some areas are abandoned cropland. The main crops are peanuts and grain sorghum.

The potential is high for range. The main plants are tall grasses and scattered oak trees. The potential is medium for grain sorghum and improved bermudagrass.

This soil has medium potential for most urban uses because of the low strength. The potential is high for recreational use. Slope is a limitation for the use of some areas as playgrounds.

Capability subclass IIIe; Sandy Loam range site.

40—Konsil fine sandy loam, 5 to 8 percent slopes. This deep, sloping soil is on uplands. Areas are irregular in shape and range from 15 to 75 acres.

The surface layer is neutral, reddish gray fine sandy loam about 9 inches thick. From 9 to 12 inches is slightly acid, light reddish brown fine sandy loam. Between 12 and 29 inches is strongly acid, red sandy clay loam. From 29 to 47 inches is strongly acid, red sandy clay loam. Between 47 and 71 inches is strongly acid, light red sandy clay loam. The underlying material is medium acid, yellowish red, weakly cemented sandstone.

This soil is well drained. The available water capacity is medium, and permeability is moderate. Surface runoff is slow. The hazard of water erosion is moderate.

Included in mapping are small areas of Callisburg and Gasil soils and Konsil loamy fine sand. Also included are areas where gullies have formed 2 to 10 feet deep and 100 to 300 feet apart. Included soils make up about 20 percent of any one mapped area.

This soil is used mainly for range. Some areas are used for crops or improved pasture, and some are abandoned cropland. The main crops are grain sorghum and wheat.

The potential is high for range. The main plants are tall grasses and scattered oak trees.

The potential is low for grain sorghum and wheat. Good management is needed to help control erosion. The potential is medium for improved bermudagrass.

The potential is only medium for most urban uses because of the low strength. It is high for most recreational uses. Slope is a limitation for the use of some areas as playgrounds.

Capability subclass IVe; Sandy Loam range site.

41—Lewisville clay loam, 1 to 5 percent slopes. This deep, gently sloping soil is on stream terraces in uplands. Areas are irregular in shape and range from 8 to 120 acres.

The surface layer is moderately alkaline, dark grayish brown clay loam about 13 inches thick. Between 13 and 40 inches is moderately alkaline, yellowish brown clay loam. From 40 to 60 inches is moderately alkaline, light yellowish brown silty clay loam.

This soil is well drained. The available water capacity is high, and permeability is moderate. Surface runoff is slow. The hazard of water erosion is moderate.

Included in mapping are small areas of Maloterre, Purves, and Venus soils. Also included are areas near stream channels where the substratum is gravelly. These included soils make up about 20 percent of any one mapped area.

This soil is used for crops, range, and improved pasture. The main crops are grain sorghum and small grain.

The potential is high for grain sorghum and small grain. It is also high for improved bermudagrass. The soil has high potential for range. The main plants are mid and tall grasses.

The potential is low for most urban uses. The low strength, the shrinking and swelling with changes in moisture content, and the risk of corrosion to uncoated steel are the most limiting features. The potential is medium for recreational use because the surface layer is too clayey.

Capability subclass IIIe; Clay Loam range site.

42—Lewisville clay loam, 5 to 8 percent slopes. This deep, sloping soil is on foot slopes in uplands. Areas are irregular in shape and range from 10 to 150 acres.

The surface layer is moderately alkaline, dark grayish brown clay loam about 13 inches thick. Between 13 and 40 inches is moderately alkaline, yellowish brown clay

loam. From 40 to 60 inches is moderately alkaline, light yellowish brown silty clay loam.

This soil is well drained. The available water capacity is high. Permeability is moderate, and surface runoff is medium. The hazard of water erosion is moderate.

Included in mapping are small areas of Bolar, Maloterre, Purves, and Venus soils. Also included are areas along escarpments and steep ridges where the substratum is gravelly. Included soils make up about 25 percent of any one mapped area.

Most of this soil is used for range.

The potential is high for grain sorghum and improved bermudagrass. On cropland, management is needed to control erosion. The potential is high for range. The main plants are mid and tall grasses.

The potential is low for most urban uses. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel are the main limiting features. The potential is medium for most recreational uses because of the clayey surface layer. Slope is also a limitation for the use of some areas as playgrounds.

Capability subclass IVe; Clay Loam range site.

43—Lindy loam, 1 to 5 percent slopes. This moderately deep, gently sloping soil is on uplands. Areas are irregular in shape and range from 20 to 125 acres.

The surface layer is 4 inches of neutral, dark brown loam. From 4 to 10 inches is neutral, reddish brown loam. Between 10 and 20 inches is neutral, reddish brown clay loam. From 20 to 30 inches is neutral, reddish brown clay. The underlying material is angular limestone fragments.

This soil is well drained. The available water capacity is low, and permeability is slow. Surface runoff is medium. The hazard of water erosion is severe.

Included in mapping are small areas of Bolar, Hensley, and Purves soils and areas of a soil that is similar to this Lindy soil, but it is underlain by shale instead of hard limestone. Also included are areas of Lindy soil where slopes are more than 5 percent. These included soils make up about 25 percent of any one mapped area.

This soil is used for crops, mainly grain sorghum and small grain. Some areas are range and improved pasture.

The potential is medium for grain sorghum. It is low for small grain and improved bermudagrass because of the low available water capacity. The potential is high for range. The main plants are mid and tall grasses.

The potential is low for most urban uses. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel are the main limiting features. The potential is medium for most recreational uses because of the slow percolation of water.

Capability subclass IVe; Deep Redland range site.

44—Mabank fine sandy loam, 0 to 1 percent slopes. This deep, nearly level soil is on uplands. Areas are irregular in shape and range from 12 to 200 acres.

The surface layer is medium acid, grayish brown fine sandy loam about 7 inches thick. From 7 to 19 inches is slightly acid, dark gray clay mottled with yellowish brown. Between 19 and 42 inches is mildly alkaline, gray clay. From 42 to 60 inches is moderately alkaline, grayish brown clay.

This soil is somewhat poorly drained. The available water capacity is medium. Permeability and surface runoff are very slow. The hazard of water erosion is severe. The seasonal water table is within a depth of 1 foot.

Included in mapping are small areas of Crockett, Crosstell, and Wilson soils and a soil that is similar to this Mabank soil but has a thicker surface layer. Included soils make up about 25 percent of any one mapped area.

Most of the acreage is used for crops, mainly grain sorghum and small grain. Some areas are improved pasture.

The potential is medium for grain sorghum and small grain. It is also medium for improved bermudagrass. The potential is high for range. The main plants are mid and tall grasses.

This soil has low potential for most urban uses. The shrinking and swelling with changes in moisture content, the low strength, wetness, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for most recreational uses because of the wetness and the slow percolation of water.

Capability subclass IIIw; Claypan Prairie range site.

45—Mabank fine sandy loam, 1 to 5 percent slopes. This deep, gently sloping soil is on uplands. Areas are irregular in shape and range from 20 to 125 acres.

The surface layer is medium acid, grayish brown fine sandy loam about 7 inches thick. From 7 to 19 inches is slightly acid, dark gray clay mottled with yellowish brown. Between 19 and 42 inches is mildly alkaline, gray clay. From 42 to 60 inches is moderately alkaline, grayish brown clay.

This soil is somewhat poorly drained. The available water capacity is medium. Permeability is very slow, and surface runoff is slow. The hazard of water erosion is severe. The seasonal water table is within a depth of 1 foot.

Included in mapping are small areas of Crockett, Crosstell, and Wilson soils. The included soils make up about 20 percent of any one mapped area.

This soil is used mainly for improved pasture. Some areas are cropland. The main crops are grain sorghum and small grain.

The potential is medium for improved bermudagrass. It is low for grain sorghum and small grain. The potential is high for range. The main plants are mid and tall grasses.

This soil has low potential for most urban uses. The shrinking and swelling with changes in moisture content, the low strength, the wetness, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of the wetness and the slow percolation of water.

Capability subclass IIIe; Claypan Prairie range site.

46—Mabank fine sandy loam, 1 to 5 percent slopes, eroded. This deep, gently sloping soil is on uplands. Erosion has removed the original surface layer on about 20 percent of the acreage. The eroded areas have gullies 1 to 3 feet deep and 200 to 400 feet apart. Areas are irregular in shape and range from 10 to 90 acres.

The surface layer is medium acid, grayish brown fine sandy loam about 7 inches thick. From 7 to 19 inches is slightly acid, dark gray clay mottled with yellowish brown. Between 19 and 42 inches is mildly alkaline, gray clay. From 42 to 60 inches is moderately alkaline, grayish brown clay.

This soil is somewhat poorly drained. The available water capacity is medium, and permeability is very slow. Surface runoff is medium. The hazard of water erosion is severe. The seasonal water table is within a depth of 1 foot.

Included in mapping are small areas of Crockett, Crosstell, and Wilson soils. Included soils make up about 20 percent of any one area mapped.

This soil is used for crops, range, and improved pasture. The main crops are grain sorghum and small grain. Some areas are abandoned cropland with a cover of low quality grasses.

The potential is low for grain sorghum and small grain and medium for improved bermudagrass. Good management is needed to control erosion. The potential is high for range. The main plants are mid and tall grasses.

The potential is low for most urban uses. The low strength, the shrinking and swelling with changes in moisture content, the wetness, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of wetness and the slow percolation of water.

Capability subclass IVe; Claypan Prairie range site.

47—Maloterre-Aledo complex, 3 to 12 percent slopes. These very shallow to shallow, gently sloping to strongly sloping soils are on uplands. Areas are irregular in shape and range from 50 to 300 acres.

This unit is about 50 percent Maloterre soils, 25 percent Aledo soils, and 25 percent rock outcrop and other soils. These soils are so intricately mixed that mapping them separately is not practical at the scale selected for mapping.

The surface layer of Maloterre soils is moderately alkaline, grayish brown gravelly clay loam about 5 inches thick. The underlying material is platy limestone.

Maloterre soils are somewhat excessively drained. The available water capacity is very low, and permeability is moderately slow. Surface runoff is rapid. The hazard of water erosion is slight.

The surface layer of Aledo soils is moderately alkaline, dark grayish brown gravelly clay loam about 7 inches thick. From 7 to 16 inches is moderately alkaline, brown very gravelly clay loam. The underlying material to 24 inches is white, coarsely fractured indurated limestone.

Aledo soils are well drained. The available water capacity is very low, and permeability is moderate. Surface runoff is rapid. The hazard of water erosion is moderate.

Included in mapping are small areas of Bolar, Purves, and San Saba soils and rock outcrop. Included soils make up about 30 percent of any one mapped area.

The soils are unsuitable for cultivation because of the depth to limestone. The main use is for range.

The potential is low for range. The main plants are mid and tall grasses, cactus, and thorny shrubs.

The potential is low for most urban uses because of the depth to rock and the risk of corrosion to uncoated steel. The potential is low for recreational use because of the slope, the depth to rock, and the clayey surface layer.

Capability subclass VIIs; Very Shallow range site, Maloterre part; Shallow range site, Aledo part.

48—Maloterre and Venus soils, hilly. These soils are on the steep breaks between the gently sloping uplands and the bottom lands of major streams. Slopes range from 10 to 30 percent. Areas are irregular and range from 25 to 200 acres.

The composition of this unit is more variable than that of others in the survey area but has been controlled well enough for expected use of the soils. The unit is about 35 percent Maloterre soils, 30 percent Venus soils, and 35 percent rock outcrop and other soils. The soils are not uniform and do not occur in a regular pattern.

The surface layer of Maloterre soils is moderately alkaline, grayish brown gravelly clay loam about 5 inches thick. The underlying material is platy limestone.

Maloterre soils are very shallow and somewhat excessively drained. The available water capacity is very low, and permeability is moderately slow. Surface runoff is rapid. The hazard of water erosion is moderate.

The surface layer of Venus soils is moderately alkaline, dark grayish brown loam about 12 inches thick. From 12 to 22 inches is moderately alkaline, brown loam. Between 22 and 46 inches is moderately alkaline, yellowish brown loam. The underlying material to 70 inches is moderately alkaline, brownish yellow loam.

Venus soils are deep and well drained. The available water capacity is high. Permeability is moderate, and

surface runoff is medium. The hazard of water erosion is moderate.

Included in mapping are small areas of Bolar and Purves soils on the upper part of the slope and Duffau and Windthorst soils on the lower slope. Also included are areas of rock outcrop and areas where slopes are more than 30 percent.

These soils are not suitable for cultivation because of the slope. They are used mainly for range.

The potential is low for range. The main plants are mid and tall grasses and oak trees.

The potential is low for urban use because of the slope, the risk of corrosion to uncoated steel, and the depth to rock. The potential is low for recreational use because of the slope.

Capability subclass VIIs; Steep Rocky range site.

49—Medlin clay, 1 to 3 percent slopes. This deep, gently sloping soil is on uplands. Areas are irregular in shape and range from 10 to 80 acres.

The surface layer is moderately alkaline, grayish brown clay about 4 inches thick. From 4 to 16 inches is moderately alkaline, light olive brown clay. Between 16 and 40 inches is moderately alkaline, grayish brown clay. The underlying material to 60 inches is moderately alkaline, grayish brown shaly clay.

This soil is well drained. The available water capacity is medium, and permeability is very slow. Surface runoff is rapid. The hazard of water erosion is moderate.

Included in mapping are small areas of Normangee, Sanger, and Wilson soils. These included soils make up about 20 percent of any one mapped area.

This soil is used for crops and range. Wheat and grain sorghum are the main crops.

The potential is high for wheat and medium for grain sorghum and improved bermudagrass. The potential is high for range. The main plants are mid and tall grasses.

The potential is low for most urban uses. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because the surface layer is too clayey.

Capability subclass IIe; Blackland range site.

50—Medlin clay, 3 to 5 percent slopes, eroded. This deep, gently sloping soil is on uplands. It has shallow gullies 1 to 3 feet deep with gentle side slopes that can be crossed with farm equipment. The gullies are about 20 feet wide at the lower end and occur at intervals of 200 to 400 feet. Areas are irregular in shape and range from 10 to 90 acres.

The surface layer is moderately alkaline, grayish brown clay about 4 inches thick. From 4 to 16 inches is moderately alkaline, light olive brown clay. Between 16 and 40 inches is moderately alkaline, grayish brown clay. The underlying material to 60 inches is moderately alkaline, grayish brown shaly clay.

This soil is well drained. The available water capacity is medium, and permeability is very slow. Surface runoff is rapid, and the hazard of water erosion is severe.

This soil is used mainly for crops. Some areas are range, and some are idle cropland. The main crops are grain sorghum and wheat.

The potential is low for grain sorghum and wheat. Good management is needed to control erosion. The potential is also low for improved bermudagrass. The potential is high for range. The main plants are mid and tall grasses.

This soil has low potential for urban use. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel are the most limiting features. The potential is low for recreational use because of the clayey surface layer.

Capability subclass IVe; Blackland range site.

51—Medlin clay, 5 to 8 percent slopes. This deep, sloping soil is on uplands. Areas are irregular in shape and range from 8 to 180 acres.

The surface layer is moderately alkaline, grayish brown clay about 4 inches thick. From 4 to 16 inches is moderately alkaline, light olive brown clay. Between 16 and 40 inches is moderately alkaline, grayish brown clay. The underlying material to 60 inches is moderately alkaline, grayish brown shaly clay.

This soil is well drained. The available water capacity is medium, and permeability is very slow. Surface runoff is rapid. The hazard of water erosion is severe.

Included in mapping are small areas of Bolar and Sanger soils. Also included are gullied areas and areas where slopes are more than 8 percent. These included soils make up about 30 percent of any one mapped area.

This soil is unsuitable for cultivation. It is used mainly for range or improved pasture. The potential is high for range. The main plants are mid and tall grasses. The potential is low for improved bermudagrass.

This soil has low potential for urban use. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of the clay surface layer.

Capability subclass VIe; Blackland range site.

52—Miller soils. These deep, nearly level soils are on bottom lands. They are flooded about once every 3 years. Slopes are 0 to 1 percent. Areas are long and narrow and range from 20 to 150 acres.

The surface texture varies and includes clay, silty clay, silty clay loam, and very fine sandy loam. A sandy substratum occurs in some areas. The soils are not uniform and do not occur in a regular pattern.

Typically, the surface layer is moderately alkaline, reddish brown clay about 18 inches thick. Between 18 and 42 inches is moderately alkaline, reddish brown clay.

From 42 to 60 inches is moderately alkaline, dark reddish brown clay.

Miller soils are moderately well drained. The available water capacity is high. Permeability is very slow, and surface runoff is slow.

Included in mapping are small areas of Gaddy and Yahola soils. These included soils make up about 15 percent of any one mapped area.

These soils are used mainly for range. There are some areas of cropland. The main crops are wheat and alfalfa. Some pecan orchards are also grown on this soil.

The potential is medium for range. The main plants are tall grasses and forbs. The potential is high for wheat and medium for improved bermudagrass.

The soil has low potential for urban uses. The shrinking and swelling with changes in moisture content, the flooding, the low strength, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of the clayey surface layer and slow percolation of water.

Capability subclass IIIw; Clayey Bottomland range site.

53—Miller soils, frequently flooded. These deep, nearly level soils are on bottom lands. Flooding occurs 3 to 5 times each year. Slopes are 0 to 1 percent. Areas are long and narrow and range from 20 to 175 acres.

The surface texture varies and includes clay, silty clay, silty clay loam, or very fine sandy loam. The soils are not uniform and do not occur in a regular pattern.

Typically, the surface layer is moderately alkaline, reddish brown clay about 18 inches thick. Between 18 and 42 inches is moderately alkaline, reddish brown clay. From 42 to 60 inches is moderately alkaline, dark reddish brown clay.

Miller soils are moderately well drained. The available water capacity is high. Permeability is very slow, and surface runoff is slow.

Included in mapping are small areas of Gaddy and Yahola soils. Included soils make up about 15 percent of any one mapped area.

This soil is unsuitable as cropland because of the flooding. It is used for range. The potential is medium for range. The main plants are tall grasses and forbs. The potential is also medium for improved bermudagrass.

The potential is low for urban use. The shrinking and swelling with changes in moisture content, the low strength, the flooding, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of the flooding and the slow percolation of water.

Capability subclass Vw; Clayey Bottomland range site.

54—Minco very fine sandy loam, 0 to 3 percent slopes. This deep, nearly level to gently sloping soil is on uplands. Areas are irregular in shape and range from 40 to 300 acres.

The surface layer is slightly acid, reddish brown very fine sandy loam about 18 inches thick. From 18 to 40 inches is neutral, yellowish red very fine sandy loam. Between 40 and 80 inches is moderately alkaline, reddish yellow very fine sandy loam.

This soil is well drained. The available water capacity is high, and permeability is moderate. Surface runoff is slow. The hazard of water erosion is moderate.

Included in mapping are small areas of Teller and Yahola soils and depressed areas of a soil that is similar to this Minco soil but has a silty clay loam surface layer. Included soils make up about 20 percent of any one mapped area.

This soil is used mainly for crops. The main crops are wheat, grain sorghum, and alfalfa. There are some areas of improved pasture.

The potential is medium for grain sorghum and wheat. It is high for improved bermudagrass and is medium for range. The main plants are mid and tall grasses.

This soil has medium potential for most urban uses because of the low strength. The potential is high for recreational use.

Capability subclass IIe; Sandy Loam range site.

55—Minco very fine sandy loam, 3 to 8 percent slopes. This deep, gently sloping to sloping soil is on uplands. Areas are irregular in shape and range from 30 to 120 acres.

The surface layer is slightly acid, reddish brown very fine sandy loam about 18 inches thick. From 18 to 40 inches is neutral, yellowish red very fine sandy loam. Between 40 and 80 inches is moderately alkaline, reddish yellow very fine sandy loam.

This soil is well drained. The available water capacity is high, and permeability is moderate. Surface runoff is medium. The hazard of water erosion is moderate.

Included in mapping are small areas of Teller soils and some areas of Minco soils where slopes are more than 8 percent. Also included are some gullied areas. These included soils make up about 15 percent of any one mapped area.

This soil is used mainly for range. There are some areas of improved pasture and cropland. Wheat is the main crop.

The potential is medium for range. The main plants are mid and tall grasses. The potential is medium for improved bermudagrass and wheat.

This soil has medium potential for most urban uses. The low strength is the main limiting feature. The potential is high for most recreational uses. Slope is a limitation for the use of some areas as playgrounds.

Capability subclass IVe; Sandy Loam range site.

56—Normangee clay loam, 1 to 3 percent slopes. This deep, gently sloping soil is on uplands. Areas are irregular in shape and range from 10 to 120 acres.

The surface layer is neutral, dark grayish brown clay loam about 7 inches thick. From 7 to 12 inches is slightly acid, brown clay mottled with dark reddish brown. From 12 to 20 inches is slightly acid, grayish brown clay mottled with dark reddish brown. Between 20 and 48 inches is olive clay that is neutral in the upper 15 inches and moderately alkaline in the lower 13 inches. From 48 to 59 inches is moderately alkaline, light olive brown clay. The underlying material to 65 inches is moderately alkaline, light olive brown shaly clay mottled with yellowish brown.

This soil is moderately well drained. The available water capacity is high, and permeability is very slow. Surface runoff is medium. The hazard of water erosion is severe.

Included in mapping are small areas of Crockett, Lindy, Medlin, and Wilson soils. Also included are areas of a soil that is similar to this Normangee soil but has a redder, unmottled subsurface layer. These included soils make up about 20 percent of any one mapped area.

This soil is used mainly for crops. The main crops are grain sorghum and small grain. There are also some areas of range.

The potential is medium for grain sorghum and small grain. It is high for improved bermudagrass. It is medium for range. The main plants are mid and tall grasses.

This soil has low potential for most urban uses. The shrinking and swelling with changes in moisture content and the risk of corrosion to uncoated steel are the main limiting features. The potential is medium for recreational use because of the clayey surface layer and the slow percolation.

Capability subclass IIIe; Claypan Prairie range site.

57—Normangee clay loam, 1 to 5 percent slopes, eroded. This deep, gently sloping soil is on uplands. The original surface layer has been removed by erosion on parts of each area mapped. Gullies 1 to 3 feet deep are 200 to 400 feet apart. Areas are irregular in shape and range from 8 to 160 acres.

The surface layer is neutral, dark grayish brown clay loam about 7 inches thick. From 7 to 12 inches is slightly acid, brown clay mottled with dark reddish brown. From 12 to 20 inches is slightly acid, grayish brown clay mottled with dark reddish brown. Between 20 and 48 inches is olive clay that is neutral in the upper 15 inches and moderately alkaline in the lower 13 inches. From 48 to 59 inches is moderately alkaline, light olive brown clay. The underlying material to 65 inches is moderately alkaline, light olive brown shaly clay mottled with yellowish brown.

This soil is moderately well drained. The available water capacity is high, and permeability is very slow. Surface runoff is rapid. The hazard of water erosion is severe.

Included in mapping are small areas of Crockett, Lindy, Medlin, and Wilson soils. Also included are areas of a soil that is similar to this Normangee soil but has a redder, unmottled subsurface layer. These included soils make up about 20 percent of any one mapped area.

This soil is used mainly for range. Some areas are cropland and improved pasture. The main crops are grain sorghum and small grain. On cropland, management is needed to control erosion.

The potential is medium for range. The main plants are mid and tall grasses. The potential is low for grain sorghum and small grain because of erosion.

This soil has low potential for most urban uses. The shrinking and swelling with changes in moisture content and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because the surface layer is clayey and water percolates slowly.

Capability subclass IVe; Claypan Prairie range site.

58—Normangee and Crockett soils, 3 to 8 percent slopes, severely eroded. These deep, gently sloping to sloping soils are on uplands. Gullies are 3 to 10 feet deep and 50 to 200 feet apart. Areas are irregular in shape and range from 6 to 80 acres.

Normangee soils make up about 35 percent of the unit, Crockett soils 35 percent, and other soils the remaining 30 percent. The soils are not uniform and do not occur in a regular pattern.

The surface layer of Normangee soils is neutral, dark grayish brown clay loam about 7 inches thick. From 7 to 12 inches is slightly acid, brown clay mottled with dark reddish brown. From 12 to 20 inches is slightly acid, grayish brown clay mottled with dark reddish brown. Between 20 and 48 inches is olive clay that is neutral in the upper 15 inches and moderately alkaline in the lower 13 inches. From 48 to 59 inches is moderately alkaline, light olive brown clay. The underlying material to 65 inches is moderately alkaline, light olive brown shaly clay mottled with yellowish brown.

Normangee soils are moderately well drained. The available water capacity is high, and permeability is very slow. Surface runoff is rapid. The hazard of water erosion is severe.

The surface layer of Crockett soils is slightly acid, brown fine sandy loam about 5 inches thick. From 5 to 18 inches is medium acid, grayish brown clay mottled with red. From 18 to 32 inches is medium acid, light yellowish brown clay mottled with red and yellowish brown. Between 32 and 50 inches is slightly acid, light yellowish brown clay mottled with brownish yellow. The underlying material to 60 inches is moderately alkaline clay loam interbedded with shaly clay that is mottled with grayish brown, light olive brown, and brownish yellow.

Crockett soils are moderately well drained. The available water capacity is high, and permeability is very slow. Surface runoff is rapid. The hazard of water erosion is severe.

Included in mapping are small areas of Callisburg, Mabank, and Medlin soils. Also included are areas of Normangee and Crockett soils where slopes are more than 8 percent.

These soils are unsuitable as cropland. They are used for range. There are some areas of abandoned cropland.

The potential is medium for range. The main plants are mid and tall grasses. The potential is also medium for improved bermudagrass.

The potential is low for urban use. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of the slow percolation of water.

Capability subclass VIe; Claypan Prairie range site.

59—Pulexas soils, frequently flooded. These deep, nearly level soils are on bottom lands. They are flooded up to 5 times each year for periods of 2 to 7 days. Slopes are 0 to 1 percent. Areas are long and narrow and range from 10 to 200 acres.

The surface texture varies because of the recent sediments. The soils are not uniform and do not occur in a regular pattern.

Typically, the surface layer is medium acid, brown fine sandy loam about 6 inches thick. From 6 to 10 inches is neutral, light yellowish brown fine sandy loam. Between 10 and 40 inches is medium acid fine sandy loam that is brown in the upper 16 inches and yellowish brown in the lower 14 inches. From 40 to 66 inches is slightly acid, brown fine sandy loam.

Pulexas soils are well drained. The available water capacity is medium, and permeability is moderately rapid. Surface runoff is slow. The hazard of water erosion is moderate.

Included in mapping are small areas of Frio and Gowen soils. These included soils make up about 25 percent of any one area mapped.

Most of the acreage is used for range. Some areas are cropland, and some are improved pasture. The main crop is small grain. The soil is used as cropland only in areas protected from flooding.

The potential is high for range. The main plants are tall grasses and poor quality trees and brush. The potential is also high for improved bermudagrass. It is medium for small grain.

The potential is low for urban and recreational uses because of the flooding.

Capability subclass Vw; Loamy Bottomland range site.

60—Purves clay loam, 1 to 3 percent slopes. This shallow, gently sloping soil is on uplands. Areas are irregular in shape and range from 15 to 60 acres.

The surface layer is moderately alkaline, very dark grayish brown clay loam about 8 inches thick. From 8 to 12 inches is moderately alkaline, brown very gravelly clay loam. The underlying material is coarsely fractured limestone.

This soil is well drained. The available water capacity is very low, and permeability is moderately slow. Surface runoff is slow. The hazard of water erosion is moderate.

Included in mapping are small areas of Bolar, Maloterre, and San Saba soils and a soil that is similar to this Purves soil but has a lighter colored surface layer. These included soils make up about 15 percent of any one mapped area.

This soil is used mainly for range. There are also some areas of cropland and some of improved pasture. Grain sorghum and small grain are the main crops.

This soil has low potential for range. The main plants are mid and tall grasses. The potential is also low for grain sorghum and small grain because of the very low available water capacity.

The potential is low for urban use because of the depth to rock. The potential is also low for recreational use because the surface layer is too clayey.

Capability subclass IIIe; Shallow range site.

61—Purves clay loam, 3 to 5 percent slopes. This shallow, gently sloping soil is on uplands. Areas are irregular in shape and range from 10 to 115 acres.

The surface is about 5 percent limestone fragments and gravel. The surface layer is moderately alkaline, very dark grayish brown clay loam about 8 inches thick. From 8 to 12 inches is moderately alkaline, brown very gravelly clay loam. The underlying material is coarsely fractured limestone.

This soil is well drained. The available water capacity is very low, and permeability is moderately slow. Surface runoff is medium. The hazard of water erosion is moderate.

Included in mapping are small areas of Bolar, Maloterre, and San Saba soils and areas of a soil that is similar to this Purves soil but has a lighter colored surface layer. These included soils make up about 30 percent of any one mapped area.

Most of the acreage is used for range. Some areas are cropland, and some are improved pasture. Grain sorghum and small grain are the main crops. On cropland, management is needed to control erosion.

The potential is low for range. The main plants are mid and tall grasses. The potential is low for grain sorghum and small grain because of the very low available water capacity. It is also low for improved bermudagrass.

The potential is low for urban use because of the depth to rock. It is low for recreational use because the surface layer is too clayey.

Capability subclass IVe; Shallow range site.

62—San Saba-Slidell complex, 3 to 5 percent slopes. These moderately deep to deep, gently sloping soils are on uplands. Areas are irregular in shape and range from 10 to 40 acres.

San Saba soils make up about 60 percent of this unit, Slidell soils 25 percent, and other soils the remaining 15 percent. These soils are so intricately mixed that mapping them separately is not practical at the scale selected for mapping.

The surface layer of San Saba soils is moderately alkaline, very dark gray clay about 15 inches thick. Between 15 and 25 inches is moderately alkaline, dark gray clay. From 25 to 33 inches is moderately alkaline, grayish brown clay. The underlying material is white indurated limestone.

San Saba soils are moderately deep and well drained. The available water capacity is low, and permeability is very slow. Surface runoff is medium. The hazard of water erosion is moderate.

The surface layer of Slidell soils is about 41 inches thick. It is moderately alkaline clay that is very dark gray in the upper 25 inches and dark gray in the lower 16 inches. From 41 to 50 inches is moderately alkaline, dark grayish brown clay. The layer from 50 to 62 inches is moderately alkaline, grayish brown clay mottled with olive yellow. The underlying material to 68 inches is moderately alkaline, light brownish gray clay mottled with olive yellow and gray.

Slidell soils are deep and well drained. The available water capacity is high, and permeability is very slow. Surface runoff is medium. The hazard of water erosion is moderate.

Included in mapping are small areas of Bolar, Purves, and Sanger soils. These included soils make up about 15 percent of any one mapped area.

This soil is used for range and crops. The main crops are grain sorghum and small grain.

The potential is high for range. The main plants are mid and tall grasses. The potential is also high for grain sorghum. It is medium for small grain and improved bermudagrass.

The potential is low for urban use. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of the clayey surface layer and the slow percolation of water.

Capability subclass IIIe; Blackland range site.

63—Sanger clay, 1 to 3 percent slopes. This deep, gently sloping soil is on uplands. Areas are irregular in shape and range from 15 to 300 acres.

The surface layer is moderately alkaline clay about 40 inches thick. It is very dark grayish brown in the upper 15 inches and dark grayish brown in the lower 25 inches. Between 40 and 65 inches is moderately alkaline, light olive brown clay.

This soil is well drained. The available water capacity is medium, and permeability is very slow. Surface runoff is slow. The hazard of water erosion is moderate.

Included in mapping are small areas of Bolar, San Saba, and Slidell soils. These included soils make up about 15 percent of any one mapped area.

This unit is used for range and crops. The main crops are wheat and grain sorghum.

The potential is high for range (fig. 3). The main plants are tall grasses. The potential is also high for grain sorghum. It is medium for wheat and improved bermudagrass.

The potential is low for urban use. The main limiting features are the low strength, the shrinking and swelling with changes in moisture content, and the risk of corrosion to uncoated steel. The potential is low for recreational use because of the clay surface layer and the slow percolation of water.

Capability subclass IIe; Blackland range site.

64—Sanger clay, 3 to 5 percent slopes, eroded. This deep, gently sloping soil is on uplands. Gullies are 1 to 3 feet deep and 150 to 300 feet apart. Areas are irregular in shape and range from 30 to 320 acres.

The surface layer is moderately alkaline clay about 40 inches thick that is very dark grayish brown in the upper 15 inches and dark grayish brown in the lower 25 inches. Between 40 and 65 inches is moderately alkaline, light olive brown clay.

This soil is well drained. The available water capacity is medium, and permeability is very slow. Surface runoff is medium. The hazard of water erosion is moderate.

Included in mapping are small areas of Bolar, San Saba, and Slidell soils. These included soils make up about 20 percent of any one mapped area.

This soil is used for range and for crops. The main crops are wheat and grain sorghum.

The potential is high for range. The main plants are tall grasses. The potential is medium for grain sorghum and improved bermudagrass. The potential is low for wheat.

This soil has low potential for urban use. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of the clayey surface layer and the slow percolation of water.

Capability subclass IIIe; Blackland range site.

65—Sanger clay, 5 to 8 percent slopes. This deep, sloping soil is on uplands. Areas are irregular in shape and range from 8 to 170 acres.

The surface layer is moderately alkaline clay about 40 inches thick that is very dark grayish brown in the upper 15 inches and dark grayish brown in the lower 25 inches. Between 40 and 65 inches is moderately alkaline, light olive brown clay.

This soil is well drained. The available water capacity is medium, and permeability is very slow. Surface runoff is medium. The hazard of water erosion is moderate.

Included in mapping are small areas of Bolar, Maloterre, and Purves soils. These included soils make up about 20 percent of any one area mapped.

This soil is used mainly for range. Some areas are cropland, and some are improved pasture. Wheat is the main crop.

The potential is high for range. The main plants are mid and tall grasses. The potential is low for wheat. It is medium for improved bermudagrass. On cropland, management is needed to control erosion.

This soil has low potential for urban use. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of the clayey surface layer and the slow percolation of water.

Capability subclass IVe; Blackland range site.

66—Sanger stony clay, 3 to 8 percent slopes. This deep, gently sloping to sloping soil is on uplands. Stones cover from 1 to 22 percent of the surface. They are 2 to 13 feet across and 6 inches to 2 feet thick. Areas are irregular in shape and range from 20 to 700 acres.

The surface layer is moderately alkaline, dark grayish brown stony clay about 12 inches thick. From 12 to 38 inches is moderately alkaline, grayish brown clay. Between 38 and 60 inches is moderately alkaline, light olive brown clay.

This soil is well drained. The available water capacity is medium, and permeability is very slow. Surface runoff is medium. The hazard of water erosion is moderate.

Included in mapping are stony phases of Bolar, Medlin, San Saba, and Slidell soils. Also included are small areas of Maloterre and Purves soils. These included soils make up about 20 percent of any one mapped area.

This soil is unsuitable for cultivation because of the stones. It is used for range.

The potential is high for range. The main plants are mid and tall grasses. The potential is low for improved bermudagrass.

The potential is low for urban use. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of the clayey surface layer, the slow percolation of water, and the large stones.

Capability subclass VIs; Blackland range site.

67—Silstid loamy fine sand, 0 to 5 percent slopes. This deep, nearly level to gently sloping soil is on uplands. Areas are irregular in shape and range from 6 to 50 acres.

The surface layer is about 10 inches of medium acid, pale brown loamy fine sand. From 10 to 22 inches is medium acid, very pale brown loamy fine sand. Between 22 and 43 inches, is medium acid sandy clay loam that is brownish yellow mottled with yellowish red in the upper 8 inches and yellow mottled with dark red and light brownish gray in the lower 13 inches. From 43 to 50 inches is medium acid, yellow fine sandy loam mottled with red and light gray. From 50 to 65 inches is medium acid, yellow fine sandy loam mottled with yellowish red.

The soil is well drained. The available water capacity is medium, and permeability is moderate. Surface runoff is slow. The hazard of water erosion is slight.

Included in mapping are small areas of Arenosa, Gasil, and Heaton soils. Included soils make up about 25 percent of any one area mapped.

This soil is used mainly for range. Some areas are cropland or improved pasture. There are some areas of idle cropland. The main crop is grain sorghum.

The potential is medium for range. The main plants are tall grasses and scattered oak trees. The potential is medium for improved bermudagrass and low for grain sorghum.

The potential is high for most urban uses. It is low for recreational use because the surface layer is so sandy.

Capability subclass IIIs; Sandy range site.

68—Silstid loamy fine sand, 5 to 8 percent slopes. This deep, sloping soil is on uplands. Areas are long and narrow and range from 8 to 60 acres.

The surface layer is about 10 inches of medium acid, pale brown loamy fine sand. From 10 to 22 inches is medium acid, very pale brown loamy fine sand. Between 22 and 43 inches is medium acid sandy clay loam that is brownish yellow mottled with yellowish red in the upper 8 inches and yellow mottled with dark red and light brownish gray in the lower 13 inches. From 43 to 50 inches is medium acid, yellow fine sandy loam mottled with red and light gray. From 50 to 65 inches is medium acid, yellow fine sandy loam mottled with yellowish red.

The soil is well drained. The available water capacity is medium, and permeability is moderate. Surface runoff is slow, and the hazard of water erosion is slight.

Included in mapping are small areas of Arenosa, Gasil, and Heaton soils. These included soils make up about 20 percent of any one mapped area.

Most of the acreage is used for range. There are some areas of cropland. The main crop is grain sorghum.

The soil has medium potential for range. The main plants are tall grasses and oak trees. The potential is low for grain sorghum. It is medium for improved bermudagrass.

The potential is high for most urban uses. The potential is low for recreational use because of the sandy surface layer.

Capability subclass IIIe; Sandy range site.

69—Slidell clay, 0 to 1 percent slopes. This deep, nearly level soil is on uplands. Areas are irregular in shape and range from 10 to 50 acres.

The surface layer is about 41 inches thick. It is moderately alkaline clay that is very dark gray in the upper 25 inches and dark gray in the lower 16 inches. From 41 to 50 inches is moderately alkaline, dark grayish brown clay. From 50 to 62 inches is moderately alkaline, grayish brown clay mottled with olive yellow. The underlying material to 68 inches is moderately alkaline, light brownish gray clay mottled with olive yellow and gray.

This soil is well drained. The available water capacity is high. Permeability is very slow, and surface runoff is slow. The hazard of water erosion is moderate.

Included in mapping are small areas of Bolar, Sanger, and San Saba soils. These included soils make up about 20 percent of any one area mapped.

This soil is used mainly for crops. The main crops are grain sorghum, cotton, and small grain. Some areas are range and improved pasture.

The potential is high for grain sorghum, cotton, and improved bermudagrass (fig. 4). It is medium for small grain. The potential is high for range. The main plants are mid and tall grasses.

This soil has low potential for urban use. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of the clayey surface layer and the slow percolation of water.

Capability subclass IIw; Blackland range site.

70—Slidell clay, 1 to 3 percent slopes. This deep, gently sloping soil is on uplands. Areas are irregular in shape and range from 10 to 70 acres.

The surface layer is about 41 inches thick. It is moderately alkaline clay that is very dark gray in the upper 25 inches and dark gray in the lower 16 inches. From 41 to 50 inches is moderately alkaline, dark grayish brown clay. From 50 to 62 inches is moderately alkaline, grayish brown clay mottled with olive yellow. The underlying material to 68 inches is moderately alkaline, light brownish gray clay mottled with olive yellow and gray.

This soil is well drained. The available water capacity is high, and permeability is very slow. Surface runoff is medium. The hazard of water erosion is moderate.

Included in mapping are small areas of Bolar, Sanger, and San Saba soils. Also included are a few areas of Slidell soils where slopes are more than 3 percent. These included soils make up about 25 percent of any one mapped area.

Most of the acreage is used for crops. The main crops are grain sorghum and small grain. Some areas are range and improved pasture.

The potential is high for grain sorghum and improved bermudagrass. It is medium for small grain. The potential is high for range. The main plants are mid and tall grasses.

This soil has low potential for urban use. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of the clayey surface layer and the slow percolation of water.

Capability subclass IIe; Blackland range site.

71—Slidell-San Saba complex, 1 to 3 percent slopes. These moderately deep to deep, gently sloping soils are on uplands. Areas are irregular in shape and range from 20 to several hundred acres.

Slidell soils make up about 50 percent of this unit, San Saba soils 35 percent, and other soils the remaining 15 percent. These soils are so intricately mixed that mapping them separately is not practical at the scale selected for mapping.

The surface layer of Slidell soils is about 41 inches thick. It is moderately alkaline clay that is very dark gray in the upper 25 inches and dark gray in the lower 16 inches. From 41 to 50 inches is moderately alkaline, dark grayish brown clay. From 50 to 62 inches is moderately alkaline, grayish brown clay mottled with olive yellow. The underlying material to 68 inches is moderately alkaline, light brownish gray clay mottled with olive yellow and gray.

Slidell soils are deep and well drained. The available water capacity is high, and permeability is very slow. Surface runoff is medium. The hazard of water erosion is moderate.

The surface layer of San Saba soils is moderately alkaline, very dark gray clay about 15 inches thick. Between 15 and 25 inches is moderately alkaline, dark gray clay. From 25 to 33 inches is moderately alkaline, grayish brown clay. The underlying material is white indurated limestone.

San Saba soils are moderately deep. They are well drained. The available water capacity is low, and permeability is very slow. Surface runoff is medium. The hazard of water erosion is moderate.

Included in mapping are small areas of Bolar, Purves, and Sanger soils. Also included is a soil that is similar to this San Saba soil but is more than 40 inches deep over limestone.

Most of the acreage is used for crops. Wheat and grain sorghum are the main crops. Some areas are range and improved pasture.

The potential is high for wheat, grain sorghum, and improved bermudagrass. The potential is also high for range. The main plants are mid and tall grasses.

The potential is low for urban use. The shrinking and swelling with changes in moisture content, the low strength, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of the clayey surface layer and the slow percolation of water.

Capability subclass IIe; Blackland range site.

72—Teller fine sandy loam, 0 to 1 percent slopes. This deep, nearly level soil is on stream terraces. Areas are irregular in shape and range from 30 to 400 acres.

The surface layer is about 22 inches of slightly acid fine sandy loam. It is brown in the upper 11 inches and dark reddish gray in the lower 11 inches. Between 22 and 68 inches is slightly acid, reddish brown sandy clay loam. The underlying material to 80 inches is neutral, pale brown fine sandy loam.

This soil is well drained. The available water capacity is high, and permeability is moderate. Surface runoff is slow. The hazard of water erosion is moderate.

Included in mapping are small areas of Mabank and Minco soils. Also included are small depressed areas where the surface layer is silty clay loam. Included soils make up about 20 percent of any one mapped area.

Most of the acreage is used as cropland. The main crops are wheat and grain sorghum. Some areas are range, improved pasture, or pecan orchards.

The potential is high for wheat and improved bermudagrass. It is medium for grain sorghum. It is also medium for range. The main plants are mid and tall grasses.

The potential is high for most urban and recreational uses.

Capability class I; Sandy Loam range site.

73—Tinn clay. This deep, nearly level soil is on bottom lands. It is protected from flooding by manmade structures, such as dams and levees, but flooding may occur once every 25 to 50 years. Slopes are 0 to 1 percent. Areas are long and narrow and range from 30 to 600 acres.

The surface layer is moderately alkaline, very dark gray clay about 38 inches. From 38 to 48 inches is moderately alkaline, dark gray clay. The underlying material to 60 inches is moderately alkaline, grayish brown silty clay.

The soil is somewhat poorly drained. The available water capacity is high. Permeability and surface runoff are very slow. The hazard of water erosion is moderate. The seasonal water table fluctuates between the surface and a depth of 3 feet.

Included in mapping are small areas of Frio and Gowen soils, which make up about 30 percent of any one mapped area.

This soil is used for crops, mainly grain sorghum, small grain, and alfalfa. There are also some areas of improved pasture.

The potential is high for grain sorghum, small grain, and improved bermudagrass. The potential is also high for range. The main plants are tall grasses.

The potential is low for most urban use. The shrinking and swelling with changes in moisture content, the risk of corrosion to uncoated steel, and the wetness are the main limiting features. The potential is low for recreational use because of the clayey surface layer and wetness.

Capability subclass IIw; Clayey Bottomland range site.

74—Tinn soils. These deep, nearly level soils are on bottom lands. They are flooded (fig. 5) 1 to 3 times each year. Areas are long and narrow and range from 15 to 600 acres.

The surface texture varies as the result of flooding. The texture is dominantly clay or clay loam, but some areas are fine sandy loam. The soils are not uniform and do not occur in a regular pattern.

Typically, the surface layer is moderately alkaline, very dark gray clay about 38 inches thick. From 38 to 48 inches is moderately alkaline, dark gray clay. The underlying material to 60 inches is moderately alkaline, grayish brown silty clay.

These soils are somewhat poorly drained. The available water capacity is high. Permeability and surface runoff are very slow. The hazard of water erosion is moderate. The seasonal water table fluctuates between the surface and a depth of 3 feet.

Included in mapping are small areas of Frio and Gowen soils. These included soils make up about 30 percent of any one mapped area.

These soils are used for crops, improved pasture, and range. The main crop is small grain.

The potential is only medium for small grain because of the flooding. It is high for improved bermudagrass. The potential is high for range. The main plants are tall grasses and oak trees.

The potential is low for urban use. The shrinking and swelling with changes in moisture content, the risk of corrosion to uncoated steel, the flooding, and the wetness are the main limiting features. The potential is low for recreational use because of the flooding, the wetness, the slow percolation of water, and the clayey surface layer.

Capability subclass Vw; Clayey Bottomland range site.

75—Venus loam, 2 to 5 percent slopes. This deep, gently sloping soil is on stream terraces. Areas are irregular in shape and range from 10 to 80 acres.

The surface layer is moderately alkaline, dark grayish brown loam about 12 inches thick. From 12 to 22 inches is moderately alkaline, brown loam. Between 22 and 46 inches is moderately alkaline, yellowish brown loam. The underlying material from 46 to 70 inches is moderately alkaline, brownish yellow loam.

This soil is well drained. The available water capacity is high, and permeability is moderate. Surface runoff is slow. The hazard of water erosion is moderate.

Included in mapping are small areas of Lewisville, Maloterre, and Purves soils. Also included is a soil that is similar to this Venus soil but has a fine sandy loam surface layer. These included soils make up about 20 percent of any one mapped area.

This soil is used mainly for range. A few small areas are cropland and improved pasture. The main crops are grain sorghum and small grain.

The potential is high for range. The main plants are mid and tall grasses and a few scattered oak trees. The potential is high for grain sorghum and small grain and medium for improved bermudagrass.

This soil has high potential for most urban uses. The risk of corrosion to uncoated steel is a limiting feature, but this can be overcome by proper design and use of material. The potential is high for most recreational uses.

Capability subclass IIIe; Clay Loam range site.

76—Venus loam, 3 to 8 percent slopes, eroded. This deep, gently sloping to sloping soil is on stream terraces. The original surface layer has been removed by erosion and gullies have formed on much of this unit. The gullies are 1 to 3 feet deep and 20 to 50 feet wide. A few in the more sloping areas are 3 to 15 feet deep. Areas are irregular in shape and range from 6 to 50 acres.

The surface layer is moderately alkaline, dark grayish brown loam about 12 inches thick. From 12 to 22 inches is moderately alkaline, brown loam. Between 22 and 46 inches is moderately alkaline, yellowish brown loam. The underlying material from 46 to 70 inches is moderately alkaline, brownish yellow loam.

This soil is well drained. The available water capacity is high, and permeability is moderate. Surface runoff is medium. The hazard of water erosion is moderate.

Included in mapping are small areas of Lewisville, Maloterre, and Purves soils. Also included are areas of a soil that is similar to this Venus soil but has a surface layer of fine sandy loam. These included soils make up about 20 percent of any one mapped area.

This soil is used mainly for range. Some areas are cropland, and some are abandoned cropland. The main crop is grain sorghum.

The potential is high for range. The main plants are mid and tall grasses.

The potential is high for grain sorghum and medium for improved bermudagrass.

This soil has high potential for most urban uses. The risk of corrosion to uncoated steel is a limiting feature, but this can be overcome by careful design. The potential is high for most recreational uses. Slope is a limiting feature for the use of some areas as playgrounds.

Capability subclass IVe; Clay Loam range site.

77—Wilson clay loam, 0 to 1 percent slopes. This deep, nearly level soil is on stream terraces. Areas are irregular in shape and range from 10 to several hundred acres.

The surface layer is neutral, dark grayish brown clay loam about 7 inches thick. From 7 to 20 inches is slightly acid, dark gray clay. From 20 to 36 inches is mildly alkaline, dark grayish brown clay. Between 36 and 62 inches is mildly alkaline, grayish brown clay. The underlying material to 70 inches is moderately alkaline, olive gray clay.

The soil is somewhat poorly drained. The available water capacity is high. Permeability and surface runoff are very slow. The hazard of water erosion is severe. The seasonal water table is within a depth of 1 foot.

Included in mapping are small areas of Mabank, Normangee, and Slidell soils. Also included are areas of Wilson soils where beds of waterworn gravel or stratified clays and sands occur between 5 and 8 feet and small areas where the soil has a high salt content. Included soils make up about 20 percent of any one mapped area.

This soil is used mainly as cropland. The main crops are grain sorghum, cotton, and small grain.

The potential is medium for grain sorghum, improved bermudagrass, and small grain. It is high for cotton. The potential is medium for range. The main plants are mid and tall grasses.

The potential is low for urban use. The shrinking and swelling with changes in moisture content, the low strength, the wetness, and the risk of corrosion to uncoated steel are the main limiting features. The potential is also low for recreational use because of the wetness and the slow percolation of water.

Capability subclass IIIw; Claypan Prairie range site.

78—Wilson clay loam, 1 to 5 percent slopes. This deep, gently sloping soil is on uplands. Areas are irregular in shape and range from 15 to I20 acres.

The surface layer is neutral, dark grayish brown clay loam about 7 inches thick. From 7 to 20 inches is slightly acid, dark gray clay. From 20 to 36 inches is mildly alkaline, dark grayish brown clay. Between 36 and 62 inches is mildly alkaline, grayish brown clay. The underlying material to 70 inches is moderately alkaline, olive gray clay.

This soil is somewhat poorly drained. The available water capacity is high, and permeability is very slow. Surface runoff is slow. The hazard of water erosion is severe. The seasonal water table is within a depth of 1 foot.

Included in mapping are small areas of Medlin, Normangee, and Sanger soils. These included soils make up about 20 percent of any one mapped area.

This soil is used mainly as cropland. The main crops are wheat, grain sorghum, and cotton. There are also areas of range and improved pasture.

This soil has low potential for cotton and grain sorghum. The potential is medium for wheat and improved bermudagrass. On cropland, cover crops are needed to help control erosion.

The potential is medium for range. The main plants are mid and tall grasses.

The potential is low for urban use. The shrinking and swelling with changes in moisture content, the low strength, the wetness, and the risk of corrosion to uncoated steel are the main limiting features. The potential

is low for recreational use because of the wetness and the slow percolation of water.

Capability subclass IVe; Claypan Prairie range site.

79—Wilson clay loam, 1 to 5 percent slopes, eroded. This deep, gently sloping soil is on uplands. Gullies 1 to 2 feet deep are 100 to 300 feet apart. Areas are irregular in shape and range from 10 to 115 acres.

The surface layer is neutral, dark grayish brown clay loam about 5 inches thick. From 5 to 17 inches is slightly acid, dark gray clay. From 17 to 36 inches is mildly alkaline, dark grayish brown clay. Between 36 and 62 inches is mildly alkaline, grayish brown clay. The underlying material to 70 inches is moderately alkaline, olive gray clay.

The soil is somewhat poorly drained. The available water capacity is high, and permeability is very slow. Surface runoff is medium, and the hazard of water erosion is severe. The seasonal water table is within a depth of 1 foot.

Included in mapping are small areas of Medlin, Normangee, and Sanger soils. These included soils make up about 20 percent of any one mapped area.

This soil is used mainly for crops. The main crops are wheat, grain sorghum, and cotton. Some areas are improved pasture, and some are abandoned cropland with a cover of poor quality grasses.

The potential is low for wheat, grain sorghum, and cotton. Cover crops are needed to help control erosion. The potential is medium for improved bermudagrass. It is also medium for range. The main plants are mid and tall grasses.

This soil has low potential for urban use. The shrinking and swelling with changes in moisture content, the low strength, the wetness, and the risk of corrosion to uncoated steel are the main limiting features. The potential is low for recreational use because of the wetness and the slow percolation of water.

Capability subclass IVe; Claypan Prairie range site.

80—Windthorst loamy fine sand, 1 to 5 percent slopes. This deep, gently sloping soil is on uplands. Areas are irregular in shape and range from 8 to 260 acres.

The surface layer is slightly acid, pale brown loamy fine sand about 12 inches thick. From 12 to 25 inches is medium acid, reddish brown sandy clay. From 25 to 40 inches is medium acid, yellowish red sandy clay mottled with reddish yellow and red. The underlying material to 50 inches is medium acid clay that is mottled with red, yellowish red, and yellowish brown.

This soil is moderately well drained. The available water capacity is high, and permeability is moderately slow. Surface runoff is medium. The hazard of water erosion is slight.

Included in mapping are small areas of Duffau soils and Windthorst fine sandy loam. Also included are areas of Windthorst loamy fine sand where slopes are less than 1 percent. Included soils make up about 30 percent of any one mapped area.

This soil is used mainly for range. Some areas are cropland and improved pasture. Grain sorghum is the main crop.

The potential is medium for range. The main plants are mid and tall grasses. The potential is low for grain sorghum. It is medium for improved bermudagrass.

This soil has only medium potential for urban use. The shrinking and swelling with changes in moisture content is the main limiting feature. The potential is medium for recreational use because of the sandy surface layer and the slow percolation of water.

Capability subclass IIIe; Loamy Sand range site.

81—Windthorst loamy fine sand, 5 to 8 percent slopes. This deep, sloping soil is on uplands. Areas are irregular in shape and range from 12 to 300 acres.

The surface layer is slightly acid, pale brown loamy fine sand about 12 inches thick. From 12 to 25 inches is medium acid, reddish brown sandy clay. From 25 to 40 inches is medium acid, yellowish red sandy clay mottled with reddish yellow and red. The underlying material to 50 inches is medium acid clay that is mottled with red, yellowish red, and yellowish brown.

This soil is moderately well drained. The available water capacity is high, and permeability is moderately slow. Surface runoff is medium. The hazard of water erosion is slight.

Included in mapping are small areas of Duffau soils and Windthorst fine sandy loam. Also included are small areas of Windthorst loamy fine sand where slopes are more than 8 percent. These included soils make up about 30 percent of any one mapped area.

This soil is used mainly for range. Some areas are abandoned cropland and improved pasture.

The potential is medium for range. The main plants are mid and tall grasses and oak trees. The potential is low for grain sorghum and medium for improved bermudagrass.

The potential is medium for urban use. The shrinking and swelling with changes in moisture content is the main limiting feature. The potential is medium for recreational use because of the sandy surface layer and the slow percolation of water.

Capability subclass IVe; Loamy Sand range site.

82— Windthorst fine sandy loam, 1 to 5 percent slopes. This deep, gently sloping soil is on erosional uplands. Areas are irregular in shape and range from 15 to 210 acres.

The surface layer is 10 inches of slightly acid, brown fine sandy loam. From 10 to 26 inches is medium acid, reddish brown sandy clay. From 26 to 40 inches is medium acid, yellowish red sandy clay mottled with reddish yellow and red. The underlying material to 48 inches

is medium acid clay that is mottled with red, yellowish red, and yellowish brown.

This soil is moderately well drained. The available water capacity is high, and permeability is moderately slow. Surface runoff is medium. The hazard of water erosion is severe.

Included in mapping are small areas of Aubrey and Duffau soils and Windthorst loamy fine sand. Also included are areas of Windthorst fine sandy loam where slopes are less than 1 percent. These included soils make up about 20 percent of any one mapped area.

This soil is used mainly for range. Some areas are cropland, abandoned cropland, and improved pasture. The main crops are grain sorghum and small grain.

The potential is medium for range. The main plants are mid and tall grasses and oak trees. This soil has low potential for grain sorghum and small grain. On cropland, cover crops are needed to help control erosion.

The potential is only medium for urban use. The main limiting feature is the shrinking and swelling with changes in moisture content. The potential is medium for recreational use because of the slow percolation of water.

Capability subclass IIIe; Sandy Loam range site.

83—Windthorst fine sandy loam, 5 to 8 percent slopes. This deep, sloping soil is on erosional uplands. Areas are irregular in shape and range from 20 to 300 acres.

The surface layer is 10 inches of slightly acid, brown fine sandy loam. From 10 to 26 inches is medium acid, reddish brown sandy clay. From 26 to 40 inches is medium acid, yellowish red sandy clay mottled with reddish yellow and red. The underlying material to 48 inches is medium acid clay that is mottled with red, yellowish red, and yellowish brown.

This soil is moderately well drained. The available water capacity is high, and permeability is moderately slow. Surface runoff is rapid, and the hazard of water erosion is severe.

Included in mapping are small areas of Aubrey and Duffau soils and Windthorst loamy fine sand. Also included are areas of Windthorst fine sandy loam where slopes are more than 8 percent. These included soils make up about 20 percent of any one mapped area.

This soil is used mainly for range. Some areas are abandoned cropland and improved pasture.

The potential is medium for range. The main plants are mid and tall grasses and oak trees. The potential is low for improved bermudagrass and grain sorghum. On cropland, a cover crop is needed to help control erosion.

This soil has only medium potential for urban use. The shrinking and swelling with changes in moisture content is the main limiting feature. The potential is medium for recreational use because of the slope and the slow percolation of water.

Capability subclass IVe; Sandy Loam range site.

84—Yahola fine sandy loam. This deep, nearly level soil is on bottom lands. It is flooded about once every 3 years. Slopes are 0 to 1 percent. Areas are long and narrow and range from 15 to 120 acres.

The surface layer is moderately alkaline, reddish brown fine sandy loam about 15 inches thick. From 15 to 20 inches is moderately alkaline, reddish brown fine sandy loam. Between 20 and 65 inches is moderately alkaline, reddish yellow loam with thin strata of other textures.

This soil is well drained. The available water capacity is medium, and permeability is moderately rapid. Surface runoff is slow.

Included in mapping are small areas of Gaddy and Miller soils. Also included are a few areas of Yahola soils that are flooded more often than this soil. These included soils make up about 20 percent of any one mapped area.

This soil is used for crops, range, and improved pasture. The main crops are grain sorghum and wheat.

The potential is medium for grain sorghum and wheat. It is high for improved bermudagrass. The potential is medium for range. The main plants are mid and tall grasses and hardwood trees.

The potential is low for urban use because of the flooding. It is medium for recreational use because of the flooding.

Capability subclass IIw; Loamy Bottomland range site.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture and rangeland; as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities, and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses

and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

In the paragraphs that follow is information on the major management concerns for cropland and pasture and on the crops or pasture plants best suited to the soil. This part of the survey also explains the system of land capability classification used by the Soil Conservation Service. Table 7 lists the estimated yields of the main crops and pasture plants for each soil in the county.

Information on the overall agricultural potential of the survey area and on the needed management practices is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. The planners of management systems for individual fields or farms should consider the detailed information in the description of the specified soil in "Soil maps for detailed planning."

More than 273,000 acres in the survey area was used for crops and pasture in 1967 (*5*). Of this total, 102,248 acres was permanent pasture; 18,095 acres row crops; 114,030 acres close-grown crops, mainly wheat and oats; and 9,679 acres rotation hay and pasture or hayland. The rest was idle cropland.

The potential of the soils in Cooke County is good for increased production of food. Thousands of acres of potentially good cropland are currently used as range and pasture. In addition to the reserve productive capacity represented by this land, food production can also be increased considerably by extending the latest crop production technology to all cropland in the county. This soil survey can greatly facilitate the application of such technology.

Erosion is the major concern on nearly all cropland where the slope is more than 2 percent. Water erosion is a hazard on Callisburg, Crockett, Lindy, Mabank, and Windthorst soils, which have slopes of 2 to 5 percent.

The loss of the surface layer through erosion is damaging for two reasons. First, erosion reduces productivity because the surface layer is lost and part of the subsoil is incorporated into the plow layer. The loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as Aubrey, Mabank, and Windthorst soils, and on soils that have a layer of bedrock that limits the depth of the root zone. The shallow and moderately deep soils that are underlain by bedrock include Hensley, Bolar, Lindy, Purves, and San Saba soils. Erosion also reduces productivity on soils that tend to be droughty, such as Aubrey fine sandy loam. Second, soil erosion on farmland results in sedimentation. Control of erosion minimizes sedimentation and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

Erosion control practices provide protective surface cover, reduce runoff, and increase infiltration. A cropping system that keeps a plant cover on the soil for extended periods can hold soil erosion losses to amounts that will not reduce the productive capacity of the soils.

The management of residue is an effective practice. A good litter of crop residue on the surface protects the soil against packing rains, reduces crusting, decreases runoff, and reduces evaporation of soil moisture. It shades the soil and thus reduces soil temperature. In addition, it adds organic matter to the soil, improves the tilth of the surface layer, and reduces packing by farm machinery. Crop residue should be protected from grazing and burning. Tillage equipment that keeps residue on the surface is needed.

Minimum tillage for grain sorghum is effective in reducing erosion on sloping land and can be adapted to most soils in the survey area.

Farming terraces on the contour reduces the length of the slope and reduces runoff and the risk of erosion. Terraces are most practical on deep and moderately deep, clayey and loamy soils that have slopes of less than 5 percent.

Soil blowing is a hazard on the sandy Arenosa and Duffau soils. Soil blowing can damage these soils in a few hours if winds are strong and the soils are dry and bare of vegetation or surface mulch. Stripcropping, a plant cover, or a surface mulch minimizes soil blowing. Most crops provide adequate cover during the growing season but do not leave enough residue to protect and improve the soil. Such crops as peanuts, for example, should be followed by a cover crop, such as rye and vetch.

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

Fertility is naturally low in most soils of the uplands. These soils are most deficient in nitrogen and phosphorus, and a few sandy soils are also deficient in potash. The soils on flood plains, such as Frio, Gowen, and Miller soils, are naturally higher in plant nutrients than most soils on uplands.

Tilth is an important factor in the germination of seed and in the infiltration of water into the soil. Soils with good tilth are granular and porous.

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

The dark colored Slidell and Sanger soils are clayey. Tilth is a concern because these soils often stay wet until late in spring. If they are wet when plowed, they tend to be very cloddy when dry. Preparing a good seedbed is difficult. Fall plowing generally results in good tilth in spring.

Field crops suited to the soils and climate of the survey area include some that are not now commonly grown—cotton, corn, guar, soybeans, peanuts, and similar crops. Grain sorghum is the principal row crop.

Wheat, oats, and forage sorghum are the most common close-growing crops. Rye, barley, vetch, alfalfa, and millet are also grown. Grass seed can be produced from Kleingrass, King Ranch bluestem, improved bermudagrass, and weeping lovegrass.

Special crops grown on small acreages are vegetables, small fruits, tree fruits, and nursery plants. Small areas are used for watermelons, cantaloupes, sweet corn, and other vegetables and small fruits. In addition, other areas are suited to other special crops, such as blackberries, grapes, and many vegetables. Peaches and pecans are the most important tree fruits grown in the county.

The deep soils that have good natural drainage and that warm up early in spring are especially well suited to many vegetables and small fruits. In the survey area, for example, are Teller, Bastrop, Duffau, and Windthorst soils on slopes of less than 5 percent. Soils in low positions where frost is frequent and air drainage is poor generally are poorly suited to early vegetables, small fruits, and orchards.

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

Pasture is important in Cooke County because livestock is the main farm enterprise. For the past several years, the trend has been to convert land from other uses to pasture and hay. Land used for pasture and hay usually is planted to introduced grasses that respond to good management. The acreage in grass along with the native range and supplemental pasture provides year-round grazing.

Among the important grasses are Coastal bermudagrass, common bermudagrass, weeping lovegrass, johnsongrass, and King Ranch bluestem.

Improved bermudagrass, such as Coastal bermudagrass, is better suited to deep soils on bottom lands, such as Pulexas and Gowen soils, than to other soils in the county. These grasses, however, are suited to most soils in the county where a good seedbed can be prepared. Weeping lovegrass is widely suited and provides good yields of forage on loamy and sandy soils on uplands, such as Windthorst and Duffau soils. King Ranch bluestem, a drought-resistant grass, is well suited to such soils as Crockett fine sandy loam.

Good management practices for pasture are fertilization, rotational grazing to maintain proper grazing heights of forage, weed and brush management, and an adequate water supply. Good management practices for hay are fertilization and cutting the forage at the correct height and at the proper stage of growth.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to horticultural crops or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, or for engineering purposes.

In the capability system, all kinds of soil are grouped at two levels: capability class and subclass. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

Class VIII soils and landforms have limitations that nearly preclude their use for commercial crop production. None are in Cooke County.

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

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

The acreage of soils in each capability class and subclass is indicated in table 6. All soils in the survey area except those named at a level higher than the series are included. Some of the soils that are well suited to crops and pasture may be in low-intensity use, for example, soils in capability classes I and II. Data in this table can be used to determine the farming potential of such soils.

The capability subclass is identified in the description of each soil mapping unit in the section "Soil maps for detailed planning."

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 7. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 7.

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

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

Crops other than those shown in table 7 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Rangeland

About 38 percent of Cooke County is range. More than half of the farm income is derived from livestock, principally cattle. Cow-calf operations are dominant in the county.

On many ranches the forage produced on rangeland is supplemented by hay and small grain. In winter the native forage is often supplemented with protein concentrate.

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

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

Table 8 shows, for each kind of soil, the name of the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the expected percentage of each

species in the composition of the potential natural plant community. Soils not listed cannot support a natural plant community of predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. The following are explanations of column headings in table 8.

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

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

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

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

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

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

Engineering

Robert C. Brown, civil engineer, Soil Conservation Service, helped prepare this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to

(1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 9 shows, for each kind of soil, the degree and kind of limitations for building site development; table 10, for sanitary facilities; and table 12, for water management. Table 11 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

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

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 9. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

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

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

Dwellings and *small commercial buildings* referred to in table 9 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 9 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, and shrink-swell potential are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 10 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 10 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to

be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 11 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 15 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 11 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 15.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 12 the degree of soil limitation and soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Soil and site limitations are expressed as slight, moderate, and severe. *Slight* means that the soil properties and site features are generally favorable for the specified use and that any limitation is minor and easily overcome. *Moderate* means that some soil properties or site features are unfavorable for the specified use but can be overcome or modified by special planning and design. *Severe* means that the soil properties and site features

are so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance is required.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

The soils of the survey area are rated in table 13 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

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

The information in table 13 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 10, and interpretations for dwellings without basements and for local roads and streets, given in table 9.

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

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

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

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

Wildlife habitat

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

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

In table 14, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

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

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, and moisture.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants.

Rangeland habitat consists of areas of wild herbaceous plants and shrubs.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 15 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 15 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 15 in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 18. The estimated classification, without group index numbers, is given in table 15. Also in table 15 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index is estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

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

Physical and chemical properties

Table 16 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Availa-

ble water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

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

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

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

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water (*7*). Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 17 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding; and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Engineering test data

The results of analyses of engineering properties of several typical soils of the survey area are given in table 18.

The data presented are for soil samples that were collected from carefully selected sites. The soil profiles sampled are typical of the series discussed in the section "Soil series and morphology." The soil samples were analyzed by the Texas Department of Highways and Public Transportation.

The methods used in obtaining the data are listed by code in the next paragraph. Most of the codes, in parentheses, refer to the methods assigned by the American Association of State Highway and Transportation Officials. The codes for shrinkage, Unified classification, and California bearing ratio are those assigned by the American Society for Testing and Materials.

The methods and codes are AASHTO classification (M-145-66); Unified classification (D-2487-66T); mechanical analysis (T88-57); liquid limit (T89-60); plasticity index (T90-56); moisture-density, method A (T99-57); shrinkage (D-427).

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*8*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 19, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustoll (*Ust*, meaning burnt, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Calciustolls (*Calc*, meaning calcic horizons, plus *ustoll*, the suborder of Mollisols that have an ustic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any

other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Calciustolls.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-silty, mixed, thermic, Typic Calciustolls.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition. The Lewisville series is an example of a fine-silty, mixed, thermic Typic Calciustoll.

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetical order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*6*). Unless otherwise noted, colors described are for dry soil.

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

Aledo series

The Aledo series consists of very shallow to shallow, well drained loamy soils on uplands. These soils formed in coarsely fractured limestone. Slope ranges from 3 to 12 percent.

Typical pedon of Aledo gravelly clay loam in an area of Maloterre-Aledo complex, 3 to 12 percent slopes; from the intersection of U.S. Highway 82 and Farm Road 373 in Muenster, 5.2 miles south on Farm Road 373, 4.4 miles west on Farm Road 1630, 0.3 mile north on private road, and 50 feet east in range:

A11—0 to 7 inches; dark grayish brown (10YR 4/2) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; moderate very fine subangular blocky structure; hard, friable; many fine roots; many fine pores; about 25 percent limestone fragments less than 3 inches across; calcareous; moderately alkaline; gradual wavy boundary.

A12—7 to 16 inches; brown (10YR 5/3) very gravelly clay loam, dark brown (10YR 4/3) moist; moderate very fine subangular blocky structure; hard, friable; common fine roots; common fine pores; about 50 percent limestone fragments mainly less than 6 inches across; calcareous; moderately alkaline; gradual irregular boundary.

R—16 to 24 inches; white (10YR 8/2) indurated limestone that is coarsely fractured.

Thickness of the solum or depth to indurated limestone ranges from 8 to 20 inches. The solum is moderately alkaline throughout.

The A horizon is dark grayish brown, very dark grayish brown, dark brown, grayish brown, or brown.

The R horizon ranges from fractured limestone several feet thick to thin layers of fractured limestone interbedded with calcareous loamy marl.

Arenosa series

The Arenosa series consists of deep, somewhat excessively drained sandy soils on uplands. These soils formed in thick sandy deposits. Slope ranges from 1 to 5 percent.

Typical pedon of Arenosa fine sand, 1 to 5 percent slopes; from the intersection of Farm Road 678 and Farm Road 372 in Gainesville, 2.5 miles southeast on Farm Road 372, 5.4 miles southeast on Farm Road 902, 1.2 miles south on county road, and 300 feet east in pasture:

A1—0 to 6 inches; dark grayish brown (10YR 4/2) fine sand, very dark grayish brown (10YR 3/2) moist; single grained; loose, very friable; few fine roots; few worm casts; neutral; clear smooth boundary.

C1—6 to 31 inches; very pale brown (10YR 7/3) fine sand, pale brown (10YR 6/3) moist; single grained; loose, very friable; few fine roots; few ironstone pebbles less than 3 inches in diameter; neutral; diffuse boundary.

C2—31 to 80 inches; very pale brown (10YR 8/4) fine sand, very pale brown (10YR 7/4) moist; single grained; loose, very friable; few fine roots; few ironstone pebbles less than 3 inches in diameter; neutral.

Depth of fine sand exceeds 80 inches. The control section is less than 5 percent weatherable minerals.

The A horizon is brown, grayish brown, dark brown, or dark grayish brown. It is slightly acid through neutral.

The C horizon is pink or very pale brown. It is medium acid through neutral.

Aubrey series

The Aubrey series consists of deep, well drained loamy soils on uplands. These soils formed in clayey shale. Slope ranges from 1 to 12 percent.

Typical pedon of Aubrey fine sandy loam, 1 to 5 percent slopes; from the intersection of Farm Road 372 and U.S. Highway 82 in Gainesville, 7.2 miles east on U.S. Highway 82, 1.1 miles south on Farm Road 678, and 40 feet west in pasture:

A1—0 to 7 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky and granular structure; hard, friable; common fine roots; medium acid; abrupt smooth boundary.

B21t—7 to 26 inches; red (2.5YR 4/6) sandy clay, dark red (2.5YR 3/6) moist; few fine faint yellowish red and common coarse faint reddish yellow (7.5YR 6/6) mottles; moderate medium and fine blocky structure; very hard, firm; common fine roots; few fine pores; clay films on faces of peds; few fine soft black concretions; strongly acid; gradual smooth boundary.

B22t—26 to 44 inches; reddish yellow (7.5YR 6/6) sandy clay, strong brown (7.5YR 5/6) moist; few coarse prominent red (2.5YR 5/6) mottles; moderate medium blocky structure; very hard, firm; common fine roots; clay films on faces of peds; few ironstone pebbles; few fine black concretions; strongly acid; gradual smooth boundary.

Cr—44 to 60 inches; mottled red (2.5YR 4/6), brownish yellow (10YR 6/8), and light olive brown (2.5Y 5/4) shale of sandy clay texture; massive; very hard, firm; few coarse roots; medium acid.

Thickness of the solum ranges from 40 to 60 inches.

The A horizon is yellowish brown, dark yellowish brown, brown, dark brown, or grayish brown. It is fine sandy loam or stony fine sandy loam. It is medium acid through neutral.

The B2t horizon is red, light red, yellowish red, reddish yellow, or brown. Mottles are red, yellowish red, reddish yellow, brown, or strong brown. The B2t horizon is clay or sandy clay; the clay content ranges from 40 to 60 percent. This horizon is very strongly acid through medium acid.

The Cr horizon is mottled in shades of red, yellow, brown, or gray. It is shale of clay or sandy clay texture. It is very strongly acid through neutral.

The Aubrey soils in this survey area are considered taxadjuncts to the Aubrey series. The solum is thicker than that of the series, but there is no difference in use and management.

Bastrop series

The Bastrop series consists of deep, well drained loamy soils on uplands. These soils formed in thick loamy sediments of ancient stream terraces. Slope ranges from 1 to 8 percent.

Typical pedon of Bastrop fine sandy loam, 1 to 5 percent slopes; from the intersection of Interstate Highway 35 and U.S. Highway 82 in Gainesville, 1.5 miles west on U.S. Highway 82, 16.0 miles north on Farm Road 1201 (Sivells Bend), 1.25 miles east and 0.3 mile south on county road, and 300 feet east in pasture:

A1—0 to 6 inches; light reddish brown (5YR 6/4) fine sandy loam, reddish brown (5YR 5/4) moist; weak medium granular structure; hard, friable; common fine roots; slightly acid; clear smooth boundary.

B21t—6 to 18 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; hard, friable; few fine roots; common fine pores; patchy clay films on faces of peds; slightly acid; gradual smooth boundary.

B22t—18 to 80 inches; reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; moderate medium subangular blocky structure; hard, friable; few fine and very fine pores; few patchy clay films on faces of peds; mildly alkaline.

Thickness of the solum ranges from 60 to about 90 inches.

The A horizon is reddish brown, brown, light reddish brown, or yellowish brown. It is medium acid through neutral.

The B2t horizon is yellowish red, reddish yellow, reddish brown, red, or brown. It is slightly acid through moderately alkaline.

Some pedons have secondary lime in the form of films, threads, and concretions below a depth of 60 inches. Some are up to 5 percent by volume small, rounded siliceous pebbles.

Birome series

The Birome series consists of moderately deep, well drained loamy soils on uplands. These soils formed in weakly cemented sandstone and clayey sediments high in iron. Slope ranges from 3 to 12 percent.

Typical pedon of Birome stony fine sandy loam in an area of Birome-Aubrey-Rayex complex, 3 to 12 percent slopes; from the intersection of Farm Road 678 and Farm Road 372 in Gainesville, 10.0 miles southeast on Farm Road 372 (Burns City), 0.8 mile east, 0.25 mile south, 0.3 mile east, 0.1 mile north, 0.95 mile east, 0.25

mile south, 0.45 mile east, 0.7 mile south on county road, and 550 feet east in wooded pasture:

A1—0 to 6 inches; brown (10YR 5/3) stony fine sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; hard, friable; many fine roots; sandstone fragments 6 to 20 inches across cover about 5 percent of surface; neutral; clear wavy boundary.

A2—6 to 9 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak fine granular structure; slightly hard, friable; many fine and few medium roots; common sandstone fragments less than 2 inches across; medium acid; abrupt wavy boundary.

B21t—9 to 21 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; strong medium blocky structure; extremely hard, extremely firm; many medium and coarse roots; many clay films on faces of peds; strongly acid; gradual wavy boundary.

B22t—21 to 30 inches; yellowish red (5YR 5/6) clay, yellowish red (5YR 4/6) moist; common medium distinct reddish brown (2.5YR 5/4) mottles; strong medium blocky structure; extremely hard, extremely firm; many medium and coarse roots; many clay films on faces of peds; strongly acid; gradual wavy boundary.

B3—30 to 36 inches; red (2.5YR 5/6) clay, red (2.5YR 4/6) moist; few fine faint yellowish brown mottles; moderate medium blocky structure; extremely hard, extremely firm; few medium roots; few platy fragments of sandstone 2 to 10 mm across; medium acid; clear wavy boundary.

Cr—36 to 44 inches; weakly cemented fractured sandstone that can be cut with spade.

The solum is 20 to 40 inches thick over weakly cemented fractured sandstone.

The A1 horizon is brown, dark brown, grayish brown, or dark grayish brown. It is medium acid through neutral. It is 2 to 15 percent by volume sandstone fragments.

The A2 horizon is pale brown, light brown, light yellowish brown, or very pale brown. It is fine sandy loam or stony fine sandy loam. It is medium acid through neutral. It is up to 10 percent by volume sandstone fragments.

The B2t horizon is brown, reddish brown, reddish yellow, yellowish red, or red. In some pedons the B2t horizon is mottled in these same colors. The B2t horizon is clay or sandy clay. It is strongly acid or medium acid.

The B3 horizon has the same colors as the B2t horizon. It is clay, sandy clay, or clay loam. It is strongly acid or medium acid.

The Cr horizon of weakly cemented fractured sandstone has a hardness of less than 3 on Mohs scale. In some pedons the sandstone is interbedded with shale and clay.

Bolar series

The Bolar series consists of moderately deep, well drained loamy soils on uplands. These soils formed in coarsely fractured limestone. Slope ranges from 1 to 12 percent.

Typical pedon of Bolar clay loam, 1 to 5 percent slopes; from the intersection of Interstate Highway 35 and Texas Highway 51 in Gainesville, 2.2 miles southwest on Texas Highway 5l, 6.3 miles west on Farm Road 1630, 0.5 mile north on county road, and 60 feet east in pasture:

A1—0 to 14 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; moderate medium and fine subangular blocky structure; hard, friable; many fine roots; common worm casts; few fine fragments of limestone; calcareous; moderately alkaline; gradual wavy boundary.

B21ca—14 to 31 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard, friable; common fine roots; few worm casts; few fragments of limestone; common weakly cemented concretions of calcium carbonate; few black streaks in old cracks; calcareous; moderately alkaline; gradual wavy boundary.

B22ca—31 to 39 inches; very pale brown (10YR 7/4) clay loam, light yellowish brown (10YR 6/4) moist; moderate medium and fine subangular blocky structure; hard, friable; few fine roots; about 5 percent fragments of limestone less than 3 inches across; common strongly and weakly cemented concretions of calcium carbonate; calcareous; moderately alkaline; abrupt smooth boundary.

R—39 to 45 inches; coarsely fractured limestone.

The solum ranges from 20 to 40 inches in thickness. It is moderately alkaline throughout.

The A horizon is dark grayish brown, very dark grayish brown, very dark brown, or very dark gray. It is clay loam or stony clay loam that is up to 15 percent by volume fragments of limestone.

The B2ca horizon is light yellowish brown, yellowish brown, dark yellowish brown, pale brown, very pale brown, brown, dark grayish brown, or light olive brown. It is clay loam or silty clay loam. The lower part of the B2ca horizon is up to 10 percent by volume fragments of limestone.

The R horizon ranges from fractured limestone several feet thick to thin layers of fractured limestone interbedded with clay.

Callisburg series

The Callisburg series consists of deep, well drained loamy soils on uplands. These soils formed in thick beds of clay and shaly clay. Slope ranges from 1 to 8 percent.

Typical pedon of Callisburg fine sandy loam, 1 to 5 percent slopes, eroded; from the intersection of Farm Road 922 and Farm Road 372 in Mountain Springs, 0.3 mile north on Farm Road 372, 3.1 miles east, 0.1 mile north on county road, and 30 feet west in idle cropland:

Ap—0 to 6 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; slightly hard, friable; common fine roots; few worm casts; medium acid; clear wavy boundary.

B21t—6 to 19 inches; reddish yellow (7.5YR 6/6) sandy clay, strong brown (7.5YR 5/6) moist; few fine faint yellowish red mottles; moderate medium subangular blocky structure; hard, firm; few fine roots; clay films on faces of peds; few fine pebbles of quartz; strongly acid; gradual wavy boundary.

B22t—19 to 31 inches; brown (7.5YR 5/4) sandy clay, brown (7.5YR 4/4) moist; common medium distinct red (2.5YR 4/8), strong brown (7.5YR 5/6), and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; hard, firm; clay films on faces of peds; few fine black concretions; few fine pebbles of quartz; strongly acid; gradual wavy boundary.

B23t—31 to 44 inches; reddish yellow (7.5YR 6/6) sandy clay, strong brown (7.5YR 5/6) moist; many coarse distinct red (2.5YR 4/8), yellowish brown (10YR 5/8), and light gray (10YR 7/l) mottles; moderate medium subangular blocky structure; hard, firm; patchy clay films on faces of peds; few pockets of uncoated sand; some ped surfaces are covered with uncoated sand; common fine pebbles of ironstone; medium acid; gradual wavy boundary.

B3—44 to 65 inches; yellowish brown (10YR 5/8), red (2.5YR 4/8), and light gray (10YR 7/1) sandy clay; weak coarse blocky structure; hard, firm; few pockets of uncoated sand; some ped surfaces are covered with uncoated sand; neutral.

The solum ranges from 60 to more than l00 inches in thickness. It is up to 5 percent by volume fine pebbles of ironstone and quartz.

The A horizon is brown, dark grayish brown, yellowish brown, dark yellowish brown, pale brown, or strong brown. It is medium acid through neutral.

The B2t horizon is brown, yellowish brown, brownish yellow, yellow, strong brown, or reddish yellow. Mottles are in shades of red, yellow, brown, and gray. The B2t horizon is sandy clay loam or sandy clay. It is strongly acid through neutral.

The B3 horizon has the same colors as the B2t horizon. The B3 horizon is sandy clay or clay. It is strongly acid through mildly alkaline.

Crockett series

The Crockett series consists of deep, moderately well drained loamy soils on uplands. These soils formed in alkaline marine clay and sandy clay or shaly clay interbedded with sandier materials. Slope ranges from 0 to 8 percent.

Typical pedon of Crockett fine sandy loam, 1 to 5 percent slopes, eroded; from the intersection of Farm Road 2896 and Farm Road 678 in Callisburg, 1.2 miles east on Farm Road 678 and 250 feet north in pasture:

A1—0 to 5 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak granular structure; hard, friable; many fine roots; slightly acid; abrupt wavy boundary.

B21t—5 to 18 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; common medium prominent red (2.5YR 4/6) mottles; moderate medium blocky structure; extremely hard, very firm; few fine roots; few worm casts; distinct clay films on faces of peds; few fine black concretions; medium acid; gradual wavy boundary.

B22t—18 to 32 inches; light yellowish brown (2.5Y 6/4) clay, light olive brown (2.5Y 5/4) moist; common medium prominent red (2.5YR 4/6) and few medium prominent yellowish brown (10YR 5/8) mottles; moderate medium blocky structure; extremely hard, very firm; few fine roots; thin patchy clay films; few fine black concretions; shiny pressure faces in lower part; mottles become fewer and less prominent with depth; medium acid; gradual wavy boundary.

B23t—32 to 50 inches; light yellowish brown (2.5Y 6/4) clay, light olive brown (2.5Y 5/4) moist; few fine faint brownish yellow mottles; moderate medium blocky structure; extremely hard, very firm; few fine black concretions; few siliceous pebbles; few shiny pressure faces; slightly acid; gradual wavy boundary.

C—50 to 60 inches; mottled grayish brown (2.5Y 5/2), light olive brown (2.5Y 5/4), and brownish yellow (10YR 6/6) clay loam interbedded with shaly clay; massive; extremely hard, very firm; common fine siliceous pebbles; few weakly cemented masses of calcium carbonate; dark clayey material filling in old cracks; moderately alkaline.

The solum ranges from 40 to 70 inches in thickness.

The A horizon is brown, dark brown, dark grayish brown, or light yellowish brown. It is medium acid through neutral.

The B2t horizon is yellowish brown, light yellowish brown, dark yellowish brown, brown, dark brown, grayish brown, light olive brown, or olive brown. It is prominently

mottled in shades of red, yellow, brown, or olive. Mottles become less red and less prominent with depth. The B2t horizon is clay or sandy clay, and the control section is 40 to 55 percent clay. Reaction is neutral or mildly alkaline.

The C horizon has the same colors as the B2t horizon. The C horizon is clay loam, sandy clay loam, or shaly clay. It is mildly alkaline or moderately alkaline. Calcium carbonate concretions and gypsum crystals are common in some pedons.

Crosstell series

The Crosstell series consists of deep, moderately well drained loamy soils on uplands. These soils formed in thick beds of stratified clays and shales. Slope is 1 to 3 percent.

Typical pedon of Crosstell fine sandy loam, 1 to 3 percent slopes; from the intersection of Farm Road 372 and U.S. Highway 82 in Gainesville, 3.0 miles east on U.S. Highway 82, 2.8 miles north and east on Farm Road 37l, 2.1 miles northeast on Farm Road 2896, 0.4 mile east on oil field road to oil well No. 6, 0.1 mile southeast, and 120 feet west in pasture:

A1—0 to 5 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; hard, very friable; common fine roots; few worm casts; medium acid; abrupt wavy boundary.

A2—5 to 7 inches; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; weak fine granular structure; slightly hard, very friable; common fine roots; few worm casts; medium acid; abrupt wavy boundary.

B21t—7 to 16 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; many medium distinct yellowish red (5YR 5/6) mottles; moderate medium blocky structure; very hard, very firm; few fine and medium roots; common distinct clay films on faces of peds; vertical cracks filled with darker soil; strongly acid; gradual wavy boundary.

B22t—16 to 27 inches; reddish yellow (7.5YR 6/6) clay, strong brown (7.5YR 5/6) moist; common medium distinct reddish brown (5YR 4/4) mottles; moderate medium blocky structure; extremely hard, extremely firm; few fine roots; common distinct clay films on faces of peds; common pressure faces; vertical cracks filled with darker soil; neutral; gradual wavy boundary.

B23t—27 to 48 inches; reddish yellow (7.5YR 6/6) clay, strong brown (7.5YR 5/6) moist; few coarse faint brownish yellow (10YR 6/8) mottles; moderate medium blocky structure; extremely hard, extremely firm; few fine roots between peds; common pressure faces; vertical cracks filled with darker soil extending to 40 inches; moderately alkaline; gradual wavy boundary.

C—48 to 80 inches; light gray (10YR 6/1) shaly clay, gray (10YR 5/1) moist; common coarse prominent brownish yellow (10YR 6/8) mottles; thin reddish brown (5YR 5/3) horizontal lenses; massive; very hard, very firm; moderately alkaline.

The solum ranges from 40 to 60 inches in thickness.

The A1 horizon is light brown, brown, grayish brown, dark grayish brown, or yellowish brown. It is medium acid through mildly alkaline.

The A2 horizon is pale brown, very pale brown, light yellowish brown, or light brownish gray. It is medium acid through mildly alkaline.

The B2t horizon is light brown, brown, light reddish brown, reddish brown, or reddish yellow. Mottles are in shades of red, brown, yellow, or olive. The upper 20 inches of the B2t horizon is clay; the clay content ranges from 40 to 60 percent. This B2t horizon is strongly acid through moderately alkaline.

The C horizon has the same range in color as the B2t horizon, but includes light gray, gray, pale olive, or olive yellow. The C horizon is shaly clay or stratified clay and shale. It is neutral through moderately alkaline.

Duffau series

The Duffau series consists of deep, well drained loamy or sandy soils on uplands and high stream terraces. These soils formed in thick beds of sand, sandy clay loam, and weakly cemented sandstone. Slope ranges from 1 to 8 percent.

Typical pedon of Duffau fine sandy loam, 2 to 5 percent slopes; from the intersection of U.S. Highway 82 and Farm Road 373 in Muenster, 10.2 miles north on Farm Road 373, 2.5 miles east on county road to Marysville Baptist Church, 0.15 mile north on county road, and 250 feet east in pasture:

A1—0 to 8 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak medium granular structure; slightly hard, friable; common fine roots; neutral; clear smooth boundary.

B21t—8 to 26 inches; reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; weak coarse prismatic structure parting to moderate coarse subangular blocky; hard, firm; common fine roots; common clay films on faces of prisms; few siliceous pebbles; slightly acid; gradual smooth boundary.

B22t—26 to 45 inches; reddish yellow (5YR 7/6) sandy clay loam, reddish yellow (5YR 6/6) moist; weak coarse prismatic structure parting to moderate coarse subangular blocky; hard, firm; few fine roots; patchy clay films on faces of prisms; few siliceous pebbles; slightly acid; gradual smooth boundary.

B23t—45 to 70 inches; reddish yellow (5YR 7/6) sandy clay loam, reddish yellow (5YR 6/6) moist; weak

coarse subangular blocky structure; hard, friable; few fine roots; few siliceous pebbles; few weakly cemented fragments of sandstone; slightly acid.

Thickness of the solum ranges from 60 to about 90 inches. The content of siliceous pebbles ranges from none to few throughout the solum.

The A1 horizon is light brown, pale brown, brown, or light yellowish brown. The A2 horizon has color value one to three units lighter than that of the A1 horizon. The A horizon is fine sandy loam or loamy fine sand. It is slightly acid through mildly alkaline.

The B2t horizon is strong brown, reddish brown, reddish yellow, yellowish red, or red. It is sandy clay loam or clay loam; the clay content ranges from 20 to 35 percent. This horizon is slightly acid through mildly alkaline.

Frio series

The Frio series consists of deep, well drained loamy soils on bottom lands. These soils formed in calcareous, loamy and clayey alluvial sediments. Slope is 0 to 1 percent.

Typical pedon of Frio clay loam, in an area of Frio soils; from the intersection of Business U.S. Highway 77 and Farm Road 922 in Valley View, 0.5 mile west on Farm Road 922 and 100 feet south in pasture:

A11—0 to 18 inches; very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2) moist; moderate medium and fine subangular blocky structure; hard, friable; many fine roots; calcareous; moderately alkaline; gradual wavy boundary.

A12—18 to 42 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine subangular blocky structure; hard, friable; many fine roots; few films and threads of calcium carbonate; calcareous; moderately alkaline; gradual wavy boundary.

Cca—42 to 60 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; hard, friable; many films and threads and common fine concretions of calcium carbonate; calcareous; moderately alkaline.

The A horizon is grayish brown, dark grayish brown, very dark grayish brown, brown, or dark brown. It is clay loam or silty clay loam.

The Cca horizon is brown, grayish brown, pale brown, or light brown. It is clay loam or silty clay loam. Some pedons have fine siliceous pebbles and limestone fragments in this horizon.

Gaddy series

The Gaddy series consists of deep, somewhat excessively drained loamy or sandy soils on bottom lands. These soils formed in calcareous, loamy and sandy alluvial sediments. Slope is 0 to 1 percent.

Typical pedon of Gaddy fine sandy loam; from the intersection of Interstate Highway 35 and U.S. Highway 82 in Gainesville, 1.5 miles west on U.S. Highway 82, 15.6 miles north on Farm Road 1201 (Sivells Bend Methodist Church), 1.3 miles west, 0.2 mile south, 0.6 mile west, 3.1 miles north and west on county road, 0.8 mile north on oil field road, and 50 feet east in pasture:

A1—0 to 9 inches; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable; few fine roots; thin layer of loamy fine sand at 7 inches; calcareous; moderately alkaline; clear wavy boundary.

C1—9 to 22 inches; reddish yellow (7.5YR 7/6) fine sandy loam, reddish yellow (7.5YR 6/6) moist; massive; hard, friable; few fine roots; common pores and root channels; calcareous; moderately alkaline; clear wavy boundary.

C2—22 to 65 inches; reddish yellow (7.5YR 7/6) loamy fine sand, reddish yellow (7.5YR 7/6) moist; single grained; soft, very friable; layers of redder loamy fine sand 1 to 2 mm thick; thin layers of loamy very fine sand at 50 inches; calcareous; moderately alkaline.

The A horizon is light brown, brown, or reddish yellow. It is fine sandy loam or loamy fine sand and has thin strata of varying texture.

The C horizon is reddish yellow, pink, or light brown. It is stratified fine sandy loam, loamy fine sand, fine sand, very fine sandy loam, or loamy very fine sand.

Gasil series

The Gasil series consists of deep, well drained loamy or sandy soils on uplands. These soils formed in weathered deposits of interbedded loamy material and sandstone. Slope ranges from 1 to 8 percent.

Typical pedon of Gasil fine sandy loam, 1 to 5 percent slopes, eroded; from the intersection of Farm Road 372 and U.S. Highway 82 in Gainesville, 9.5 miles east on U.S. Highway 82, 2.7 miles south on county road, and 50 feet east in pasture:

Ap—0 to 8 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable; common fine roots; few fine pebbles of ironstone; mildly alkaline; clear smooth boundary.

A2—8 to 17 inches; very pale brown (10YR 7/3) fine sandy loam, pale brown (10YR 6/3) moist; weak fine granular structure; soft, very friable; common fine roots; few fine pebbles of ironstone; neutral; clear smooth boundary.

B21t—17 to 30 inches; reddish yellow (7.5YR 6/6) sandy clay loam, strong brown (7.5YR 5/6) moist; few fine

distinct red mottles; moderate medium subangular blocky structure; hard, firm; common fine roots; patchy clay films on faces of peds; few fine pebbles of ironstone; few fragments of sandstone up to two inches in length; strongly acid; gradual smooth boundary.

B22t—30 to 53 inches; brownish yellow (10YR 6/8) sandy clay loam, yellowish brown (10YR 5/8) moist; common medium distinct red (2.5YR 4/8) mottles; moderate coarse prismatic structure parting to weak fine and medium subangular blocky; hard, firm; many fine pores and root channels; few patchy clay films; few fine pebbles of ironstone; few fragments of sandstone up to 2 inches in length; strongly acid; gradual smooth boundary.

B23t—53 to 75 inches; brownish yellow (10YR 6/8) sandy clay loam, yellowish brown (10YR 5/8) moist; many medium distinct red (2.5YR 4/8) mottles; moderate coarse prismatic structure parting to weak fine and medium subangular blocky; hard, firm; many fine pores and root channels; few fine reddish black concretions and soft masses; few fine pockets of uncoated sand grains; medium acid.

The solum ranges from 60 to more than 100 inches in thickness. Fine pebbles of ironstone and fragments of sandstone range from none to about 5 percent by volume throughout the solum.

The Ap horizon is brown, dark yellowish brown, pale brown, yellowish brown, or light yellowish brown. It is fine sandy loam or loamy fine sand. It is slightly acid through mildly alkaline. The A2 horizon is one or two units of value higher in color than that of the Ap horizon.

The B2t horizon is reddish yellow, strong brown, brown, yellow, brownish yellow, yellowish brown, light yellowish brown, or very pale brown. Mottles are few to common and in colors and shades of red, yellow, and brown. The B2t horizon is sandy clay loam, loam, or fine sandy loam. It is strongly acid through slightly acid.

Gladewater series

The Gladewater series consists of deep, poorly drained clayey soils on bottom lands. These soils formed in thick beds of clayey alluvium. Slope is 0 to 1 percent.

Typical pedon of Gladewater clay, frequently flooded; from the intersection of Farm Road 922 and Farm Road 372 in Mountain Springs, 2.1 miles south, 1.4 miles east, 0.3 mile south on Farm Road 372, 0.3 mile east, 0.3 mile south, 2.3 miles east, 0.3 mile south on county road, and 220 feet west in pasture:

A1—0 to 9 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; weak fine blocky structure; extremely hard, very firm; common fine roots; 2 mm layer of silt loam on surface; medium acid; gradual smooth boundary.

B2g—9 to 40 inches; gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; common fine faint light olive brown mottles; weak medium blocky structure; extremely hard, very firm; few fine roots; few fine black concretions; few pressure faces; vertical streaks of brown clay filling old cracks; slightly acid; gradual wavy boundary.

Cg—40 to 60 inches; gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; common fine faint yellowish brown mottles; massive; extremely hard, very firm; few fine roots; thin strata of silty clay loam in lower part; medium acid.

The A horizon is gray, dark gray, dark grayish brown, or dark brown. It is medium acid through neutral.

The B2g horizon is gray, dark gray, light brownish gray, olive gray, or light olive gray. It has few to common faint mottles of yellowish brown or light olive brown. The B2g horizon is clay or silty clay; the clay content ranges from 40 to 60 percent. This horizon is strongly acid through neutral.

The Cg horizon is gray, dark gray, light brownish gray, olive gray, or light olive gray. It is clay or silty clay thinly stratified with silty clay loam, clay loam, or silt loam. It is strongly acid through neutral.

Gowen series

The Gowen series consists of deep, well drained loamy soils on bottom lands. These soils formed in loamy alluvial sediments. Slope ranges from 0 to 1 percent.

Typical pedon of Gowen clay loam in an area of Gowen soils, frequently flooded; from the intersection of U.S. Highway 82 and Weaver Street in Gainesville, 0.75 mile north on Weaver Street and 120 feet west in pasture:

A11—0 to 14 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; hard, firm; common fine roots; 2 cm layer of light gray (10YR 7/2) silty clay loam on surface; moderately alkaline; clear wavy boundary.

A12—14 to 43 inches; dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; hard, firm; common fine roots; mildly alkaline; clear smooth boundary.

C—43 to 65 inches; gray (10YR 5/1) clay loam, dark gray (10YR 4/1) moist; moderate medium subangular blocky structure; very hard, very firm; few fine roots; 2 cm layer of clay at 45 inches; few fine limestone fragments; moderately alkaline.

The A horizon is dark gray, very dark gray, dark grayish brown, very dark grayish brown, dark brown, or brown. It is clay loam or fine sandy loam and the 10- to

40-inch control section averages 22 to 35 percent clay. The A horizon is neutral through moderately alkaline.

The C horizon is dark grayish brown, grayish brown, dark gray, gray, dark brown, or brown. It is clay, clay loam, or loam thinly stratified with silty clay loam or fine sandy loam. It is neutral through moderately alkaline.

Heaton series

The Heaton series consists of deep, well drained sandy soils on uplands. These soils formed in thick loamy sediments. Slope ranges from 1 to 8 percent.

Typical pedon of Heaton loamy fine sand, 1 to 8 percent slopes; from the intersection of Farm Road 678 and Farm Road 372 in Gainesville, 2.5 miles southeast on Farm Road 372, 5.4 miles east on Farm Road 902, 0.1 mile north on county road, and 50 feet west in pasture:

A1—0 to 11 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 3/3) moist; weak fine granular structure; loose, very friable; common fine roots; neutral; clear smooth boundary.

A2—11 to 35 inches; very pale brown (10YR 7/4) loamy fine sand, light yellowish brown (10YR 6/4) moist; weak fine granular structure; loose, very friable; common fine roots; slightly acid; clear smooth boundary.

B21t—35 to 46 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; hard, friable; few fine roots; common fine pores; patchy clay films on faces of peds; medium acid; gradual boundary.

B22t—46 to 56 inches; reddish yellow (5YR 6/6) sandy clay loam, yellowish red (5YR 5/6) moist; moderate medium subangular blocky structure; hard, friable; few fine roots; few fine pores; patchy clay films on faces of peds; medium acid; gradual boundary.

B23t—56 to 70 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; hard, friable; few fine roots; few fine pores; medium acid.

The solum is 60 to more than 100 inches thick. It is medium acid through neutral.

The A horizon is 20 to 40 inches thick. The A1 horizon is very pale brown, pale brown, light yellowish brown, or brown. The A2 horizon is one or two units of value higher than that of the A1 horizon.

The B2t horizon is red, yellowish red, reddish yellow, or reddish brown.

Hensley series

The Hensley series consists of shallow, well drained loamy soils on uplands. These soils formed in fractured limestone. Slope ranges from 1 to 5 percent.

Typical pedon of Hensley loam, 1 to 5 percent slopes; from the intersection of Interstate Highway 35 and U.S. Highway 82 in Gainesville, 1.5 miles west on U.S. Highway 82, 10.4 miles north on Farm Road 1201, and 30 feet southwest in pasture:

A1—0 to 4 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky and granular structure; hard, friable; many fine roots; many worm casts; neutral; clear smooth boundary.

B2t—4 to 13 inches; dark reddish brown (2.5YR 3/4) clay loam, dark reddish brown (2.5YR 3/4) moist; moderate medium and coarse subangular blocky structure; hard, friable; few fine roots; few worm casts; distinct clay films on faces of peds; moderately alkaline; abrupt irregular boundary.

R—13 to 15 inches; finely fractured indurated limestone containing material from above in fine fractures.

The solum is 10 to 20 inches thick. Ironstone pebbles are on the surface and throughout the pedon in some places. Limestone fragments from the R horizon have been brought to the surface through plowing in some places.

The A horizon is brown or reddish brown. It is slightly acid through mildly alkaline.

The B2t horizon is dark reddish brown, reddish brown, dark red, or red. This horizon is clay or clay loam; the clay content ranges from 35 to 55 percent. The B2t horizon is neutral through moderately alkaline.

Konsil series

The Konsil series consists of deep, well drained loamy or sandy soils on uplands. These soils formed in weathered beds of loamy material and interbedded weakly cemented sandstone. Slope ranges from 1 to 8 percent.

Typical pedon of Konsil fine sandy loam, 2 to 5 percent slopes; from the intersection of Farm Road 372 and U.S. Highway 82 in Gainesville, 7.2 miles east on U.S. Highway 82, 13.2 miles north and east on Farm Road 678 (0.35 mile south of Dexter), and 200 feet east in pasture:

A1—0 to 9 inches; reddish gray (5YR 5/2) fine sandy loam, dark reddish gray (5YR 4/2) moist; weak fine granular structure; soft, very friable; common fine roots; neutral; clear smooth boundary.

A2—9 to 12 inches; light reddish brown (5YR 6/3) fine sandy loam, reddish brown (5YR 5/3) moist; weak fine granular structure; soft, very friable; common fine roots; slightly acid; clear smooth boundary.

B21t—12 to 29 inches; red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; moderate medium subangular blocky structure; hard, friable; common fine roots; patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

B22t—29 to 47 inches; red (2.5YR 5/8) sandy clay loam, red (2.5YR 4/8) moist; moderate medium subangular blocky structure; hard, friable; common fine roots; common fine pores; patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

B23t—47 to 71 inches; light red (2.5YR 6/8) sandy clay loam, red (2.5YR 5/8) moist; weak medium subangular blocky structure; hard, friable; few fine roots; common fine pores; patchy clay films on faces of peds; few weakly cemented fragments of sandstone in lower part; strongly acid; clear smooth boundary.

Cr—71 to 80 inches; yellowish red (5YR 5/6) weakly cemented sandstone; medium acid.

The solum ranges from 60 to 100 inches in thickness. It is up to 5 percent fragments of sandstone and pebbles of quartz.

The A horizon is fine sandy loam or loamy fine sand. It is slightly acid through mildly alkaline. The A1 horizon is reddish brown, reddish gray, dark reddish gray, light brown, brown, light yellowish brown, or yellowish brown. The A2 horizon is one or two units of value higher than that of the A1 horizon.

The B2t horizon is reddish brown, yellowish red, red, reddish yellow, or light red. It is sandy clay loam, loam, or fine sandy loam. It is strongly acid through slightly acid.

The Cr horizon ranges from weakly cemented sandstone to weathered beds of loamy material interbedded with sandstone.

Lewisville series

The Lewisville series consists of deep, well drained loamy soils on stream terraces. These soils formed in calcareous, loamy alluvial sediments. Slope ranges from 1 to 8 percent.

Typical pedon of Lewisville clay loam, 1 to 5 percent slopes; from the intersection of Interstate Highway 35 and Farm Road 922 in Valley View, 2.7 miles east on Farm Road 922, 2.5 miles south on county road, and 20 feet west in pasture:

A1—0 to 13 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine subangular blocky structure; hard, friable; many fine roots; many worm casts; calcareous; moderately alkaline; gradual smooth boundary.

B21ca—13 to 40 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, friable; common fine roots; common worm casts; few strongly and weakly cemented concretions of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary.

B22ca—40 to 60 inches; light yellowish brown (10YR 6/4) silty clay loam, yellowish brown (10YR 5/4) moist; weak subangular blocky structure; hard, friable; few fine roots; few worm casts; common strongly cemented and few weakly cemented concretions of calcium carbonate; calcareous; moderately alkaline.

The solum is 40 to 70 inches thick. It is calcareous and moderately alkaline throughout. In some pedons it is up to 5 percent by volume fine limestone fragments or fossil shells. Beds of gravel or sand are at a depth of more than 36 inches in some places.

The A horizon is brown, dark brown, grayish brown, dark grayish brown, or very dark grayish brown.

The B2ca horizon is brown, light brown, pale brown, yellowish brown, light yellowish brown, or dark yellowish brown. This horizon is clay loam or silty clay loam; the silicate clay content ranges from 24 to 35 percent.

Lindy series

The Lindy series consists of moderately deep, well drained loamy soils on uplands. These soils formed in thick beds of indurated limestone. Slope ranges from 1 to 5 percent.

Typical pedon of Lindy loam, 1 to 5 percent slopes; from the intersection of Interstate Highway 35 and U.S. Highway 82 in Gainesville, 1.5 miles west on U.S. Highway 82, 1.6 miles north on Farm Road 1201, 1.3 miles northwest on Farm Road 1200, and 285 feet southwest in pasture:

Ap—0 to 4 inches; dark brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak medium granular structure, thin platy in surface inch; very hard, friable; few pellet-like concretions 2 mm in size, black inside, brown outside; few coarse ironstone fragments on and in horizon; neutral; abrupt smooth boundary.

A1—4 to 10 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; moderate very fine and fine subangular blocky structure; very hard, friable; common fine subrounded pebbles of quartz and ironstone; few coarse ironstone fragments; neutral; clear wavy boundary.

B21t—10 to 20 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate medium blocky structure; very hard, firm; patchy clay films on faces of peds; common very fine smooth and subrounded pebbles; few medium to coarse angular ironstone fragments; neutral; clear wavy boundary.

B22t—20 to 30 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; strong very fine blocky structure; many acute and obtuse angular peds; extremely hard, very firm; continuous shiny surfaces on peds; about 10 percent fine pebbles

(subrounded ironstone, quartz, hematite) and some coarser ironstone fragments; neutral; abrupt wavy boundary.

R—30 to 40 inches; weakly bedded angular limestone fragments up to 6 inches and up to 14 inches across the long axis; smooth fragments in upper part; pendants of precipitated calcium carbonate on fragments in lower part; limestone more bedded in lower part; contains some reddish brown (5YR 4/3) calcareous clay in horizontal and vertical crevices.

The solum ranges from 20 to 40 inches in thickness. It is slightly acid through mildly alkaline.

The A horizon is dark brown, brown, dark grayish brown, or reddish brown.

The B2t horizon is red, brown, reddish brown, dark reddish brown, or yellowish red. It is clay loam or clay; the clay content ranges from 35 to 60 percent.

The R horizon ranges from bedded limestone to unbedded limestone. Interstices in the bedded limestone are filled with soil.

Mabank series

The Mabank series consists of deep, somewhat poorly drained loamy soils on uplands. These soils formed in alkaline marine clay and shale. Slope ranges from 0 to 5 percent.

Typical pedon of Mabank fine sandy loam, 1 to 5 percent slopes; from the intersection of Farm Road 372 and Farm Road 678 in Gainesville, 1.6 miles east on Farm Road 678, 0.7 mile south, 0.8 mile southeast, 0.5 mile south, 0.5 mile east on county road, 0.1 mile south on oil field road, and 100 feet west in pasture:

A1—0 to 7 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; hard, friable; common fine roots; medium acid; abrupt wavy boundary.

B21tg—7 to 19 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; few fine faint yellowish brown mottles; moderate medium blocky structure; extremely hard, very firm; few fine roots; common clay films; few fine black concretions; slightly acid; gradual wavy boundary.

B22tg—19 to 42 inches; gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; moderate medium blocky structure; extremely hard, very firm; few fine roots; common clay films; few fine pebbles of quartz; few fine black concretions; mildly alkaline; gradual wavy boundary.

B23tg—42 to 60 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak coarse blocky structure; extremely hard, very firm; few fine black concretions; few soft masses of calcium carbonate; moderately alkaline.

The solum ranges from 60 to more than 80 inches in thickness.

The A1 horizon is light brownish gray, grayish brown, dark grayish brown, gray, dark gray, or very dark gray. It is medium acid through neutral.

The B21tg horizon is dark gray or very dark gray. It is clay or clay loam and is medium acid through mildly alkaline. The B22tg and B23tg horizons are grayish brown, light brownish gray, light gray, or gray. These horizons are clay or clay loam and are neutral through moderately alkaline.

Maloterre series

The Maloterre series consists of very shallow, somewhat excessively drained loamy soils on uplands. These soils formed in indurated platy limestone. Slope ranges from 3 to 30 percent.

Typical pedon of Maloterre gravelly clay loam in an area of Maloterre-Aledo complex, 3 to 12 percent slopes; from the intersection of Farm Road 922 and Texas Highway 51 in Era, 3.0 miles south and 2.0 miles southwest on Texas Highway 51 (on the divide between Flat Creek and Grasshopper Creek) and 700 feet south in pasture:

A1—0 to 5 inches; grayish brown (10YR 5/2) gravelly clay loam, dark grayish brown (10YR 4/2) moist; moderate fine subangular blocky structure; hard, friable; few fine roots; about 30 percent by volume limestone fragments and gravel; calcareous; moderately alkaline; clear wavy boundary.

R—5 to 13 inches; platy limestone with plates about 4 inches thick and about 16 inches across the long axis.

The solum ranges from 3 to 10 inches in thickness.

The A horizon is brown, grayish brown, or dark grayish brown. If the soil is moist, color values and chromas are less than 3.5 and thickness of the A horizon is less than 4 inches. The A horizon is clay loam or gravelly clay loam. The content of fragments and gravel ranges from none to 35 percent.

The R horizon is hard limestone or plates of limestone with soil from above in the horizontal and vertical crevices.

Medlin series

The Medlin series consists of deep, well drained clayey soils on uplands. These soils formed in clayey and shaly marine sediments. Slope ranges from 1 to 8 percent.

Typical pedon of Medlin clay, 5 to 8 percent slopes, at the center of a microdepression; from the intersection of Interstate Highway 35 and Farm Road 922 in Valley View, 2.6 miles east on Farm Road 922, 2.5 miles south,

0.2 mile west, 0.6 mile south, 0.1 mile west, 1.25 miles south on county road, and 230 feet east in pasture

A1—0 to 4 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium blocky structure; extremely hard, extremely firm; common fine roots; surface cracks 1 to 1.5 inches wide; calcareous; moderately alkaline; clear boundary.

AC1—4 to 16 inches; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; extremely hard, extremely firm; common fine roots to depth of 10 inches; cracks 1 to 1.5 inches wide throughout horizon; few strongly and weakly cemented concretions of calcium carbonate; coarse slickensides in lower part; calcareous; moderately alkaline; diffuse boundary.

AC2—16 to 40 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak coarse blocky structure; extremely hard, extremely firm; shiny ped faces; intersecting slickensides; few strongly and weakly cemented concretions of calcium carbonate; calcareous; moderately alkaline; diffuse boundary.

C—40 to 60 inches; grayish brown (2.5Y 5/2) shaly clay, dark grayish brown (2.5Y 4/2) moist; many fine and medium prominent brownish yellow (10YR 6/6) mottles; rock structure; extremely hard, extremely firm; calcareous; moderately alkaline.

Thickness of the solum ranges from 40 inches to more than 60 inches. Most untilled areas have gilgai microrelief of microknolls 3 to 8 inches higher than the microdepressions. Microknolls are 6 to 20 feet across and microdepressions are 4 to 12 feet across.

The A horizon is grayish brown, dark grayish brown, brown, olive brown, or olive.

The AC horizon is light olive brown, light yellowish brown, very pale brown, pale brown, or grayish brown. Mottles are in shades of gray, brown, or yellow. The AC horizon is clay or silty clay.

The C horizon is brown, grayish brown, yellowish brown, pale yellow, or yellow. Mottles are in shades of gray, brown, or yellow. The C horizon is silty clay, shaly clay, or shale.

Miller series

The Miller series consists of deep, moderately well drained clayey soils on bottom lands. These soils formed in calcareous clayey alluvium. Slope is 0 to 1 percent.

Typical pedon of Miller clay in an area of Miller soils; from the intersection of Interstate Highway 35 and U.S. Highway 82 in Gainesville, 1.5 miles west on U.S. Highway 82, 15.6 miles north on Farm Road 1201 (Sivells Bend Methodist Church), 1.3 miles west, 0.2 mile south, 0.6 mile west, 2.4 miles north and west on county road, and 150 feet south in pasture:

A1—0 to 18 inches; reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; moderate coarse blocky structure parting to strong granular in surface 0.5 inch; very hard, very firm; common fine roots; few fine pores and wormholes; calcareous; moderately alkaline; abrupt boundary.

B2—18 to 42 inches; reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; hard, firm; common fine roots; few fine pores; few strongly and weakly cemented concretions of calcium carbonate; calcareous; moderately alkaline; clear boundary.

Ab—42 to 60 inches; dark reddish brown (5YR 3/2) clay, dark reddish brown (5YR 2/2) moist; moderate fine subangular blocky structure; very hard, firm; few fine weakly cemented concretions of calcium carbonate; calcareous; moderately alkaline.

The A horizon is dark reddish gray, reddish brown, or brown. It is clay, silty clay, silty clay loam, or very fine sandy loam. It is mildly alkaline or moderately alkaline.

The B2 horizon is reddish brown, dark reddish brown, strong brown, brown, or red. It is clay or silty clay. It is mildly alkaline or moderately alkaline.

The Ab horizon has colors similar to those in the B2 horizon. The Ab horizon is clay, silty clay, clay loam, or silty clay loam. It is moderately alkaline. Some pedons lack the Ab horizon and have a C horizon.

Minco series

The Minco series consists of deep, well drained loamy soils on uplands. These soils formed in loamy eolian sediments. Slope ranges from 0 to 8 percent.

Typical pedon of Minco very fine sandy loam, 0 to 3 percent slopes; from the intersection of Farm Road 372 and U.S. Highway 82 in Gainesville, 3.0 miles east on U.S. Highway 82, 9.6 miles north and east on Farm Road 371 (Walnut Bend School), 5.3 miles east and north on county road, 0.2 mile west on poor motor road, and 200 feet south in cultivated field:

Ap—0 to 9 inches; reddish brown (5YR 5/3) very fine sandy loam, dark reddish brown (5YR 3/2) moist; weak fine subangular blocky structure; hard, very friable; common fine roots; many fine pores; slightly acid; clear boundary.

A1—9 to 18 inches; reddish brown (5YR 5/3) very fine sandy loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; hard, very friable; many fine roots; many fine pores; few worm casts; slightly acid; gradual boundary.

B21—18 to 40 inches; yellowish red (5YR 5/6) very fine sandy loam, yellowish red (5YR 4/6) moist; weak

coarse prismatic structure parting to moderate fine granular; hard, friable; few fine roots; many fine pores; many worm casts; neutral; gradual boundary.

B22—40 to 80 inches; reddish yellow (5YR 6/6) very fine sandy loam, yellowish red (5YR 5/6) moist; weak coarse prismatic structure parting to moderate fine granular; hard, friable; few fine roots; many fine pores; many worm casts; moderately alkaline.

The solum ranges from 40 to more than 80 inches in thickness.

The A horizon is grayish brown, dark grayish brown, dark brown, reddish brown, or brown. It is medium acid through neutral.

The B2 horizon is reddish brown, light brown, brown, reddish yellow, red, or yellowish red. It is loam, very fine sandy loam, or silt loam. It is slightly acid through moderately alkaline.

Normangee series

The Normangee series consists of deep, moderately well drained loamy soils on uplands. These soils formed in alkaline marine sediments of clay, sandy clay, shaly clay, or shale. Slope ranges from 1 to 8 percent.

Typical pedon of Normangee clay loam, 1 to 5 percent slopes, eroded; from the intersection of Interstate Highway 35 and Farm Road 922 in Valley View, 1.9 miles east on Farm Road 922, 1.1 miles north, 0.25 mile east, 0.15 mile north on county road, and 30 feet east in pasture:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium blocky and granular structure; hard, friable; common fine roots; common worm casts; few pebbles of quartz; neutral; abrupt wavy boundary.

B21t—7 to 12 inches; brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; common fine distinct dark reddish brown mottles; moderate medium subangular blocky structure; extremely hard, very firm; few fine roots; few worm casts; distinct clay films on faces of peds; few pebbles of quartz; cracks to 20 mm wide; slightly acid; clear wavy boundary.

B22t—12 to 20 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; few fine distinct dark reddish brown mottles; moderate medium subangular blocky structure; extremely hard, very firm; few fine roots; distinct clay films on faces of peds; few fine black concretions; slightly acid; clear wavy boundary.

B23t—20 to 35 inches; olive (5Y 5/3) clay, olive (5Y 4/3) moist; moderate medium subangular blocky structure; extremely hard, very firm; common clay films; few pebbles of quartz; few fine black concretions; cracks to 15 mm wide; neutral; gradual wavy boundary.

B24t—35 to 48 inches; olive (5Y 5/4) clay, olive (5Y 4/4) moist; moderate medium and coarse subangular blocky structure; extremely hard, very firm; few clay films; few fine black concretions; few fine concretions of calcium carbonate; moderately alkaline; gradual wavy boundary.

B25t—48 to 59 inches; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; weak coarse blocky structure; extremely hard, very firm; few strongly and weakly cemented concretions of calcium carbonate; moderately alkaline; gradual wavy boundary.

C—59 to 65 inches; light olive brown (2.5Y 5/4) shaly clay, common coarse distinct yellowish brown (10YR 5/6) mottles; massive; very hard, firm; few concretions of calcium carbonate; few gypsum crystals; moderately alkaline.

The solum is 40 to 60 inches thick.

The A horizon is dark grayish brown, pale brown, or dark brown. It is medium acid through neutral.

The B2t horizon is reddish brown, dark reddish brown, brown, yellowish brown, dark yellowish brown, light olive brown, grayish brown, or olive. Mottles are in shades of red, yellow, or brown. The B2t horizon is medium acid through moderately alkaline.

The C horizon is in shades of olive, gray, or brown. It is clay or shaly clay. It is slightly acid through moderately alkaline.

Pulexas series

The Pulexas series consists of deep, well drained loamy soils on bottom lands. These soils formed in stratified loamy alluvium. Slope is 0 to 1 percent.

Typical pedon of Pulexas fine sandy loam, in an area of Pulexas soils, frequently flooded; from the intersection of Farm Road 372 and Farm Road 678 in Gainesville, 6.9 miles east on Farm Road 678 (community of Woodbine), 0.15 mile east, 1.0 mile south, 0.3 mile east on county road, and 105 feet south in pasture:

A1—0 to 6 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; strata about 2 cm thick of very dark gray (10YR 3/1) loam, black (10YR 2/1) moist; moderate medium subangular blocky and granular structure; hard, friable; many fine roots; medium acid; clear wavy boundary.

C1—6 to 10 inches; light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak granular structure; soft, friable; many fine roots; few worm casts; neutral; clear wavy boundary.

C2—10 to 26 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak granular structure; soft, friable; few fine roots; many worm casts; medium acid; gradual wavy boundary.
C3—26 to 40 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 3/4) moist; weak granular structure; few fine roots; few worm casts; hard, friable; bedding planes of coarser and finer material; medium acid; gradual wavy boundary.
C4—40 to 66 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak granular structure; soft, friable; thin strata of sandy clay loam; slightly acid.

The A horizon is brown, pale brown, light brown, light yellowish brown, or yellowish brown. It is fine sandy loam or loam. It is medium acid through moderately alkaline.

The C horizon is brown, yellowish brown, light yellowish brown, or light brown. It is fine sandy loam and has thin strata of clay loam, sandy clay loam, or loamy fine sand. It is medium acid through moderately alkaline.

Purves series

The Purves series consists of shallow, well drained loamy soils on uplands. These soils formed in coarsely fractured limestone. Slope ranges from 1 to 5 percent.

Typical pedon of Purves clay loam, 1 to 3 percent slopes; from the intersection of Interstate Highway 35 and U.S. Highway 82 in Gainesville, 9.0 miles west on U.S. Highway 82, 1.5 miles south on Farm Road 1198 (community of Myra), 1.2 miles southeast on county road, and 300 feet south in pasture:

A11—0 to 8 inches; very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2) moist; strong fine subangular blocky and granular structure; hard, firm; many fine roots; many worm casts; few fine limestone fragments; calcareous; moderately alkaline; gradual smooth boundary.
A12ca—8 to 12 inches; brown (10YR 4/3) very gravelly clay loam, dark brown (10YR 3/3) moist; strong fine subangular blocky and granular structure; hard, firm; many fine roots; many worm casts; about 40 percent limestone fragments 1 to 5 inches across the long axis in lower part; calcareous; moderately alkaline; abrupt smooth boundary.
R—12 to 15 inches; indurated, coarsely fractured limestone.

Thickness of the solum or depth to indurated limestone ranges from 10 to 20 inches. The solum is moderately alkaline throughout.

The A horizon is very dark gray, dark gray, very dark grayish brown, dark grayish brown, grayish brown, or brown. The content of limestone fragments in the lower part of the A horizon ranges from 0 to 45 percent but is less than 35 percent of the weighted average.

In some pedons the R horizon of fractured limestone is interbedded with calcareous clayey and loamy marl.

Rayex series

The Rayex series consists of shallow, well drained loamy soils on uplands. These soils formed in stratified sandstone and shale. Slope ranges from 3 to 12 percent.

Typical pedon of Rayex stony fine sandy loam, in an area of Birome-Aubrey-Rayex complex, 3 to 12 percent slopes; from the intersection of Interstate Highway 35 and Farm Road 922 in Valley View, 3.6 miles east on Farm Road 922, 1.2 miles east on county road, and 200 feet north in wooded pasture:

A1—0 to 6 inches; brown (10YR 5/3) stony fine sandy loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; hard, friable; many fine roots; few coarse roots; sandstone fragments 10 to 20 inches across cover about 5 percent of surface; neutral; clear wavy boundary.
B2t—6 to 13 inches; yellowish red (5YR 5/8) clay, yellowish red (5YR 4/8) moist; moderate medium blocky structure; very hard, very firm; few coarse roots; many distinct clay films on faces of peds; few fragments of sandstone; strongly acid; gradual irregular boundary.
Cr—13 to 30 inches; strongly cemented fractured sandstone stratified with shale and clay. Roots penetrate clay filled cracks.

The solum is 10 to 20 inches thick over strongly cemented, fractured sandstone.

The A horizon is brown, dark brown, light brown, or grayish brown. It is medium acid through neutral. It is 2 to 20 percent by volume sandstone fragments.

The B2t horizon is reddish brown, yellowish red, red, or reddish yellow. It is clay loam, sandy clay, or clay; the clay content ranges from 35 to 55 percent. The B2t horizon is very strongly acid through medium acid.

The Cr horizon is fractured sandstone interbedded with brown, red, or gray shale and clay. The sandstone has a hardness of less than 3 on Mohs scale.

San Saba series

The San Saba series consists of moderately deep, well drained clayey soils on uplands. These soils formed in calcareous clays underlain by limestone. Slope ranges from 1 to 5 percent.

Typical pedon of San Saba clay in an area of Slidell-San Saba complex, 1 to 3 percent slopes, at the center of a microdepression; from the intersection of Interstate Highway 35 and Texas Highway 51 in Gainesville, 7.0 miles southwest on Texas Highway 51, 0.1 mile east on county road, and 30 feet north in pasture:

A1—0 to 15 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium subangular blocky structure; very hard, very firm; many fine roots; few worm casts; calcareous; moderately alkaline; gradual wavy boundary.

AC1—15 to 25 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; very hard, very firm; shiny ped faces; intersecting slickensides in lower part; few cracks filled with material from above; few fine black concretions; calcareous; moderately alkaline; gradual wavy boundary.

AC2—25 to 33 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky and granular structure; very hard, very firm; shiny ped faces; intersecting slickensides; cracks filled with darker material from above; many 10 to 15 mm concretions of calcium carbonate; common fine black concretions; calcareous; moderately alkaline; abrupt wavy boundary.

R—33 to 35 inches; white indurated limestone that can be flaked off at the surface in platy flakes up to 2 inches thick. Hardness is about 3 on Mohs scale.

Thickness of the soil or depth to indurated limestone ranges from 24 to 40 inches. The soil is moderately alkaline throughout. Most untilled areas have gilgai microrelief of microknolls 3 to 6 inches higher than the microdepressions. The distance between the center of microknolls and the center of microdepressions ranges from 6 to 12 feet.

The A horizon is dark gray or very dark gray.

The AC horizon is dark gray, gray, grayish brown, or dark grayish brown. Clay content ranges from 45 to 60 percent.

In some pedons the limestone in the R horizon is interbedded with shale.

Sanger series

The Sanger series consists of deep, well drained clayey soils on erosional uplands. These soils formed in calcareous, clayey marine sediments. Slope ranges from 1 to 8 percent.

Typical pedon of Sanger clay, 3 to 5 percent slopes, eroded, at the center of a microdepression; from the intersection of Interstate Highway 35 and U.S. Highway 82 in Gainesville, 1.5 miles west on U.S. Highway 82, 13.0 miles north on Farm Road 1201, and 90 feet east in pasture:

A11—0 to 15 inches; very dark grayish brown (10YR 3/2) clay, very dark brown (10YR 2/2) moist; moderate medium and fine subangular blocky structure; extremely hard, very firm, sticky and plastic; many fine roots; few worm casts; few fine limestone fragments; calcareous; moderately alkaline; clear wavy boundary.

A12—15 to 40 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium blocky structure; extremely hard, very firm, sticky and plastic; many fine roots; shiny ped faces; intersecting slickensides in lower part; calcareous; moderately alkaline; gradual wavy boundary.

AC—40 to 65 inches; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; weak medium blocky

structure; very hard, very firm, sticky and plastic; few wedge-shaped peds; shiny ped faces; few intersecting slickensides; many limestone fragments and shells; calcareous; moderately alkaline.

Thickness of the solum ranges from 40 to 70 inches. The solum is moderately alkaline throughout. Most untilled areas have gilgai microrelief of microknolls 3 to 12 inches higher than the microdepressions. Microknolls are 6 to 20 feet across and microdepressions are 4 to 12 feet across.

The A horizon is very dark grayish brown, dark grayish brown, grayish brown, or dark gray. It is clay or stony clay.

The AC horizon is grayish brown, light brownish gray, light yellowish brown, light olive brown, or very pale brown. In some pedons the AC horizon has mottles in shades of yellow, brown, or gray.

Silstid series

The Silstid series consists of deep, well drained sandy soils on uplands. These soils formed in thick beds of sandy and loamy material interbedded with sandstone. Slope ranges from 0 to 8 percent.

Typical pedon of Silstid loamy fine sand, 0 to 5 percent slopes; from the intersection of Farm Road 372 and Farm Road 922 in Mountain Springs, 0.4 mile west on Farm Road 922, 0.5 mile north, 0.25 mile west, 0.1 mile north on county road, and 70 feet east in pasture:

A1—0 to 10 inches; pale brown (10YR 6/3) loamy fine sand, brown (10YR 4/3) moist; single grained and weak granular structure; soft, very friable; common fine and medium roots; medium acid; clear smooth boundary.

A2—10 to 22 inches; very pale brown (10YR 7/3) loamy fine sand, brown (10YR 5/3) moist; single grained; loose; common fine and medium roots; medium acid; clear smooth boundary.

B21t—22 to 30 inches; brownish yellow (10YR 6/6) sandy clay loam, yellowish brown (10YR 5/6) moist; few medium distinct yellowish red (5YR 4/6) mottles; weak medium subangular blocky structure; very hard, friable; common fine roots; few fine pores; few worm casts; thin patchy clay films on faces of peds; medium acid; gradual smooth boundary.

B22t—30 to 43 inches; yellow (10YR 7/6) sandy clay loam, brownish yellow (10YR 6/6) moist; common medium distinct dark red (2.5YR 3/6) and light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; very hard, friable; common fine roots; common fine pores; thin patchy clay films on faces of peds; medium acid; gradual smooth boundary.

B23t—43 to 50 inches; yellow (10YR 7/8) fine sandy loam, brownish yellow (10YR 6/8) moist; common medium distinct red (2.5YR 4/6) and light gray (10YR 7/1) mottles; weak fine subangular blocky structure; hard, friable; common fine roots; common fine pores; few patchy clay films; medium acid; gradual smooth boundary.

B3—50 to 65 inches; yellow (10YR 7/6) fine sandy loam, brownish yellow (10YR 6/6) moist; common coarse distinct yellowish red (5YR 4/8) mottles; weak fine subangular blocky structure; hard, friable; light gray coatings on some peds; medium acid.

Thickness of the solum ranges from 60 inches to more than 80 inches. The solum is medium acid or slightly acid.

The A1 horizon is pale brown, very pale brown, grayish brown, brown, yellowish brown, dark brown, light yellowish brown, or dark yellowish brown.

The A2 horizon is very pale brown, light brown, pale brown, or light yellowish brown.

The B2t horizon and B3 horizon are brownish yellow, yellow, reddish yellow, yellowish red, yellowish brown, or strong brown. Mottles are in shades of red or gray. The B2t horizon is sandy clay loam, loam, or fine sandy loam. Clay content in the control section is 18 to 32 percent.

Slidell series

The Slidell series consists of deep, well drained clayey soils on uplands. These soils formed in calcareous, clayey marine sediments. Slope ranges from 0 to 5 percent.

Typical pedon of Slidell clay, 0 to 1 percent slopes, at the center of a microdepression; from the intersection of Interstate Highway 35 and U.S. Highway 82 in Gainesville, 7.5 miles west on U.S. Highway 82 (0.25 mile west of roadside park), and 30 feet north in pasture:

A11—0 to 25 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium granular and subangular blocky structure; extremely hard, very firm, sticky and plastic; many fine roots; calcareous; moderately alkaline; gradual wavy boundary.

A12—25 to 41 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate medium blocky structure; extremely hard, very firm, sticky and plastic; common fine roots; shiny ped faces; few intersecting slickensides in lower part; calcareous; moderately alkaline; gradual wavy boundary.

AC1—41 to 50 inches; dark grayish brown (2.5Y 4/2) clay, very dark grayish brown (2.5Y 3/2) moist; moderate medium blocky structure; extremely hard, very firm, sticky and plastic; few fine roots; shiny ped faces; coarse intersecting slickensides; few fine concretions of calcium carbonate; few fine black concretions; calcareous; moderately alkaline; diffuse boundary.

AC2—50 to 62 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; few fine faint olive yellow mottles; weak coarse blocky structure; extremely hard, very firm, sticky and plastic; few intersecting slickensides; few medium concretions of calcium carbonate; few fine black concretions; calcareous; moderately alkaline; diffuse boundary.

C—62 to 68 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; few fine faint olive yellow and gray mottles; massive; extremely hard, very firm; streaks of black clay filling old cracks; few strongly and weakly cemented concretions of calcium carbonate; few pebbles of quartz; calcareous; moderately alkaline.

Thickness of the solum ranges from 60 to more than 80 inches. The solum is calcareous and is moderately alkaline throughout. Most untilled areas have gilgai microrelief of microknolls 3 to 16 inches higher than the microdepressions. Distance between the center of microknolls and the center of microdepressions ranges from 10 to 20 feet.

The A horizon is very dark gray or dark gray.

The AC horizon is dark grayish brown, grayish brown, brown, light yellowish brown, or very pale brown. Mottles are in shades of brown or yellow. The AC horizon is clay or silty clay.

The C horizon is light brownish gray or pale brown. Mottles are in shades of brown, yellow, or gray. In some pedons the C horizon is interbedded with shale.

Teller series

The Teller series consists of deep, well drained loamy soils on stream terraces. These soils formed in loamy alluvial sediments. Slope is 0 to 1 percent.

Typical pedon of Teller fine sandy loam, 0 to 1 percent slopes; from the intersection of Interstate Highway 35 and U.S. Highway 82 in Gainesville, 1.5 miles west on U.S. Highway 82, 16.0 miles north on Farm Road 1201 (Sivells Bend), 1.25 miles east, 0.6 mile south, 0.2 mile east on county road, 0.5 mile east on oil field road, and 600 feet west in field:

Ap—0 to 11 inches; brown (7.5YR 4/2) fine sandy loam, dark brown (7.5YR 3/2) moist; moderate medium granular structure; hard, very friable; few worm casts; slightly acid; abrupt smooth boundary.

A1—11 to 22 inches; dark reddish gray (5YR 4/2) fine sandy loam, dark reddish brown (5YR 3/2) moist; weak medium subangular blocky structure; hard, very friable; common fine roots; common fine pores; few worm casts; slightly acid; clear smooth boundary.

B21t—22 to 46 inches; reddish brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; hard, friable; common fine pores; thin clay films on faces of peds; slightly acid; gradual smooth boundary.

B22t—46 to 68 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable; common fine pores; patchy clay films on faces of peds; slightly acid; gradual smooth boundary.

C—68 to 80 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; massive; hard, friable; neutral.

Thickness of the solum is 60 to more than 70 inches. The solum is medium acid or slightly acid.

The A horizon is dark grayish brown, grayish brown, brown, dark brown, dark reddish gray, or reddish brown.

The B2t horizon is reddish brown, yellowish red, or red. It is sandy clay loam or clay loam. Clay content in the control section averages 18 to 30 percent.

The C horizon is in shades of red or brown. It is fine sandy loam, very fine sandy loam, or loam. It is medium acid through neutral.

Tinn series

The Tinn series consists of deep, somewhat poorly drained clayey soils on bottom lands. These soils formed in calcareous, clayey alluvial sediments. Slope ranges from 0 to 1 percent.

Typical pedon of Tinn clay; from the intersection of Farm Road 372 and Farm Road 2071 in Gainesville, 8.6 miles south on Farm Road 2071, 0.5 mile east on Farm Road 922, 0.3 mile east on county road, and 50 feet north in cultivated field:

Ap—0 to 9 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; weak coarse blocky structure; very hard, very firm, sticky and plastic; few fine roots; few fine pores; calcareous; moderately alkaline; abrupt smooth boundary.

A11—9 to 38 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium and fine blocky structure; very hard, very firm, sticky and plastic; few fine roots; few fine pores; calcareous; moderately alkaline; gradual wavy boundary.

A12—38 to 48 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate medium blocky structure; very hard, very firm, sticky and plastic; few fine pores; calcareous; moderately alkaline; gradual wavy boundary.

C—48 to 60 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; massive; very hard, very firm, sticky and plastic; common bedding planes; calcareous; moderately alkaline.

The A horizon is dark gray or very dark gray. It is clay, silty clay, or clay loam. Clay content in the control sec-

tion ranges from 40 to 60 percent. The A horizon is mildly alkaline or moderately alkaline.

The C horizon is in shades of gray or olive. Mottles are in shades of brown or yellow. The C horizon is clay or silty clay. It is mildly alkaline or moderately alkaline.

Venus series

The Venus series consists of deep, well drained loamy soils on stream terraces. These soils formed in thick beds of calcareous loamy sediments. Slope ranges from 2 to 30 percent.

Typical pedon of Venus loam, 3 to 8 percent slopes, eroded; from the intersection of Texas Highway 51 and Farm Road 922 in Era, 7.7 miles west on Farm Road 922, and 40 feet north in pasture:

A1—0 to 12 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, friable; common fine roots; few worm casts; few fine limestone fragments; calcareous; moderately alkaline; gradual wavy boundary.

B21ca—12 to 22 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; weak coarse prismatic structure parting to weak fine subangular blocky; hard, friable; common fine roots; common fine pores; few fine limestone fragments; common films and threads and few soft masses of calcium carbonate; calcareous; moderately alkaline; gradual wavy boundary.

B22ca—22 to 46 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak coarse prismatic structure parting to weak fine subangular blocky; hard, friable; few fine roots; few fine limestone fragments; common films and threads and soft masses of calcium carbonate; calcareous; moderately alkaline; gradual wavy boundary.

Cca—46 to 70 inches; brownish yellow (10YR 6/6) loam, yellowish brown (10YR 5/6) moist; weak subangular blocky structure; hard, friable; few fine roots; common fine pores; many fine concretions and common fine soft masses of calcium carbonate; calcareous; moderately alkaline.

Thickness of the solum ranges from 40 to 70 inches. The solum is moderately alkaline throughout.

The A horizon is brown, dark brown, grayish brown, dark grayish brown, or very dark grayish brown.

The B2ca horizon is very pale brown, pale brown, brown, yellowish brown, or grayish brown. It is loam, clay loam, or sandy clay loam. It is 5 to 20 percent by volume concretions, films, threads, or soft masses of calcium carbonate.

The Cca horizon is in shades of brown or yellow. It is fine sandy loam, loam, or sandy clay loam.

Wilson series

The Wilson series consists of deep, somewhat poorly drained loamy soils on uplands or terraces. These soils formed in old clayey alluvium. Slope ranges from 0 to 5 percent.

Typical pedon of Wilson clay loam, 1 to 5 percent slopes; from the intersection of Farm Road 922 and Interstate Highway 35 in Valley View, 0.9 mile north on Interstate Highway 35 service road, 1.7 miles east on county road, and 40 feet south in cultivated field:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; massive; very hard, firm; common fine roots; neutral; abrupt wavy boundary.

B21tg—7 to 20 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate medium blocky structure; extremely hard, very firm; few fine roots; few fine black concretions; few cracks up to 4 mm wide; continuous clay films on faces of peds; slightly acid; gradual wavy boundary.

B22tg—20 to 36 inches; dark grayish brown (2.5Y 4/2) clay, very dark grayish brown (2.5Y 3/2) moist; moderate medium and fine blocky structure; extremely hard, very firm; few fine roots; continuous clay films on faces of peds; few shiny pressure faces; few fine black concretions; few pebbles of quartz; mildly alkaline; gradual wavy boundary.

B23tg—36 to 62 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium blocky structure; extremely hard, very firm; patchy clay films on faces of peds; common fine black concretions; few pebbles of quartz; few cracks filled with darker material from above; few fine concretions of calcium carbonate; mildly alkaline; gradual wavy boundary.

C—62 to 70 inches; olive gray (5Y 5/2) clay, olive gray (5Y 4/2) moist; massive; extremely hard, very firm; few black concretions; few fine concretions of calcium carbonate; few gypsum crystals; calcareous; moderately alkaline.

Solum thickness ranges from 40 to more than 60 inches.

The A horizon is very dark gray, dark gray, gray, very dark grayish brown, dark grayish brown, or grayish brown. It is medium acid through neutral.

The B2tg horizon is dark gray, very dark gray, black, grayish brown, dark grayish brown, light brownish gray, or olive gray. It is clay, silty clay, or clay loam. Clay content ranges from 35 to 50 percent. The B2tg horizon is medium acid through moderately alkaline.

The C horizon is in shades of gray, brown, yellow, or red. It is clay or silty clay. It is neutral through moderately alkaline.

Windthorst series

The Windthorst series consists of deep, moderately well drained loamy or sandy soils on erosional uplands. These soils formed in stratified clayey and loamy material. Slope ranges from 1 to 8 percent.

Typical pedon of Windthorst fine sandy loam, 1 to 5 percent slopes; from the intersection of Montague county line and Farm Road 1630, 0.55 mile east on Farm Road 1630 and 150 feet south in pasture:

A1—0 to 10 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium granular structure; slightly hard, friable; many fine roots; slightly acid; abrupt smooth boundary.

B21t—10 to 26 inches; reddish brown (5YR 5/4) sandy clay, reddish brown (5YR 4/4) moist; moderate medium blocky structure; very hard, very firm; common fine roots; many clay films on faces of peds; medium acid; gradual smooth boundary.

B22t—26 to 40 inches; yellowish red (5YR 5/6) sandy clay, yellowish red (5YR 4/6) moist; few fine faint reddish yellow and red mottles; moderate medium and fine blocky structure; very hard, very firm; few fine roots; few pebbles of quartz; common clay films on faces of peds; medium acid; gradual smooth boundary.

C—40 to 48 inches; mottled red (2.5YR 5/8), yellowish red (5YR 5/6), and yellowish brown (10YR 5/4) clay; massive; very hard, very firm; few black splotches; common flakes of shale; few pebbles of quartz; medium acid.

Thickness of the solum ranges from 40 to 60 inches.

The A horizon is brown, pale brown, grayish brown, yellowish brown, dark grayish brown, or light brownish gray. It is fine sandy loam or loamy fine sand. It is medium acid through neutral. Some pedons have an A2 horizon, which is one or two units of value higher than that in the A1 horizon.

The B2t horizon is reddish brown, yellowish red, or red. Mottles are reddish yellow, brownish yellow, yellowish brown, strong brown, or red. The B2t horizon is clay, sandy clay, or clay loam. Clay content ranges from 35 to 50 percent. The B2t horizon is medium acid through neutral.

The C horizon is mottled in shades of red, brown, yellow, or gray. It is clay, sandy clay, sandy clay loam, or fine sandy loam. It is medium acid through moderately alkaline.

Yahola series

The Yahola series consists of deep, well drained loamy soils on bottom lands. These soils formed in calcareous loamy alluvium. Slope is 0 to 1 percent.

Typical pedon of Yahola fine sandy loam; from the intersection of Interstate Highway 35 and U.S. Highway 82 in Gainesville, 1.5 miles west on U.S. Highway 82, 15.6 miles north on Farm Road 1201 (Sivells Bend Methodist Church), 1.3 miles west, 0.2 mile south, 0.6 mile west, 3.1 miles north and west on county road, 1.1 miles north on oil field road, and 500 feet east in pasture:

A1—0 to 15 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable; many fine roots; calcareous; moderately alkaline; clear wavy boundary.

C1—15 to 20 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; massive; slightly hard, friable; common fine roots; many fine pores; thin strata of loamy fine sand, loam, and clay loam in lower part; calcareous; moderately alkaline; abrupt wavy boundary.

C2—20 to 65 inches; reddish yellow (5YR 7/6) loam, reddish yellow (5YR 6/6) moist; massive; slightly hard, very friable; flakes of red shaly clay in lower part; thin strata of loamy fine sand through clay loam; calcareous; moderately alkaline.

The A horizon is brown, light brown, strong brown, light reddish brown, reddish brown, or dark reddish gray. It is mildly or moderately alkaline.

The C horizon is brown, light brown, strong brown, reddish brown, light reddish brown, reddish yellow, yellowish red, or red. It is fine sandy loam or loam. Thin strata of coarser or finer materials are in the C horizon of most pedons. The C horizon is moderately alkaline throughout.

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Glossary

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.

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

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

	Inches
Very low	0 to 3
Low	3 to 6
Medium	6 to 9
High	More than 9

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

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

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse textured (light textured) soil. Sand or loamy sand.

Complex soil. A map unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

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

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

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

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

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

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

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

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

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

Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

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.

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

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation

during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Gilgai. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soils are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

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.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. Inadequate strength for supporting loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three 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.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderate-*

ly rapid (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range (or rangeland). Land that, for the most part, produces native plants suitable for grazing by livestock; includes land supporting some forest trees.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

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.

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.

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.

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

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.
Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.
Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.
Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

ILLUSTRATIONS

Figure 1.—Straight walled gully pattern in Callisburg fine sandy loam, 3 to 8 percent slopes, severely eroded.

Figure 2.—Area of Sandy Loam range site where brush has been removed. The soil is Gasil fine sandy loam, 1 to 3 percent slopes.

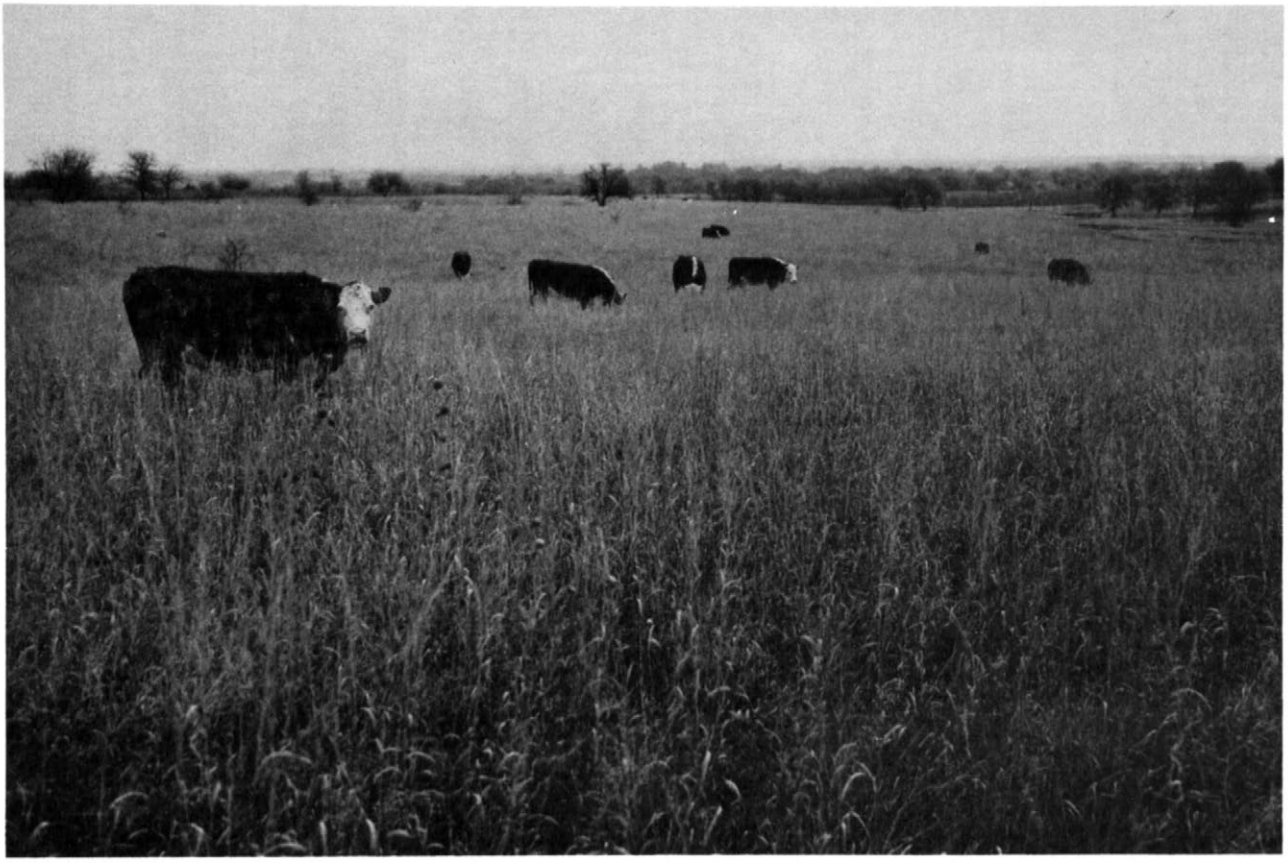

Figure 3.—Blackland range site on Sanger clay, 1 to 3 percent slopes.

Figure 4.—Coastal bermudagrass on Slidell clay, 0 to 1 percent slopes.

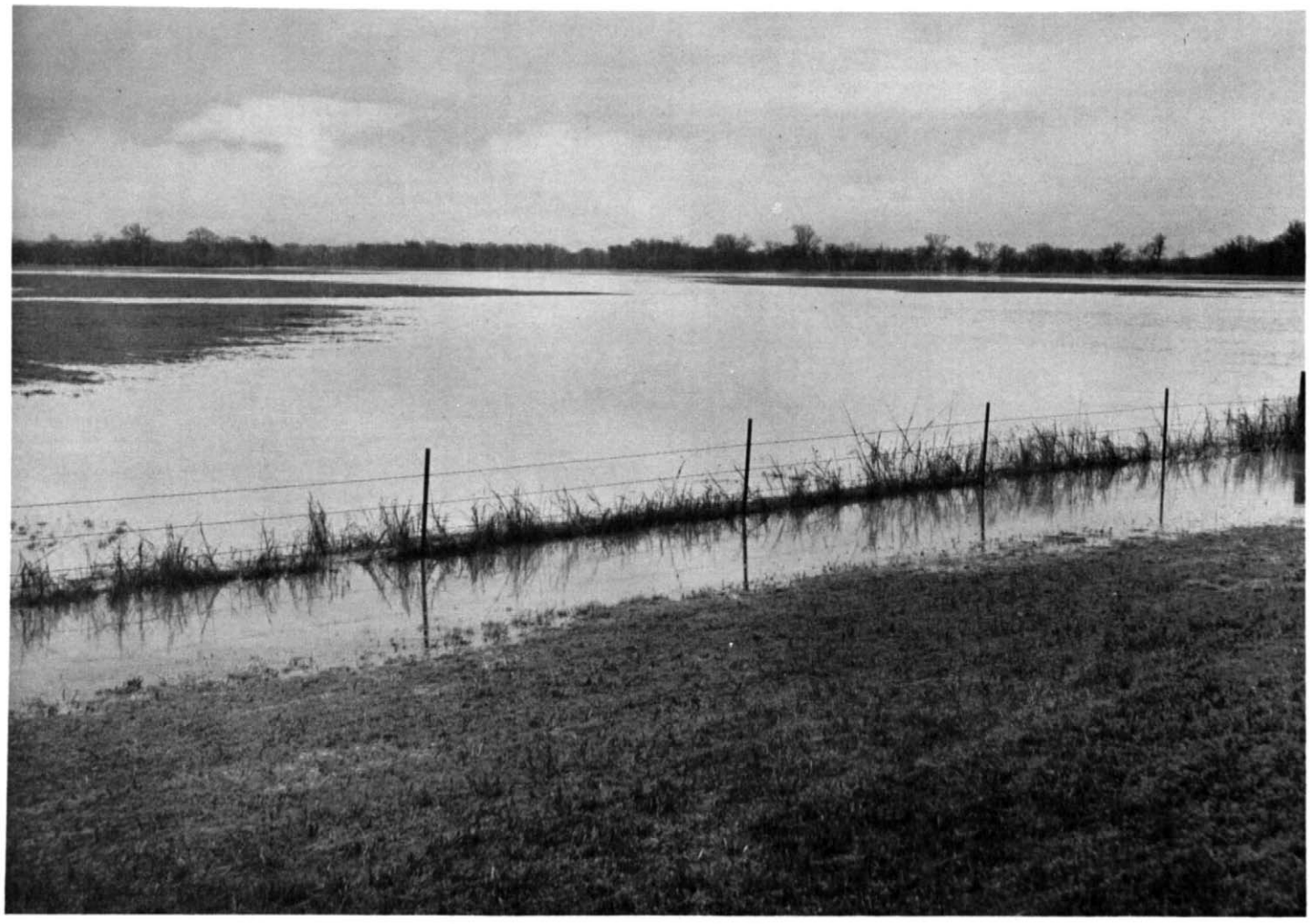

Figure 5.—Flooding on Tinn soils.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

[Data were recorded in the period 1951-76 at Gainesville, Texas]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	53.6	28.9	41.3	81	7	42	1.58	.39	2.51	3	1.0
February	58.7	33.0	45.8	84	13	74	1.89	.71	2.84	4	.8
March	65.8	39.9	52.9	89	19	214	2.41	.94	3.58	5	.0
April	75.5	50.7	63.1	92	29	398	3.55	1.45	5.24	6	.0
May	82.7	59.0	70.9	96	40	648	4.47	2.27	6.27	6	.0
June	90.6	67.7	79.2	101	53	876	3.23	1.12	4.91	5	.0
July	95.7	71.6	83.6	105	58	1,042	2.33	.51	3.74	3	.0
August	95.9	70.3	83.1	107	58	1,026	2.22	.76	3.38	4	.0
September	87.9	63.0	75.5	102	45	765	4.18	1.55	6.29	5	.0
October	77.7	51.5	64.6	95	32	458	3.35	.60	5.48	4	.0
November	64.7	39.3	52.0	85	20	143	2.22	.60	3.50	4	.0
December	56.2	31.6	43.9	79	11	30	1.73	.61	2.62	3	.2
Yearly:											
Average	75.4	50.5	63.0	---	---	---	---	---	---	---	---
Extreme	---	---	---	108	6	---	---	---	---	---	---
Total	---	---	---	---	---	5,716	33.16	26.10	39.81	52	2.0

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data were recorded in the period 1951-76 at Gainesville, Texas]

Probability	Temperature		
	24° F or lower	24° F or lower	24° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 20	April 4	April 14
2 years in 10 later than--	March 13	March 29	April 9
5 years in 10 later than--	February 27	March 19	March 31
First freezing temperature in fall:			
1 year in 10 earlier than--	November 7	October 30	October 26
2 years in 10 earlier than--	November 16	November 5	October 30
5 years in 10 earlier than--	December 3	November 18	November 8

TABLE 3.--GROWING SEASON LENGTH

[Data were recorded in the period 1951-76 at Gainesville, Texas]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	246	221	203
8 years in 10	257	228	209
5 years in 10	278	243	221
2 years in 10	298	258	234
1 year in 10	309	266	240

TABLE 4.--POTENTIALS AND LIMITATIONS OF GENERAL SOIL MAP UNITS

Map unit	Percent of county	Cultivated farm crops	Range	Improved pasture	Urban uses	Recreation
1. Sanger-Slidell-San Saba.	20	High	High	High	Low: shrink-swell, low strength, corrosive.	Low: too clayey, percs slowly.
2. Normangee-Wilson-Crockett.	16	Medium: droughty.	Medium: droughty.	Medium: droughty.	Low: shrink-swell, low strength, corrosive.	Medium: percs slowly.
3. Sanger-Maloterre-Venus.	14	Medium: excess lime.	High	Medium: excess lime.	Low: corrosive, low strength, depth to rock.	Low: slope, too clayey.
4. Purves-Maloterre-Aledo.	9	Low: depth to rock.	Low: depth to rock.	Low: depth to rock.	Medium: depth to rock, corrosive.	Low: depth to rock. too clayey.
5. Callisburg-Gasil-Aubrey.	15	Medium: low fertility, erodes easily.	Medium: low fertility.	Medium: low fertility.	Medium: shrink-swell, low strength, corrosive.	Medium: slope, percs slowly.
6. Duffau-Windthorst	8	Low: erodes easily, droughty.	Medium: droughty.	Medium: droughty.	High	High.
7. Konsil-Aubrey-Birome.	8	Medium: low fertility, erodes easily.	Medium: low fertility.	Medium: low fertility.	Medium: shrink-swell, low strength, corrosive, depth to rock.	High.
8. Tinn-Frio	6	High	High	High	Low: shrink-swell, corrosive, flooding.	Low: flooding, wetness, too clayey.
9. Gaddy-Teller-Miller.	4	Medium: flooding.	Medium: flooding.	High	Low: flooding, shrink-swell, corrosive.	Low: flooding.

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Arenosa fine sand, 1 to 5 percent slopes	600	0.1
2	Aubrey fine sandy loam, 1 to 5 percent slopes	12,200	2.1
3	Aubrey fine sandy loam, 5 to 12 percent slopes	3,400	0.6
4	Bastrop fine sandy loam, 1 to 5 percent slopes	2,100	0.4
5	Bastrop fine sandy loam, 5 to 8 percent slopes	2,400	0.4
6	Birome-Aubrey-Rayex complex, 3 to 12 percent slopes	25,400	4.4
7	Bolar clay loam, 1 to 5 percent slopes	12,900	2.2
8	Bolar clay loam, 5 to 8 percent slopes	2,600	0.4
9	Bolar stony clay loam, 5 to 12 percent slopes	2,500	0.4
10	Bolar-Maloterre-Aledo complex, 3 to 12 percent slopes	17,000	2.9
11	Callisburg fine sandy loam, 1 to 3 percent slopes	4,400	0.8
12	Callisburg fine sandy loam, 1 to 5 percent slopes, eroded	15,860	2.7
13	Callisburg fine sandy loam, 3 to 8 percent slopes, severely eroded	4,500	0.8
14	Crockett fine sandy loam, 0 to 1 percent slopes	800	0.1
15	Crockett fine sandy loam, 1 to 3 percent slopes	4,100	0.7
16	Crockett fine sandy loam, 1 to 5 percent slopes, eroded	14,300	2.4
17	Crosstell fine sandy loam, 1 to 3 percent slopes	2,600	0.4
18	Duffau loamy fine sand, 1 to 8 percent slopes	3,400	0.6
19	Duffau fine sandy loam, 2 to 5 percent slopes	5,200	0.9
20	Duffau fine sandy loam, 5 to 8 percent slopes	9,700	1.7
21	Duffau and Windthorst soils, 3 to 8 percent slopes, severely eroded	3,900	0.7
22	Frio clay loam	3,600	0.6
23	Frio soils	2,800	0.5
24	Gaddy fine sandy loam	2,200	0.4
25	Gaddy soils, frequently flooded	4,500	0.8
26	Gasil loamy fine sand, 1 to 5 percent slopes	6,800	1.2
27	Gasil loamy fine sand, 5 to 8 percent slopes	1,300	0.2
28	Gasil fine sandy loam, 1 to 3 percent slopes	3,300	0.6
29	Gasil fine sandy loam, 1 to 5 percent slopes, eroded	9,800	1.7
30	Gasil fine sandy loam, 5 to 8 percent slopes, eroded	1,900	0.3
31	Gladewater clay, frequently flooded	1,000	0.2
32	Gowen fine sandy loam	1,500	0.3
33	Gowen clay loam	700	0.1
34	Gowen soils, frequently flooded	7,000	1.2
35	Heaton loamy fine sand, 1 to 8 percent slopes	5,400	0.9
36	Hensley loam, 1 to 5 percent slopes	7,200	1.2
37	Konsil loamy fine sand, 1 to 5 percent slopes	3,700	0.6
38	Konsil loamy fine sand, 5 to 8 percent slopes, eroded	500	0.1
39	Konsil fine sandy loam, 2 to 5 percent slopes	7,800	1.3
40	Konsil fine sandy loam, 5 to 8 percent slopes	1,700	0.3
41	Lewisville clay loam, 1 to 5 percent slopes	3,700	0.6
42	Lewisville clay loam, 5 to 8 percent slopes	1,800	0.3
43	Lindy loam, 1 to 5 percent slopes	21,500	3.7
44	Mabank fine sandy loam, 0 to 1 percent slopes	2,700	0.5
45	Mabank fine sandy loam, 1 to 5 percent slopes	2,600	0.4
46	Mabank fine sandy loam, 1 to 5 percent slopes, eroded	1,900	0.3
47	Maloterre-Aledo complex, 3 to 12 percent slopes	37,700	6.5
48	Maloterre and Venus soils, hilly	18,800	3.2
49	Medlin clay, 1 to 3 percent slopes	2,000	0.3
50	Medlin clay, 3 to 5 percent slopes, eroded	3,100	0.5
51	Medlin clay, 5 to 8 percent slopes	3,300	0.6
52	Miller soils	2,100	0.4
53	Miller soils, frequently flooded	1,900	0.3
54	Minco very fine sandy loam, 0 to 3 percent slopes	3,500	0.6
55	Minco very fine sandy loam, 3 to 8 percent slopes	900	0.2
56	Normangee clay loam, 1 to 3 percent slopes	10,200	1.8
57	Normangee clay loam, 1 to 5 percent slopes, eroded	14,200	2.4
58	Normangee and Crockett soils, 3 to 8 percent slopes, severely eroded	2,100	0.4
59	Pulexas soils, frequently flooded	7,300	1.3
60	Purves clay loam, 1 to 3 percent slopes	10,000	1.7
61	Purves clay loam, 3 to 5 percent slopes	18,200	3.1
62	San Saba-Slidell complex, 3 to 5 percent slopes	2,600	0.4
63	Sanger clay, 1 to 3 percent slopes	11,400	1.9
64	Sanger clay, 3 to 5 percent slopes, eroded	15,800	2.7
65	Sanger clay, 5 to 8 percent slopes	4,700	0.8
66	Sanger stony clay, 3 to 8 percent slopes	24,300	4.2
67	Silstid loamy fine sand, 0 to 5 percent slopes	6,000	1.0
68	Silstid loamy fine sand, 5 to 8 percent slopes	1,000	0.2
69	Slidell clay, 0 to 1 percent slopes	1,300	0.2
70	Slidell clay, 1 to 3 percent slopes	7,400	1.3
71	Slidell-San Saba complex, 1 to 3 percent slopes	41,800	7.2
72	Teller fine sandy loam, 0 to 1 percent slopes	5,600	1.0

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
73	Tinn clay	15,300	2.6
74	Tinn soils	14,000	2.4
75	Venus loam, 2 to 5 percent slopes	1,100	0.2
76	Venus loam, 3 to 8 percent slopes, eroded	4,600	0.8
77	Wilson clay loam, 0 to 1 percent slopes	3,500	0.6
78	Wilson clay loam, 1 to 5 percent slopes	9,600	1.7
79	Wilson clay loam, 1 to 5 percent slopes, eroded	7,900	1.4
80	Windthorst loamy fine sand, 1 to 5 percent slopes	600	0.1
81	Windthorst loamy fine sand, 5 to 8 percent slopes	1,000	0.2
82	Windthorst fine sandy loam, 1 to 5 percent slopes	2,900	0.5
83	Windthorst fine sandy loam, 5 to 8 percent slopes	3,300	0.6
84	Yahola fine sandy loam	1,500	0.3
	Water	2,500	0.4
	Total	581,760	100.0

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas excluded. Absence of an entry means no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	7,800	---	---	---	---
II	76,690	54,990	21,700	---	---
III	162,014	144,714	8,300	9,000	---
IV	146,060	145,460	---	600	---
V	38,500	---	38,500	---	---
VI	63,835	17,410	---	46,425	---
VII	50,330	---	---	50,330	---
VIII	---	---	---	---	---

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

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

Soil name and map symbol	Cotton lint	Grain sorghum	Wheat	Improved bermudagrass
	Lb	Bu	Bu	AUM[1]
Arenosa:				
1	---	30	---	3.5
Aubrey:				
2	250	40	25	5.0
3	---	---	---	2.0
Bastrop:				
4	300	45	35	5.5
5	250	40	---	5.5
Birome:				
26	---	---	---	---
Bolar:				
7	---	35	25	5.0
8	---	30	20	4.5
9	---	---	---	---
[2]10	---	---	---	---
Callisburg:				
11	300	50	30	5.5
12	300	45	30	5.5
13	---	---	---	4.0
Crockett:				
14	400	60	25	7.5
15	350	54	25	7.5
16	200	45	20	5.5
Crosstell:				
17	250	40	30	5.0
Duffau:				
18	---	40	---	6.5
19	---	40	25	6.0
20	---	30	20	5.5
[2]21	---	---	---	4.5
Frio:				
22	450	75	35	7.0
[2]23	---	---	30	7.0
Gaddy:				
24	---	30	20	6.0
[2]25	---	---	15	6.0
Gasil:				
26	200	45	25	5.0
27	100	35	15	5.0

See footnotes at end of table.

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

Soil name and map symbol	Cotton lint	Grain sorghum	Wheat	Improved bermudagrass
	Lb	Bu	Bu	AUM[1]
Gasil:				
28	300	55	30	5.5
29	200	45	20	5.0
30	---	---	---	4.5
Gladewater:				
31	---	---	---	7.0
Gowen:				
32, 33	550	75	30	8.0
234	---	---	---	7.0
Heaton:				
35	---	40	---	5.5
Hensley:				
36	---	20	15	3.0
Konsil:				
37	200	45	25	5.0
38	---	---	---	4.0
39	250	50	25	5.5
40	150	40	20	5.0
Lewisville:				
41	375	70	35	7.0
42	---	60	---	6.0
Lindy:				
43	200	45	20	4.0
Mabank:				
44	330	55	25	6.0
45	250	40	20	5.0
46	200	35	15	5.0
Maloterre:				
247	---	---	---	---
248	---	---	---	---
Medlin:				
49	300	50	35	5.0
50	---	35	20	4.5
51	---	---	---	4.0
Miller:				
252	450	60	35	6.5
253	---	---	---	5.5
Minco:				
54	450	45	30	7.5
55	---	---	25	6.5
Normangee:				
56	300	50	25	8.0

See footnotes at end of table.

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

Soil name and map symbol	Cotton lint	Grain sorghum	Wheat	Improved bermudagrass
	Lb	Bu	Bu	AUM[1]
Normangee:				
57	---	40	20	6.0
[2]58	---	---	---	5.5
Pulexas:				
[2]59	---	---	25	7.5
Purves:				
60	---	35	20	4.0
61	---	25	20	3.5
San Saba:				
[2]62	325	60	25	6.0
Sanger:				
63	350	70	30	6.5
64	275	55	20	6.0
65	---	40	20	6.0
66	---	---	---	3.5
Silstid:				
67	---	40	---	5.5
68	---	30	---	5.0
Slidell:				
69	400	80	30	7.0
70	350	70	30	7.0
[2]71	350	70	30	6.5
Teller:				
72	450	55	35	7.5
Tinn:				
[3]73	450	100	35	8.0
[2]74	---	---	30	8.0
Venus:				
75	250	65	---	6.5
76	200	60	---	6.0
Wilson:				
77	350	55	30	6.0
78	300	40	25	5.5
79	250	35	20	5.0
Windthorst:				
80	---	30	---	6.0
81	---	25	---	5.5
82	---	35	---	5.0
83	---	30	---	4.5
Yahola:				
84	425	50	30	7.5

[1]Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

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

[3]Yields are for areas protected from flooding.

TABLE 8.--RANGE PRODUCTIVITY AND COMPOSITION

[Soils not listed are not in range sites; such soils can be used for grazing if grass cover is established]

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Arenosa:					
1	Deep Sand	Favorable	3,000	Post oak	15
		Normal	2,000	Sand lovegrass	10
		Unfavorable	1,000	Blackjack oak	10
				Purpletop	5
				Indiangrass	5
				Red lovegrass	5
				Scribner panicum	5
				Fringeleaf paspalum	5
Aubrey:					
2, 3	Tight Sandy Loam	Favorable	4,500	Little bluestem	25
		Normal	3,500	Sideoats grama	25
		Unfavorable	2,000	Post oak	10
				Big bluestem	5
				Purpletop	5
				Panicum	5
				Blackjack oak	5
Bastrop:					
4, 5	Sandy Loam	Favorable	5,500	Little bluestem	50
		Normal	4,500	Indiangrass	10
		Unfavorable	3,000	Switchgrass	5
				Purpletop	5
				Sideoats grama	5
				Fall witchgrass	5
				Post oak	5
				Blackjack oak	5
				Lindheimer hackberry	5
Birome:					
[1]6:					
Birome part	Sandstone Hill	Favorable	4,500	Little bluestem	25
		Normal	3,500	Indiangrass	10
		Unfavorable	2,000	Post oak	10
				Switchgrass	5
				Purpletop	5
				Beaked panicum	5
				Scribner panicum	5
				Sedge	5
				Blackjack oak	5
Aubrey part	Sandstone Hill	Favorable	4,500	Little bluestem	25
		Normal	3,500	Indiangrass	10
		Unfavorable	2,000	Panicum	10
				Post oak	10
				Switchgrass	5
				Purpletop	5
				Blackjack oak	5
				Sedge	5
Rayex part	Sandstone Hill	Favorable	3,500	Little bluestem	25
		Normal	2,500	Purpletop	10
		Unfavorable	1,500	Indiangrass	10
				Post oak	10
				Beaked panicum	5
				Big bluestem	5
				Sand lovegrass	5
				Scribner panicum	5
				Blackjack oak	5

See footnote at end of table.

TABLE 8.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Bolar:					
7, 8, 9	Clay Loam	Favorable	6,000	Little bluestem	20
		Normal	5,000	Indiangrass	15
		Unfavorable	3,000	Big bluestem	10
				Sideoats grama	10
				Silver bluestem	5
				Tall dropseed	5
				Texas needlegrass	5
				Canada wildrye	5
[1]10:					
Bolar part	Clay Loam	Favorable	6,000	Little bluestem	20
		Normal	5,000	Indiangrass	15
		Unfavorable	3,000	Big bluestem	10
				Sideoats grama	10
				Silver bluestem	5
				Tall dropseed	5
				Texas needlegrass	5
				Canada wildrye	5
Maloterre part	Very Shallow	Favorable	1,500	Little bluestem	20
		Normal	1,200	Sideoats grama	15
		Unfavorable	750	Indiangrass	10
				Rough tridens	10
				Tall grama	10
				Tall dropseed	10
Aledo part	Shallow	Favorable	3,000	Little bluestem	30
		Normal	2,000	Indiangrass	15
		Unfavorable	1,800	Sideoats grama	10
				Big bluestem	10
				Switchgrass	5
				Silver bluestem	5
				Hairy grama	5
				Hairy dropseed	5
				Texas wintergrass	5
Callisburg:					
11, 12, 13	Sandy Loam	Favorable	6,000	Little bluestem	45
		Normal	4,500	Indiangrass	10
		Unfavorable	3,500	Switchgrass	10
				Sand lovegrass	5
Crockett:					
14, 15, 16	Claypan Prairie	Favorable	6,000	Little bluestem	10
		Normal	5,000	Indiangrass	10
		Unfavorable	3,000	Virginia wildrye	10
				Florida paspalum	10
				Sideoats grama	10
				Texas needlegrass	10
				Silver bluestem	10
				Paspalum	10
				Big bluestem	5
Crosstell:					
17	Claypan Savannah	Favorable	4,500	Little bluestem	25
		Normal	2,500	Sideoats grama	15
		Unfavorable	1,500	Purpletop	10
				Silver bluestem	10
				Big bluestem	5
				Indiangrass	5
				Tall dropseed	5
Duffau:					
18	Loamy Sand	Favorable	5,000	Little bluestem	25
		Normal	4,000	Big bluestem	10
		Unfavorable	3,000	Indiangrass	10
				Post oak	10
				Silver bluestem	5
				Scribner panicum	5
				Sand lovegrass	5
				Tall dropseed	5
				Purpletop	5

See footnote at end of table.

TABLE 8.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Duffau:					
19, 20	Sandy Loam	Favorable	5,500	Little bluestem	30
		Normal	4,500	Big bluestem	10
		Unfavorable	3,000	Indiangrass	10
				Sideoats grama	5
				Silver bluestem	5
				Scribner panicum	5
				Texas needlegrass	5
				Arizona cottontop	5
[1]21:					
Duffau part	Sandy Loam	Favorable	4,000	Little bluestem	30
		Normal	3,000	Big bluestem	10
		Unfavorable	1,500	Indiangrass	10
				Sideoats grama	5
				Silver bluestem	5
				Scribner panicum	5
				Texas needlegrass	5
				Arizona cottontop	5
Windthorst part	Sandy Loam	Favorable	4,000	Little bluestem	30
		Normal	3,000	Big bluestem	10
		Unfavorable	1,500	Indiangrass	10
				Sideoats grama	5
				Silver bluestem	5
				Scribner panicum	5
				Texas needlegrass	5
				Arizona cottontop	5
Frio:					
22, [1]23	Loamy Bottomland	Favorable	5,500	Big bluestem	10
		Normal	4,000	Little bluestem	10
		Unfavorable	3,000	Vine-mesquite	10
				Switchgrass	5
				Indiangrass	5
				Eastern gamagrass	5
				Texas needlegrass	5
				Plains lovegrass	5
				Canada wildrye	5
				Cane bluestem	5
				Southwestern bristlegrass	5
Gaddy:					
24, [1]25	Sandy Bottomland	Favorable	3,800	Switchgrass	30
		Normal	2,700	Sand bluestem	15
		Unfavorable	2,000	Indiangrass	15
				Little bluestem	5
				Texas bluegrass	5
				Beaked panicum	5
				Purpletop	5
				Goldenrod	5
				Heath aster	5
				Maximilian sunflower	5
Gasil:					
26, 27	Loamy Sand	Favorable	6,000	Little bluestem	35
		Normal	4,000	Indiangrass	5
		Unfavorable	3,000	Beaked panicum	5
				Virginia wildrye	5
28, 29, 30	Sandy Loam	Favorable	6,500	Little bluestem	45
		Normal	5,000	Indiangrass	10
		Unfavorable	3,500	Beaked panicum	10
				Virginia wildrye	5

See footnote at end of table.

TABLE 8.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Gladewater:					
31	Clayey Bottomland	Favorable	8,000	Virginia wildrye	10
		Normal	6,000	Beaked panicum	10
		Unfavorable	4,000	Sedge	10
				Panicum	10
				Eastern gamagrass	10
				Switchgrass	10
				Vine-mesquite	10
				Purpletop	5
				Giant cane	5
				Paspalum	5
Gowen:					
32, 33, [1]34	Loamy Bottomland	Favorable	8,000	Indiangrass	20
		Normal	5,500	Big bluestem	15
		Unfavorable	4,000	Little bluestem	15
				Switchgrass	10
				Tall dropseed	5
				Sideoats grama	5
				Vine-mesquite	5
				Texas needlegrass	5
Heaton:					
35	Sandy	Favorable	4,500	Little bluestem	25
		Normal	3,500	Big bluestem	10
		Unfavorable	2,000	Indiangrass	10
				Post oak	8
				Blackjack oak	7
				Sand lovegrass	5
				Purpletop	5
				Tall dropseed	5
				Silver bluestem	5
				Scribner panicum	5
Hensley:					
36	Redland	Favorable	5,000	Little bluestem	30
		Normal	4,000	Indiangrass	20
		Unfavorable	2,500	Sideoats grama	10
				Big bluestem	5
				Silver bluestem	5
				Switchgrass	5
				Blue grama	5
Konsil:					
37, 38	Loamy Sand	Favorable	6,000	Little bluestem	35
		Normal	4,000	Indiangrass	5
		Unfavorable	3,000	Big bluestem	5
				Post oak	5
				Purpletop	5
				Sand lovegrass	5
				Blackjack oak	5
39, 40	Sandy Loam	Favorable	6,500	Little bluestem	45
		Normal	5,000	Indiangrass	10
		Unfavorable	3,500	Big bluestem	10
				Post oak	10
				Purpletop	5
				Sand lovegrass	5
				Blackjack oak	5

See footnote at end of table.

TABLE 8.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Lewisville:					
41, 42	Clay Loam	Favorable	6,500	Little bluestem	20
		Normal	5,500	Indiangrass	15
		Unfavorable	3,500	Big bluestem	15
				Switchgrass	10
				Texas needlegrass	5
				Virginia wildrye	5
				Torrey silver bluestem	5
				Meadow dropseed	5
				Buffalograss	5
				Sideoats grama	5
Lindy:					
43	Deep Redland	Favorable	6,000	Big bluestem	20
		Normal	5,000	Indiangrass	20
		Unfavorable	4,000	Little bluestem	15
				Sideoats grama	5
				Tall dropseed	5
				Silver bluestem	5
				Plains lovegrass	5
				Texas needlegrass	5
				Canada wildrye	5
Mabank:					
44, 45, 46	Claypan Prairie	Favorable	6,000	Little bluestem	30
		Normal	5,000	Big bluestem	15
		Unfavorable	3,000	Indiangrass	15
				Switchgrass	10
				Virginia wildrye	5
				Texas needlegrass	5
				Torrey silver bluestem	5
				Meadow dropseed	5
Maloterre:					
[1]47:					
Maloterre part--	Very Shallow	Favorable	1,500	Little bluestem	20
		Normal	1,200	Sideoats grama	15
		Unfavorable	750	Indiangrass	10
				Rough tridens	10
				Tall grama	10
				Tall dropseed	10
Aledo part	Shallow	Favorable	3,000	Little bluestem	30
		Normal	2,000	Indiangrass	15
		Unfavorable	1,800	Sideoats grama	10
				Big bluestem	10
				Switchgrass	5
				Silver bluestem	5
				Hairy grama	5
				Hairy dropseed	5
				Texas wintergrass	5
[1]48:					
Maloterre part--	Steep Rocky	Favorable	1,500	Little bluestem	20
		Normal	1,200	Sideoats grama	15
		Unfavorable	750	Indiangrass	10
				Rough tridens	10
				Tall grama	10
				Tall dropseed	10
Venus part	Steep Rocky	Favorable	6,500	Little bluestem	20
		Normal	5,000	Indiangrass	15
		Unfavorable	3,000	Big bluestem	10
				Sideoats grama	10
				Silver bluestem	5
				Tall dropseed	5
				Texas needlegrass	5
				Canada wildrye	5

See footnote at end of table.

TABLE 8.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Medlin:					
49, 50, 51	Blackland	Favorable	6,000	Little bluestem	30
		Normal	5,000	Indiangrass	15
		Unfavorable	3,000	Big bluestem	15
				Texas needlegrass	10
				Switchgrass	5
				Meadow dropseed	5
				Sideoats grama	5
				Buffalograss	5
Miller:					
[1]52, [1]53	Clayey Bottomland	Favorable	5,000	Big bluestem	25
		Normal	3,200	Switchgrass	15
		Unfavorable	2,000	Indiangrass	15
				Prairie cordgrass	10
				Western wheatgrass	5
				Tall dropseed	5
				Sunflower	5
				Goldenrod	5
				Sedge	5
Minco:					
54, 55	Sandy Loam	Favorable	5,500	Little bluestem	25
		Normal	4,000	Big bluestem	20
		Unfavorable	3,000	Indiangrass	10
				Switchgrass	10
				Canada wildrye	5
				Sideoats grama	5
				Blue grama	5
				Tall dropseed	5
				Lespedeza	5
				Dotted gayfeather	5
Normangee:					
56, 57	Claypan Prairie	Favorable	5,500	Little bluestem	45
		Normal	4,000	Indiangrass	15
		Unfavorable	3,000	Big bluestem	10
				Switchgrass	10
				Florida paspalum	5
				Sideoats grama	5
[1]58:					
Normangee part	Claypan Prairie	Favorable	5,500	Little bluestem	45
		Normal	4,000	Indiangrass	15
		Unfavorable	3,000	Big bluestem	10
				Switchgrass	10
				Florida paspalum	5
				Sideoats grama	5
Crockett part	Claypan Prairie	Favorable	6,000	Little bluestem	10
		Normal	5,000	Indiangrass	10
		Unfavorable	3,000	Virginia wildrye	10
				Florida paspalum	10
				Sideoats grama	10
				Texas needlegrass	10
				Silver bluestem	10
				Paspalum	10
				Big bluestem	5
Pulexas:					
[1]59	Loamy Bottomland	Favorable	6,500	Indiangrass	20
		Normal	5,000	Switchgrass	15
		Unfavorable	3,500	Little bluestem	10
				Big bluestem	10
				Tall dropseed	5
				Canada wildrye	5
				Vine-mesquite	5
				Texas needlegrass	5

See footnote at end of table.

TABLE 8.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Purves:					
60, 61	Shallow	Favorable	3,000	Little bluestem	30
		Normal	2,500	Indiangrass	15
		Unfavorable	1,800	Big bluestem	10
				Sideoats grama	10
				Switchgrass	5
				Hairy grama	5
				Texas needlegrass	5
				Silver bluestem	5
San Saba:					
[1]62:					
San Saba part	Blackland	Favorable	6,000	Little bluestem	45
		Normal	5,000	Big bluestem	10
		Unfavorable	3,500	Indiangrass	10
				Switchgrass	5
				Texas needlegrass	5
				Sideoats grama	5
				Silver bluestem	5
Slidell part	Blackland	Favorable	6,000	Little bluestem	45
		Normal	5,000	Big bluestem	10
		Unfavorable	3,000	Sideoats grama	5
				Texas needlegrass	5
				Meadow dropseed	5
				Buffalograss	5
				Silver bluestem	5
Sanger:					
63, 64, 65, 66	Blackland	Favorable	6,000	Little bluestem	45
		Normal	5,000	Big bluestem	10
		Unfavorable	3,000	Sideoats grama	5
				Texas needlegrass	5
				Meadow dropseed	5
				Buffalograss	5
				Silver bluestem	5
Silstid:					
67, 68	Sandy	Favorable	4,500	Little bluestem	50
		Normal	4,000	Indiangrass	10
		Unfavorable	2,000	Crinkleawn	5
				Purpletop	5
				Switchgrass	5
				Fringeleaf paspalum	5
				Post oak	5
				Blackjack oak	5
Slidell:					
69, 70	Blackland	Favorable	6,000	Little bluestem	45
		Normal	5,000	Big bluestem	10
		Unfavorable	3,000	Sideoats grama	5
				Texas needlegrass	5
				Meadow dropseed	5
				Buffalograss	5
				Silver bluestem	5
[1]71:					
Slidell part	Blackland	Favorable	6,000	Little bluestem	45
		Normal	5,000	Big bluestem	10
		Unfavorable	3,000	Sideoats grama	5
				Texas needlegrass	5
				Meadow dropseed	5
				Buffalograss	5
				Silver bluestem	5

See footnote at end of table.

TABLE 8.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Slidell:					
San Saba part---	Blackland	Favorable	6,000	Little bluestem----------	45
		Normal	5,000	Big bluestem----------	10
		Unfavorable	3,500	Indiangrass----------	10
				Switchgrass----------	5
				Texas needlegrass----------	5
				Sideoats grama----------	5
				Silver bluestem----------	5
Teller:					
72----------	Sandy Loam	Favorable	6,000	Little bluestem----------	25
		Normal	4,500	Big bluestem----------	20
		Unfavorable	3,000	Indiangrass----------	10
				Switchgrass----------	10
				Canada wildrye----------	5
				Sideoats grama----------	5
				Blue grama----------	5
				Tall dropseed----------	5
				Dotted gayfeather----------	5
Tinn:					
73, [1]74----------	Clayey Bottomland	Favorable	7,000	Virginia wildrye----------	15
		Normal	6,000	Sedge----------	15
		Unfavorable	4,000	Eastern gamagrass----------	10
				Switchgrass----------	10
				Indiangrass----------	10
				Giant cane----------	5
				Beaked panicum----------	5
				Panicum----------	5
Venus:					
75, 76----------	Clay Loam	Favorable	6,500	Little bluestem----------	20
		Normal	5,000	Indiangrass----------	15
		Unfavorable	3,000	Big bluestem----------	10
				Sideoats grama----------	10
				Silver bluestem----------	5
				Tall dropseed----------	5
				Texas needlegrass----------	5
				Canada wildrye----------	5
Wilson:					
77, 78, 79--------	Claypan Prairie	Favorable	6,000	Little bluestem----------	45
		Normal	4,500	Indiangrass----------	10
		Unfavorable	3,000	Big bluestem----------	10
				Virginia wildrye----------	5
				Vine-mesquite----------	5
				Florida paspalum----------	5
				Sideoats grama----------	5
				Texas needlegrass----------	5
				Silver bluestem----------	5
Windthorst:					
80, 81----------	Loamy Sand	Favorable	5,000	Little bluestem----------	25
		Normal	4,000	Big bluestem----------	10
		Unfavorable	3,000	Indiangrass----------	10
				Post oak----------	10
				Silver bluestem----------	5
				Scribner panicum----------	5
				Sand lovegrass----------	5
				Tall dropseed----------	5
				Purpletop----------	5
82, 83----------	Sandy Loam	Favorable	6,000	Little bluestem----------	30
		Normal	4,500	Big bluestem----------	10
		Unfavorable	3,000	Indiangrass----------	10
				Sideoats grama----------	5
				Silver bluestem----------	5
				Scribner panicum----------	5
				Texas needlegrass----------	5
				Arizona cottontop----------	5

See footnote at end of table.

TABLE 8.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production		Common plant name	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Yahola:					
84	Loamy Bottomland	Favorable	7,000	Big bluestem	25
		Normal	4,900	Indiangrass	15
		Unfavorable	3,500	Switchgrass	15
				Little bluestem	10
				Eastern gamagrass	5
				Tall dropseed	5
				Beaked panicum	5
				Compassplant	5
				Sedge	5
				Heath aster	5

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

TABLE 9.--BUILDING SITE DEVELOPMENT

["Depth to rock" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Arenosa:					
1	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Aubrey:					
2, 3	Severe: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
Bastrop:					
4	Slight	Slight	Slight	Slight	Moderate: low strength.
5	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
Birome:					
[1]6:					
Birome part	Severe: depth to rock.	Moderate: depth to rock, shrink-swell.	Moderate: depth to rock, shrink-swell.	Severe: depth to rock, large stones.	Severe: low strength.
Aubrey part	Severe: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
Rayex part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
Bolar:					
7	Moderate: depth to rock.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Severe: low strength.
8	Moderate: depth to rock.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength, slope.	Severe: low strength.
9	Moderate: slope, depth to rock.	Moderate: slope, low strength.	Moderate: slope, low strength.	Severe: slope.	Severe: low strength.
[1]10:					
Bolar part	Moderate: depth to rock.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength, slope.	Severe: low strength.
Maloterre part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Aledo part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Callisburg:					
11, 12, 13	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Severe: low strength.
Crockett:					
14, 15, 16	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, corrosive, low strength.	Severe: shrink-swell, low strength.
Crosstell:					
17	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Duffau: 18, 19, 20	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.
121: Duffau part	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.
Windthorst part	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Frio: 22	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods, low strength.
123	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods, low strength.
Gaddy: 24	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
125	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Gasil: 26, 27, 28, 29, 30	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Severe: low strength.
Gladewater: 31	Severe: too clayey.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, shrink-swell.
Gowen: 32, 33	Moderate: too clayey, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: shrink-swell, floods.
134	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Heaton: 35	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Hensley: 36	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Konsil: 37, 38, 39, 40	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Severe: low strength.
Lewisville: 41, 42	Moderate: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Lindy:					
43	Severe: depth to rock, too clayey.	Moderate: shrink-swell, low strength.	Severe: depth to rock.	Moderate: shrink-swell, low strength.	Severe: low strength.
Mabank:					
44, 45, 46	Severe: too clayey, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell.	Severe: shrink-swell, wetness, low strength.	Severe: shrink-swell, low strength.
Maloterre:					
[1]47:					
Maloterre part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Aledo part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
[1]48:					
Maloterre part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Venus part	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
Medlin:					
49, 50, 51	Severe: too clayey, cutbanks cave.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Miller:					
[1]52, [1]53	Severe: floods, too clayey.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: low strength, shrink-swell.
Minco:					
54	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
55	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength, slope.	Moderate: low strength.
Normangee:					
56, 57	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, corrosive.	Severe: shrink-swell, low strength.
[1]58:					
Normangee part	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, corrosive.	Severe: shrink-swell, low strength.
Crockett part	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, corrosive, low strength.	Severe: shrink-swell, low strength.
Pulexas:					
[1]59	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Purves:					
60, 61	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
San Saba:					
162:					
San Saba part--	Severe: cutbanks cave, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.
Slidell part---	Severe: too clayey, cutbanks cave.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Sanger:					
63, 64, 65, 66---	Severe: cutbanks cave, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Silstid:					
67----------	Moderate: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.
68----------	Moderate: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Slight.
Slidell:					
69, 70----------	Severe: too clayey, cutbanks cave.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
171:					
Slidell part---	Severe: too clayey, cutbanks cave.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
San Saba part--	Severe: cutbanks cave, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.
Teller:					
72----------	Slight----------	Slight----------	Slight----------	Slight----------	Moderate: low strength.
Tinn:					
73----------	Severe: wetness, too clayey.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.
174----------	Severe: wetness, floods, too clayey.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell.
Venus:					
75----------	Slight----------	Slight----------	Slight----------	Slight----------	Moderate: low strength.
76----------	Slight----------	Slight----------	Slight----------	Moderate: slope.	Moderate: low strength.
Wilson:					
77, 78, 79-------	Severe: wetness, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Windthorst:					
80, 82----------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
81, 83----------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Yahola: 84	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, low strength.

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

TABLE 10.--SANITARY FACILITIES

["Depth to rock" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Arenosa:					
1	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
Aubrey:					
2	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
3	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
Bastrop:					
4, 5	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Birome:					
16:					
Birome part	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, large stones.
Aubrey part	Severe: percs slowly.	Moderate: large stones, slope.	Severe: too clayey.	Slight	Poor: too clayey.
Rayex part	Severe: depth to rock, percs slowly.	Severe: depth to rock, large stones.	Severe: depth to rock.	Slight	Poor: thin layer, large stones.
Bolar:					
7, 8	Severe: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Slight	Fair: too clayey.
9	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: depth to rock.	Moderate: slope.	Fair: slope, too clayey.
10:					
Bolar part	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: depth to rock.	Slight	Fair: too clayey.
Maloterre part	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
Aledo part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, small stones.
Callisburg:					
11, 12, 13	Moderate: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
Crockett:					
14	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
15, 16	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Crosstell:					
17	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Duffau:					
18, 19, 20	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
[1]21:					
Duffau part	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
Windthorst part	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Frio:					
22	Severe: floods, percs slowly.	Severe: floods.	Severe: floods.	Severe: floods.	Fair: too clayey.
[1]23	Severe: floods, percs slowly.	Severe: floods.	Severe: floods.	Severe: floods.	Fair: too clayey.
Gaddy:					
24, [1]25	Severe: floods.	Severe: seepage, floods.	Severe: seepage, too sandy, floods.	Severe: floods, seepage.	Fair: too sandy.
Gasil:					
26, 27	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Fair: too sandy.
28, 29, 30	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Gladewater:					
31	Severe: percs slowly, floods.	Slight	Severe: floods, too clayey.	Severe: floods.	Poor: too clayey, wetness.
Gowen:					
32	Moderate: percs slowly, floods.	Moderate: seepage.	Moderate: too clayey, floods.	Moderate: floods.	Good.
33	Moderate: percs slowly, floods.	Moderate: seepage.	Moderate: too clayey,	Moderate: floods.	Fair: too clayey.
[1]34	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
Heaton:					
35	Slight	Moderate: seepage.	Slight	Slight	Fair: too sandy.
Hensley:					
36	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
Konsil:					
37, 38	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Fair: too sandy.
39, 40	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Lewisville:					
41, 42	Moderate: percs slowly.	Moderate: seepage.	Severe: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Lindy:					
43	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer, too clayey.
Mabank:					
44	Severe: percs slowly, wetness.	Slight	Severe: too clayey.	Severe: wetness.	Poor: too clayey.
45, 46	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey.	Severe: wetness.	Poor: too clayey.
Maloterre:					
[1]47:					
Maloterre part	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
Aledo part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, small stones.
[1]48:					
Maloterre part	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer.
Venus part	Slight	Moderate: seepage.	Slight	Slight	Good.
Medlin:					
49, 50, 51	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Miller:					
[1]52, [1]53	Severe: percs slowly, floods.	Severe: floods.	Severe: floods, too clayey.	Severe: floods.	Poor: too clayey, hard to pack.
Minco:					
54	Slight	Moderate: seepage.	Slight	Slight	Good.
55	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
Normangee:					
56, 57	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
[1]58:					
Normangee part	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Crockett part	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Pulexas:					
[1]59	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
Purves:					
60, 61	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, too clayey.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
San Saba:					
[1]62:					
San Saba part	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight	Poor: too clayey.
Slidell part	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Sanger:					
63, 64, 65	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
66	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, large stones.
Silstid:					
67, 68	Slight	Moderate: seepage, slope.	Slight	Slight	Poor: too sandy.
Slidell:					
69	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
70	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
[1]71:					
Slidell part	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
San Saba part	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight	Poor: too clayey.
Teller:					
72	Slight	Severe: seepage.	Severe: seepage.	Slight	Good.
Tinn:					
73	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
[1]74	Severe: wetness, floods, percs slowly.	Severe: wetness, floods.	Severe: floods, too clayey, wetness.	Severe: floods, wetness.	Poor: too clayey.
Venus:					
75, 76	Slight	Moderate: seepage.	Slight	Slight	Good.
Wilson:					
77	Severe: percs slowly.	Slight	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
78, 79	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
Windthorst:					
80, 81, 82, 83	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Yahola:					
84	Severe: floods.	Severe: seepage, floods.	Severe: floods, seepage.	Severe: floods, seepage.	Good.

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

TABLE 11.--CONSTRUCTION MATERIALS

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," and "unsuited." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Arenosa:				
1	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Aubrey:				
2, 3	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Bastrop:				
4, 5	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Birome:				
16:				
Birome part	Poor: thin layer, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, large stones.
Aubrey part	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, large stones.
Rayex part	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, large stones.
Bolar:				
7, 8	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: excess lime.
9	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
10:				
Bolar part	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Maloterre part	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, excess lime.
Aledo part	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, small stones.
Callisburg:				
11, 12, 13	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Crockett:				
14, 15, 16	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Crosstell:				
17	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Duffau:				
18	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too sandy.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Duffau: 19, 20	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
[1]21: Duffau part	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Windthorst part	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Frio: 22, [1]23	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Gaddy: 24, [1]25	Good	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Gasil: 26, 27	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too sandy.
28, 29, 30	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Gladewater: 31	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Gowen: 32, [1]34	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
33	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Heaton: 35	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Hensley: 36	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
Konsil: 37, 38	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too sandy.
39, 40	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Lewisville: 41, 42	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Lindy: 43	Severe: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Mabank: 44, 45, 46	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Maloterre:				
147:				
Maloterre part	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, excess lime.
Aledo part	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, small stones.
148:				
Maloterre part	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, excess lime.
Venus part	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Medlin: 49, 50, 51	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Miller: 152, 153	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Minco: 54, 55	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Normangee: 56, 57	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
158:				
Normangee part	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Crockett part	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Pulexas: 159	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Purves: 60, 61	Poor: shrink-swell, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, thin layer.
San Saba:				
162:				
San Saba part	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Slidell part	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Sanger: 63, 64, 65	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Sanger: 66	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, large stones.
Silstid: 67, 68	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Slidell: 69, 70	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
[1]71: Slidell part	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
San Saba part	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Teller: 72	Good	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Tinn: 73, [1]74	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Venus: 75, 76	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Wilson: 77, 78, 79	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Windthorst: 80, 81	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too sandy.
82, 83	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Yahola: 84	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.

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

TABLE 12.--WATER MANAGEMENT

["Seepage" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not evaluated]

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Irrigation	Terraces and diversions	Grassed waterways
Arenosa:					
1	Severe: seepage.	Severe: seepage, piping.	Fast intake, soil blowing.	Piping, erodes easily.	Droughty.
Aubrey:					
2	Slight	Moderate: compressible.	Slow intake	Favorable	Favorable.
3	Slight	Moderate: compressible.	Slow intake	Slope	Slope.
Bastrop:					
4, 5	Moderate: seepage.	Moderate: piping.	Favorable	Favorable	Favorable.
Birome:					
[1]6:					
Birome part	Severe: depth to rock.	Severe: large stones.	Complex slope, large stones.	Large stones	Large stones.
Aubrey part	Slight	Moderate: compressible.	Slow intake	Large stones	Large stones.
Rayex part	Severe: depth to rock.	Severe: thin layer.	Rooting depth, droughty.	Depth to rock, rooting depth.	Rooting depth, droughty.
Bolar:					
7	Severe: seepage.	Moderate: thin layer.	Excess lime	Favorable	Favorable.
8	Severe: seepage.	Moderate: thin layer.	Excess lime	Slope	Favorable.
9	Severe: seepage.	Moderate: thin layer.	Excess lime	Large stones	Large stones.
[1]10:					
Bolar part	Severe: seepage.	Moderate: thin layer.	Excess lime	Large stones	Large stones.
Maloterre part	Severe: depth to rock.	Severe: thin layer.	Droughty, rooting depth.	Depth to rock	Droughty, rooting depth.
Aledo part	Severe: depth to rock.	Severe: thin layer.	Rooting depth, droughty.	Depth to rock, rooting depth.	Droughty, rooting depth.
Callisburg:					
11, 12, 13	Moderate: seepage.	Moderate: compressible, piping.	Slow intake	Erodes easily	Percs slowly, erodes easily.
Crockett:					
14, 15, 16	Slight	Moderate: unstable fill, compressible.	Percs slowly, rooting depth, erodes easily.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Crosstell:					
17	Slight	Moderate: unstable fill.	Slow intake, percs slowly.	Percs slowly, slow intake.	Percs slowly.
Duffau:					
18	Moderate: seepage.	Moderate: erodes easily, piping.	Soil blowing, erodes easily.	Soil blowing, erodes easily.	Erodes easily.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Irrigation	Terraces and diversions	Grassed waterways
Duffau: 19, 20	Moderate: seepage.	Moderate: erodes easily, piping.	Erodes easily	Erodes easily	Erodes easily.
[1]21: Duffau part	Moderate: seepage.	Moderate: erodes easily, piping.	Erodes easily	Erodes easily	Erodes easily.
Windthorst part	Moderate: seepage.	Moderate: compressible.	Percs slowly, erodes easily.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Frio: 22	Moderate: seepage.	Moderate: compressible.	Floods	Favorable	Favorable.
[1]23	Moderate: seepage.	Moderate: compressible.	Floods	Favorable	Favorable.
Gaddy: 24, [1]25	Severe: seepage.	Moderate: unstable fill, piping.	Seepage	Erodes easily	Erodes easily.
Gasil: 26, 27, 28, 29, 30	Moderate: seepage.	Slight	Erodes easily	Erodes easily	Erodes easily.
Gladewater: 31	Slight	Moderate: low strength.	Slow intake	Percs slowly	Percs slowly.
Gowen: 32, 33	Moderate: seepage.	Moderate: compressible.	Favorable	Favorable	Favorable.
[1]34	Moderate: seepage.	Moderate: compressible.	Floods	Wetness	Favorable.
Heaton: 35	Moderate: seepage.	Moderate: erodes easily.	Fast intake, soil blowing.	Piping, erodes easily.	Droughty, erodes easily.
Hensley: 36	Severe: depth to rock.	Severe: thin layer.	Rooting depth, slow intake.	Depth to rock	Percs slowly, rooting depth.
Konsil: 37, 38, 39, 40	Moderate: seepage.	Moderate: piping.	Erodes easily	Favorable	Favorable.
Lewisville: 41, 42	Moderate: seepage.	Moderate: unstable fill.	Favorable	Favorable	Favorable.
Lindy: 43	Severe: depth to rock.	Moderate: piping, thin layer.	Rooting depth, slow intake.	Rooting depth	Rooting depth.
Mabank: 44, 45, 46	Slight	Moderate: unstable fill.	Slow intake, percs slowly.	Percs slowly	Percs slowly.
Maloterre: [1]47: Maloterre part	Severe: depth to rock.	Severe: thin layer.	Droughty, rooting depth.	Depth to rock	Droughty, rooting depth.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Irrigation	Terraces and diversions	Grassed waterways
Maloterre:					
Aledo part	Severe: depth to rock.	Severe: thin layer.	Rooting depth, droughty.	Depth to rock, rooting depth.	Droughty, rooting depth.
[1]48:					
Maloterre part	Severe: depth to rock.	Severe: thin layer.	Droughty, rooting depth.	Depth to rock	Droughty, rooting depth.
Venus part	Severe: seepage.	Moderate: piping.	Favorable	Slope	Favorable.
Medlin:					
49, 50, 51	Slight	Moderate: unstable fill.	Percs slowly, slope.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Miller:					
[1]52, [1]53	Slight	Moderate: unstable fill, compressible.	Floods, slow intake.	Not needed	Percs slowly.
Minco:					
54, 55	Moderate: seepage.	Moderate: unstable fill, compressible, piping.	Erodes easily	Erodes easily	Erodes easily.
Normangee:					
56, 57	Slight	Moderate: unstable fill.	Percs slowly, slow intake, erodes easily.	Slow intake, erodes easily, percs slowly.	Percs slowly, erodes easily.
[1]58:					
Normangee part	Slight	Moderate: unstable fill.	Percs slowly, slow intake, erodes easily.	Slow intake, erodes easily, percs slowly.	Percs slowly, erodes easily.
Crockett part	Slight	Moderate: unstable fill, compressible.	Percs slowly, rooting depth, erodes easily.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Pulexas:					
[1]59	Severe: seepage.	Moderate: unstable fill, seepage, piping.	Fast intake	Not needed	Favorable.
Purves:					
60, 61	Severe: depth to rock.	Severe: thin layer.	Droughty, rooting depth.	Depth to rock	Rooting depth, droughty.
San Saba:					
[1]62:					
San Saba part	Severe: depth to rock.	Moderate: low strength, thin layer.	Slow intake	Percs slowly	Percs slowly.
Slidell part	Slight	Moderate: compressible, unstable fill.	Slow intake	Percs slowly	Percs slowly.
Sanger:					
63, 64	Slight	Moderate: unstable fill, compressible.	Slow intake	Percs slowly	Percs slowly, slope.
65	Slight	Moderate: unstable fill, compressible.	Slow intake, slope.	Slope, percs slowly.	Percs slowly, slope.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Irrigation	Terraces and diversions	Grassed waterways
Sanger: 66	Slight	Moderate: unstable fill, low strength.	Slow intake, slope.	Large stones, slope, percs slowly.	Percs slowly, slope, large stones.
Silstid: 67, 68	Moderate: seepage.	Moderate: piping.	Erodes easily, seepage.	Too sandy	Erodes easily.
Slidell: 69, 70	Slight	Moderate: compressible, unstable fill.	Slow intake	Percs slowly	Percs slowly.
[1]71: Slidell part	Slight	Moderate: compressible, unstable fill.	Slow intake	Percs slowly	Percs slowly.
San Saba part	Severe: depth to rock.	Moderate: low strength, thin layer.	Slow intake	Percs slowly	Percs slowly.
Teller: 72	Severe: seepage.	Moderate: unstable fill, piping.	Favorable	Favorable	Favorable.
Tinn: 73	Slight	Moderate: compressible, unstable fill.	Percs slowly, wetness.	Wetness	Wetness, percs slowly.
[1]74	Slight	Moderate: compressible, unstable fill.	Percs slowly, floods, wetness.	Floods, wetness, percs slowly.	Floods, wetness, percs slowly.
Venus: 75	Severe: seepage.	Moderate: piping.	Favorable	Favorable	Favorable.
76	Severe: seepage.	Moderate: piping.	Favorable	Slope	Favorable.
Wilson: 77, 78, 79	Slight	Moderate: unstable fill.	Percs slowly, slow intake.	Percs slowly	Percs slowly.
Windthorst: 80, 81, 82, 83	Moderate: seepage.	Moderate: compressible.	Percs slowly, erodes easily.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Yahola: 84	Severe: seepage.	Moderate: unstable fill, seepage, piping.	Floods	Not needed	Not needed.

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

TABLE 13.--RECREATIONAL DEVELOPMENT

["Depth to rock" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Arenosa:				
1	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.
Aubrey:				
2	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
3	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight.
Bastrop:				
4, 5	Slight	Slight	Moderate: slope.	Slight.
Birome:				
[1]6:				
Birome part	Moderate: large stones.	Moderate: large stones.	Severe: slope, large stones.	Moderate: large stones.
Aubrey part	Moderate: percs slowly.	Slight	Severe: slope, large stones.	Moderate: large stones.
Rayex part	Moderate: percs slowly.	Slight	Severe: slope, large stones.	Moderate: large stones.
Bolar:				
7	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
8	Moderate: too clayey.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.
9	Moderate: large stones.	Moderate: large stones.	Severe: large stones.	Moderate: large stones.
[1]10:				
Bolar part	Moderate: large stones.	Moderate: large stones.	Severe: large stones.	Moderate: large stones.
Maloterre part	Moderate: too clayey, percs slowly.	Moderate: too clayey.	Severe: depth to rock, slope.	Moderate: too clayey.
Aledo part	Moderate: too clayey.	Moderate: too clayey.	Severe: depth to rock, small stones.	Moderate: too clayey.
Callisburg:				
11, 12, 13	Slight	Slight	Moderate: percs slowly.	Slight.
Crockett:				
14, 15, 16	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight.
Crosstell:				
17	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight.

See footnote at end of table.

TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Duffau:				
18	Moderate: too sandy.	Moderate: too sandy.	Severe: soil blowing.	Moderate: too sandy.
19	Slight	Slight	Moderate: slope.	Slight.
20	Slight	Slight	Severe: slope.	Slight.
[1]21:				
Duffau part	Slight	Slight	Severe: slope.	Slight.
Windthorst part	Moderate: percs slowly.	Slight	Severe: slope.	Slight.
Frio:				
22	Severe: floods.	Moderate: too clayey.	Moderate: too clayey, floods.	Moderate: too clayey.
[1]23	Severe: floods.	Moderate: too clayey, floods.	Severe: floods.	Moderate: too clayey, floods.
Gaddy:				
24	Severe: floods.	Slight	Moderate: floods.	Slight.
[1]25	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
Gasil:				
26	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
27	Moderate: too sandy.	Moderate: too sandy.	Severe: slope.	Moderate: too sandy.
28, 29	Slight	Slight	Moderate: slope.	Slight.
30	Slight	Slight	Severe: slope.	Slight.
Gladewater:				
31	Severe: floods, too clayey.	Severe: floods, too clayey.	Severe: floods, too clayey.	Severe: too clayey.
Gowen:				
32, 33	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
[1]34	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: too clayey, floods.
Heaton:				
35	Moderate: too sandy.	Moderate: too sandy.	Severe: soil blowing, too sandy.	Moderate: too sandy.
Hensley:				
36	Moderate: percs slowly.	Slight	Severe: depth to rock.	Slight.
Konsil:				
37	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.

See footnote at end of table.

TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Konsil:				
38	Moderate: too sandy.	Moderate: too sandy.	Severe: slope.	Moderate: too sandy.
39	Slight	Slight	Moderate: slope.	Slight.
40	Slight	Slight	Severe: slope.	Slight.
Lewisville:				
41	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
42	Moderate: too clayey.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.
Lindy:				
43	Moderate: percs slowly.	Slight	Moderate: depth to rock.	Slight.
Mabank:				
44, 45, 46	Severe: wetness.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.
Maloterre:				
[1]47:				
Maloterre part	Moderate: too clayey, percs slowly.	Moderate: too clayey.	Severe: depth to rock, slope.	Moderate: too clayey.
Aledo part	Moderate: too clayey.	Moderate: too clayey.	Severe: depth to rock, small stones.	Moderate: too clayey.
[1]48:				
Maloterre part	Moderate: too clayey, percs slowly.	Moderate: too clayey.	Severe: depth to rock, slope.	Moderate: too clayey.
Venus part	Slight	Slight	Severe: slope.	Slight.
Medlin:				
49, 50	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey.
51	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly, slope.	Severe: too clayey.
Miller:				
[1]52	Severe: floods, percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly.	Severe: too clayey.
[1]53	Severe: floods, percs slowly, too clayey.	Moderate: floods.	Severe: percs slowly.	Moderate: floods.
Minco:				
54	Slight	Slight	Slight	Slight.
55	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Normangee:				
56, 57	Severe: percs slowly.	Moderate: too clayey.	Severe: percs slowly.	Moderate: too clayey.
[1]58:				
Normangee part	Severe: percs slowly.	Moderate: too clayey.	Severe: percs slowly.	Moderate: too clayey.
Crockett part	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight.
Pulexas:				
[1]59	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
Purves:				
60, 61	Severe: too clayey.	Severe: too clayey.	Severe: depth to rock, too clayey.	Severe: too clayey.
San Saba:				
[1]62:				
San Saba part	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey.
Slidell part	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
Sanger:				
63, 64, 65	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey.
66	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly, large stones.	Severe: too clayey.
Silstid:				
67	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
68	Severe: too sandy.	Severe: too sandy.	Severe: too sandy, slope.	Severe: too sandy.
Slidell:				
69, 70	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
[1]71:				
Slidell part	Severe: percs slowly, too clayey.	Severe: too clayey.	Severe: percs slowly, too clayey.	Severe: too clayey.
San Saba part	Severe: too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey.
Teller:				
72	Slight	Slight	Slight	Slight.
Tinn:				
73	Severe: wetness, percs slowly.	Severe: too clayey.	Severe: wetness, too clayey.	Severe: too clayey.

See footnote at end of table.

TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Tinn:				
174[1]	Severe: wetness, floods, percs slowly.	Severe: too clayey.	Severe: wetness, floods, percs slowly.	Severe: too clayey.
Venus:				
75, 76	Slight	Slight	Moderate: slope.	Slight.
Wilson:				
77, 78, 79	Severe: percs slowly, wetness.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.
Windthorst:				
80	Moderate: percs slowly.	Moderate: too sandy.	Moderate: percs slowly.	Moderate: too sandy.
81	Moderate: percs slowly.	Moderate: too sandy.	Severe: slope.	Moderate: too sandy.
82	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
83	Moderate: percs slowly.	Slight	Severe: slope.	Slight.
Yahola:				
84	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.

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

TABLE 14.--WILDLIFE HABITAT POTENTIALS

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

Soil name and map symbol	Potential for habitat elements				Potential as habitat for--	
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Shrubs	Openland wildlife	Rangeland wildlife
Arenosa:						
1	Poor	Poor	Fair	Fair	Poor	Fair.
Aubrey:						
2	Fair	Fair	Good	Good	Fair	Good.
3	Poor	Fair	Good	Good	Fair	Good.
Bastrop:						
4, 5	Fair	Fair	Good	Good	Fair	Good.
Birome:						
[1]6:						
Birome part	Very poor	Very poor	Good	Good	Poor	Good.
Aubrey part	Very poor	Very poor	Good	Good	Poor	Good.
Rayex part	Very poor	Very poor	Fair	Fair	Poor	Fair.
Bolar:						
7, 8	Fair	Good	Fair	Fair	Fair	Fair.
9	Poor	Poor	Fair	Fair	Poor	Fair.
[1]10:						
Bolar part	Poor	Poor	Fair	Fair	Poor	Fair.
Maloterre part	Very poor	Very poor	Poor	Very poor	Very poor	Very poor.
Aledo part	Poor	Poor	Poor	Fair	Poor	Poor.
Callisburg:						
11, 12, 13	Good	Good	Good	Good	Good	Good.
Crockett:						
14, 15, 16	Fair	Good	Good	Good	Good	Good.
Crosstell:						
17	Fair	Fair	Good	Good	Fair	Fair.
Duffau:						
18	Fair	Good	Good	Good	Good	Good.
19, 20	Fair	Good	Good	Good	Good	Good.
[1]21:						
Duffau part	Poor	Fair	Good	Good	Fair	Good.
Windthorst part	Poor	Fair	Good	Good	Fair	Good.
Frio:						
22	Good	Good	Fair	Good	Good	Fair.
[1]23	Very poor	Poor	Fair	Good	Poor	Fair.
Gaddy:						
24	Fair	Fair	Fair	Fair	Fair	Fair.
[1]25	Very poor	Poor	Fair	Fair	Poor	Fair.
Gasil:						
26, 27	Good	Good	Good	Good	Good	Good.
28, 29, 30	Good	Good	Good	Good	Good	Good.

See footnote at end of table.

TABLE 14.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements				Potential as habitat for--	
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Shrubs	Openland wildlife	Rangeland wildlife
Gladewater:						
31	Poor	Fair	Fair	---	Fair	---
Gowen:						
32, 33	Good	Good	Fair	Good	Good	Fair.
[1]34	Very poor	Poor	Fair	Good	Poor	Fair.
Heaton:						
35	Fair	Good	Good	Good	Good	Good.
Hensley:						
36	Poor	Poor	Fair	Fair	Poor	Fair.
Konsil:						
37, 38	Good	Good	Good	Good	Good	Good.
39, 40	Good	Good	Good	Good	Good	Good.
Lewisville:						
41, 42	Fair	Fair	Fair	Fair	Fair	Fair.
Lindy:						
43	Fair	Good	Good	Good	Good	Good.
Mabank:						
44, 45, 46	Fair	Good	Good	Fair	Good	Fair.
Maloterre:						
[1]47:						
Maloterre part	Very poor	Very poor	Poor	Very poor	Very poor	Very poor.
Aledo part	Poor	Poor	Poor	Fair	Poor	Poor.
[1]48:						
Maloterre part	Very poor	Very poor	Poor	Very poor	Very poor	Very poor.
Venus part	Fair	Good	Good	Fair	Good	Fair.
Medlin:						
49	Fair	Fair	Poor	Poor	Fair	Poor.
50, 51	Fair	Fair	Poor	Poor	Fair	Poor.
Miller:						
[1]52	Fair	Fair	Poor	Poor	Fair	Poor.
[1]53	Poor	Fair	Poor	Poor	Poor	Poor.
Minco:						
54	Good	Good	Good	Good	Good	Good.
55	Fair	Good	Good	Good	Good	Good.
Normangee:						
56, 57	Fair	Good	Fair	Good	Fair	Fair.
[1]58:						
Normangee part	Fair	Good	Fair	Good	Fair	Fair.
Crockett part	Poor	Fair	Good	Good	Fair	Good.
Pulexas:						
[1]59	Very poor	Poor	Fair	Good	Poor	Fair.
Purves:						
60, 61	Fair	Good	Poor	Fair	Fair	Poor.

See footnote at end of table.

TABLE 14.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements				Potential as habitat for--	
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Shrubs	Openland wildlife	Rangeland wildlife
San Saba:						
[1]62:						
San Saba part	Fair	Fair	Fair	Fair	Fair	Fair.
Slidell part	Fair	Good	Fair	Fair	Fair	Fair.
Sanger:						
63	Good	Good	Fair	Fair	Good	Fair.
64, 65	Fair	Good	Fair	Fair	Fair	Fair.
66	Poor	Poor	Fair	Fair	Poor	Fair.
Silstid:						
67, 68	Poor	Poor	Fair	Good	Poor	Fair.
Slidell:						
69, 70	Good	Good	Fair	Fair	Good	Fair.
[1]71:						
Slidell part	Good	Good	Fair	Fair	Good	Fair.
San Saba part	Fair	Fair	Fair	Fair	Fair	Fair.
Teller:						
72	Good	Good	Good	Good	Good	Good.
Tinn:						
73	Fair	Fair	Fair	---	Fair	---
[1]74	Poor	Fair	Fair	---	Fair	---
Venus:						
75, 76	Fair	Good	Good	Fair	Good	Fair.
Wilson:						
77	Fair	Fair	Good	Fair	Fair	Fair.
78, 79	Fair	Fair	Good	Fair	Fair	Fair.
Windthorst:						
80, 82	Fair	Good	Good	Good	Good	Good.
81, 83	Fair	Good	Good	Good	Good	Good.
Yahola:						
84	Good	Good	Good	Good	Good	Good.

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

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Arenosa:											
1	0-80	Fine sand	SM, SP-SM	A-2-4, A-3	0	95-100	95-100	60-100	8-20	<25	NP-3
Aubrey:											
2, 3	0-7	Fine sandy loam	ML, SM, CL-ML, SM-SC	A-4	0	95-100	95-100	70-85	40-55	<25	NP-7
	7-44	Clay, sandy clay	CL, CH	A-6, A-7-6	0	95-100	95-100	90-100	51-75	40-60	20-35
	44-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Bastrop:											
4, 5	0-6	Fine sandy loam	ML, SM, CL-ML, SM-SC	A-4	0	95-100	80-100	80-100	36-70	18-25	2-7
	6-80	Sandy clay loam, clay loam, loam.	CL, SC	A-6	0	95-100	80-100	80-100	40-70	26-40	11-22
Birome:											
16:											
Birome part	0-9	Stony fine sandy loam.	SM, SM-SC, CL-ML, ML	A-4, A-2-4	0-15	75-90	75-90	55-90	30-55	<30	NP-7
	9-30	Clay, sandy clay	CL, CH	A-6, A-7	0	80-100	80-100	70-100	51-75	35-55	15-35
	30-36	Clay, sandy clay, clay loam.	CL, SC	A-6, A-7	0	70-100	60-100	50-70	40-60	30-45	15-25
	36-44	Stratified unweathered bedrock to weathered bedrock.	---	---	---	---	---	---	---	---	---
Aubrey part	0-7	Stony fine sandy loam.	SM, SM-SC, CL-ML, ML	A-4	1-5	95-100	95-100	70-85	40-55	<25	NP-7
	7-44	Clay, sandy clay	CL, CH	A-6, A-7-6	0	95-100	95-100	90-100	51-75	40-60	20-35
	44-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rayex part	0-6	Stony fine sandy loam.	SC, CL, SM-SC, CL-ML	A-4	2-20	90-100	75-100	65-100	40-75	<30	NP-10
	6-13	Clay loam, sandy clay, clay.	CL, SC	A-6, A-7	0-10	80-100	80-100	80-100	48-80	30-45	15-25
	13-30	Variable	---	---	---	---	---	---	---	---	---
Bolar:											
7, 8	0-14	Clay loam	CL, SC	A-6, A-7, A-4	0-5	75-100	75-100	70-98	40-80	25-42	9-25
	14-39	Clay loam, loam, silty clay loam.	CL, SC	A-6, A-7	0-10	75-95	75-95	70-90	40-75	25-42	11-25
	39-45	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

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

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Bolar:											
9	0-12	Stony clay loam	CL, SC	A-6, A-7, A-4	8-20	75-90	75-90	70-85	36-65	25-42	9-25
	12-36	Clay loam, loam, silty clay loam.	CL, SC	A-6, A-7	0-10	75-95	75-95	70-90	40-75	25-42	11-25
	36-45	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]10:											
Bolar part	0-12	Stony clay loam	CL, SC	A-6, A-7, A-4	8-20	75-90	75-90	70-85	36-65	25-42	9-25
	12-36	Clay loam, loam, silty clay loam.	CL, SC	A-6, A-7	0-10	75-95	75-95	70-90	40-75	25-42	11-25
	36-45	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Maloterre part	0-5	Gravelly clay loam.	SC, CL, GC	A-6	0-10	60-95	50-95	45-90	36-80	30-40	11-20
	5-13	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Aledo part	0-7	Gravelly clay loam.	CL, GC, SC	A-4, A-6	0-20	65-95	60-90	55-90	40-70	30-40	10-20
	7-16	Very gravelly clay loam, very gravelly loam.	GC, SC,	A-2-4, A-2-6	5-30	35-55	30-50	25-50	15-35	30-40	10-20
	16-24	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Callisburg:											
11, 12, 13	0-6	Fine sandy loam	CL, ML, SM, SC	A-4	0	95-100	90-100	75-100	36-75	<25	NP-8
	6-19	Sandy clay loam, sandy clay.	CL, SC	A-6, A-7	0	95-100	90-100	85-100	40-90	30-48	12-28
	19-65	Sandy clay, clay	CL	A-6, A-7	0	90-100	85-100	80-99	51-80	30-50	12-28
Crockett:											
14, 15, 16	0-5	Fine sandy loam	SM, ML, CL, SC	A-2, A-4, A-6	0-2	95-100	95-100	90-100	35-95	20-35	3-15
	5-50	Clay, clay loam, sandy clay.	CH, CL	A-7, A-6	0	85-100	80-100	75-100	65-91	36-60	22-40
	50-60	Clay loam, sandy clay loam, loam.	CL	A-6, A-7	0-5	90-100	85-100	75-100	51-90	30-45	11-30
Crosstell:											
17	0-7	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-2-4, A-4	0	85-100	85-100	75-95	28-60	<31	NP-7
	7-48	Clay	CH, CL	A-7-6	0	80-100	80-100	75-98	51-75	42-60	25-40
	48-80	Stratified clay to weathered bedrock.	CH, CL, SC	A-7-6, A-6	0	80-100	80-98	70-95	36-88	35-55	15-35
Duffau:											
18	0-15	Loamy fine sand	SM, SM-SC	A-2-4, A-4	0	95-100	95-100	75-98	15-40	<22	NP-4
	15-70	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0	95-100	95-100	80-100	36-65	30-40	15-24
19, 20	0-8	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4, A-2-4	0	95-100	95-100	75-90	30-60	<25	NP-7
	8-70	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0	95-100	95-100	80-100	36-65	30-40	15-24

See footnote at end of table.

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

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Duffau:											
[1]21:											
Duffau part-----	0-8	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4, A-2-4	0	95-100	95-100	75-90	30-60	<25	NP-7
	8-70	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0	95-100	95-100	80-100	36-65	30-40	15-24
Windthorst part-	0-10	Fine sandy loam	SM, SM-SC, CL-ML	A-4	0	95-100	90-100	75-100	36-75	<28	NP-7
	10-40	Clay, sandy clay, clay loam.	CL, CH	A-6, A-7-6	0	95-100	95-100	85-100	51-90	35-53	20-35
	40-48	Sandy clay loam, clay, fine sandy loam.	SC, CL	A-4, A-6, A-7-6	0	85-100	80-100	75-100	36-90	25-45	8-28
Frio:											
22, [1]23-----------	0-42	Clay loam-------	CL, CH	A-6, A-7	0-2	80-100	80-100	70-100	60-95	35-52	20-34
	42-60	Silty clay, clay loam, gravelly clay loam.	CL, CH	A-6, A-7	0-2	65-100	65-100	60-100	55-95	35-52	20-34
Gaddy:											
24, [1]25-----------	0-22	Fine sandy loam	SM, SC, ML, CL	A-4	0	100	98-100	94-100	36-80	<30	NP-10
	22-65	Loamy fine sand, fine sand.	SM	A-2	0	100	98-100	90-100	15-35	---	NP
Gasil:											
26, 27----------	0-11	Loamy fine sand	SM, SM-SC	A-2-4, A-4	0	95-100	92-100	50-99	20-50	<21	NP-4
	11-61	Sandy clay loam, loam, fine sandy loam.	CL, SC, CL-ML, SM-SC	A-6, A-4	0	95-100	92-100	85-100	36-71	22-40	7-20
28, 29, 30--------	0-17	Fine sandy loam	CL, ML, SC, SM	A-4	0	95-100	92-100	85-99	36-55	20-28	3-10
	17-75	Sandy clay loam, loam, fine sandy loam.	CL, SC, CL-ML, SM-SC	A-6, A-4	0	95-100	92-100	85-100	36-71	22-40	7-20
Gladewater:											
31----------	0-9	Clay----------	CH, CL	A-7	0	100	100	90-100	80-95	48-75	25-50
	9-60	Clay, silty clay	CH	A-7	0	100	100	95-100	90-100	51-75	30-50
Gowen:											
32----------	0-28	Fine sandy loam	CL	A-6, A-7-6	0	100	95-100	85-100	60-85	28-43	11-25
	28-60	Clay loam, loam	CL	A-4, A-6, A-7-6	0	100	95-100	85-100	55-85	25-43	10-25
33, [1]34-----------	0-43	Clay loam-------	CL	A-6, A-7-6	0	100	95-100	85-100	60-85	28-43	11-25
	43-65	Clay loam, loam	CL	A-4, A-6, A-7-6	0	100	95-100	85-100	55-85	25-43	10-25
Heaton:											
35----------	0-35	Loamy fine sand	SM	A-2-4	0	95-100	95-100	70-90	15-30	<25	NP-3
	35-70	Sandy clay loam	SC, SM-SC	A-2-4, A-4, A-6, A-2-6	0	98-100	95-100	75-90	25-45	20-35	4-15

See footnote at end of table.

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

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Hensley:											
36	0-4	Loam	CL, CL-ML	A-6, A-4	0-2	80-100	75-100	70-100	60-85	20-40	5-20
	4-13	Clay, clay loam	CL, CH	A-6, A-7	0-10	80-100	75-100	70-100	60-95	35-55	18-35
	13-15	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Konsil:											
37, 38	0-10	Loamy fine sand	SM, SM-SC	A-2, A-4	0	90-100	90-99	50-75	20-40	<25	NP-4
	10-71	Sandy clay loam, loam, fine sandy loam.	CL, SC	A-6	0	90-100	90-99	85-95	40-60	28-40	11-20
	71-80	Weathered bedrock.	---	---	---	---	---	---	---	---	---
39, 40	0-12	Fine sandy loam	CL, ML, SC, SM	A-4	0	90-100	90-100	85-95	36-55	20-28	3-10
	12-71	Sandy clay loam, loam, fine sandy loam.	CL, SC	A-6	0	90-100	90-99	85-95	40-60	28-40	11-20
	71-80	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Lewisville:											
41, 42	0-13	Clay loam	CL, CH	A-7	0	100	99-100	82-99	80-95	41-59	20-36
	13-40	Silty clay, clay loam.	CL, CH	A-7	0	99-100	98-100	73-99	72-95	48-60	25-36
	40-60	Silty clay, clay loam, silty clay loam.	CL, CH, SC	A-6, A-7	0	83-100	65-99	56-98	41-95	30-55	12-34
Lindy:											
43	0-10	Loam	CL, CL-ML	A-4, A-6	0-15	75-100	70-100	70-100	60-85	20-40	5-20
	10-30	Clay loam, clay	CL, CH	A-6, A-7	0-5	80-100	75-100	75-100	65-90	35-60	15-35
	30-40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Mabank:											
44, 45, 46	0-7	Fine sandy loam	CL, ML, SM, SC	A-4	0	95-100	95-100	80-98	40-70	<30	NP-10
	7-60	Clay, clay loam	CH, CL	A-7, A-6	0	95-100	95-100	95-100	60-85	35-65	20-40
Maloterre:											
[1]47:											
Maloterre part	0-5	Gravelly clay loam.	SC, CL, GC	A-6	0-10	60-95	50-95	45-90	36-80	30-40	11-20
	5-13	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Aledo part	0-7	Gravelly clay loam.	CL, GC, GM, SC	A-4, A-6	0-20	65-95	60-90	55-90	40-70	30-40	10-20
	7-16	Very gravelly clay loam, very gravelly loam.	GC, SC	A-2-4, A-2-6	5-30	35-55	30-50	25-50	15-35	30-40	10-20
	16-24	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]48:											
Maloterre part	0-5	Gravelly clay loam.	SC, CL, GC	A-6	0-10	60-95	50-95	45-90	36-80	30-40	11-20
	5-13	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Venus part	0-12	Loam	CL, CL-ML	A-4, A-6	0	100	95-100	85-100	50-80	20-40	5-20
	12-46	Loam, clay loam, sandy clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	50-80	20-40	5-20
	46-70	Fine sandy loam, loam, sandy clay loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0	80-100	70-100	65-100	40-80	20-40	5-20
Medlin:											
49, 50, 51	0-16	Clay	CH, CL	A-7	0	95-100	95-100	95-100	80-95	48-70	25-45
	16-60	Clay, silty clay, shaly clay.	CL, CH	A-7, A-6	0	95-100	95-100	95-100	80-95	35-55	15-35

See footnote at end of table.

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

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Miller:											
[1]52, [1]53----------	0-18	Clay----------	CL, CH	A-6, A-7	0	100	98-100	96-100	80-99	35-60	15-35
	18-42	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	98-100	96-100	90-99	41-65	20-40
	42-60	Clay, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	100	98-100	96-100	80-99	35-60	15-35
Minco:											
54, 55----------	0-40	Very fine sandy loam.	ML, CL, CL-ML	A-4	0	100	100	94-100	51-97	<31	NP-10
	40-80	Loam, silt loam, fine sandy loam, very fine sandy loam.	ML, CL, SM, SC	A-4	0	100	98-100	94-100	36-97	<31	NP-10
Normangee:											
56, 57----------	0-7	Clay loam-------	CL	A-6, A-7	0	98-100	96-100	90-100	55-85	30-48	11-25
	7-59	Clay----------	CL, CH	A-7	0	98-100	98-100	90-100	70-96	44-80	22-58
	59-65	Stratified shaly clay.	CL, CH	A-7	0	95-100	90-100	90-100	70-90	41-60	20-35
[1]58:											
Normangee part--	0-7	Clay loam-------	CL	A-6, A-7	0	98-100	96-100	90-100	55-85	30-48	11-25
	7-59	Clay----------	CL, CH	A-7	0	98-100	98-100	90-100	70-96	44-80	22-58
	59-65	Stratified shaly clay.	CL, CH	A-7	0	95-100	90-100	90-100	70-90	41-60	20-35
Crockett part---	0-5	Fine sandy loam	SM, ML, CL, SC	A-2, A-4, A-6	0-2	95-100	95-100	90-100	35-95	20-35	3-15
	5-50	Clay, clay loam, sandy clay.	CH, CL	A-7, A-6	0	85-100	80-100	75-100	65-91	36-60	22-40
	50-60	Clay loam, sandy clay loam, loam.	CL	A-6, A-7	0-5	90-100	85-100	75-100	51-90	30-45	11-30
Pulexas:											
[1]59----------	0-6	Fine sandy loam	SM, SC, ML, CL	A-4	0	100	95-100	90-100	36-85	<30	NP-10
	6-40	Stratified fine sandy loam to loam.	SM, SC, ML, CL	A-4	0	100	95-100	90-100	36-85	<30	NP-10
	40-66	Stratified loamy sand to clay loam.	SM, SC, ML, CL	A-4, A-2, A-6	0	100	95-100	90-100	15-85	<30	NP-15
Purves:											
60, 61----------	0-12	Clay loam-------	CH	A-7-6	0-5	90-100	80-100	80-95	70-95	51-65	30-40
	12-15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
San Saba:											
[1]62:											
San Saba part---	0-33	Clay----------	CH, MH	A-7-5, A-7-6	0	90-100	85-100	80-100	75-100	55-70	30-45
	33-35	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Slidell part----	0-25	Clay----------	CH	A-7-6	0	95-100	95-100	95-100	85-100	51-68	28-42
	25-68	Silty clay, clay	CH, CL	A-7-6, A-6	0	95-100	95-100	85-100	75-100	40-60	20-38
Sanger:											
63, 64, 65--------	0-40	Clay----------	CH	A-7-6	0	95-100	95-100	90-100	80-95	51-70	28-42
	40-65	Clay, silty clay	CH, CL	A-7-6, A-6	0	95-100	95-100	90-100	85-100	40-60	20-36
66----------	0-38	Stony clay------	CH	A-7-6	2-20	90-100	90-100	85-100	75-95	51-70	28-42
	38-60	Clay, silty clay	CH, CL	A-7-6, A-6	0	90-100	90-100	75-100	70-99	40-60	20-36

See footnote at end of table.

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

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Silstid:											
67, 68	0-22	Loamy fine sand	SM, SP-SM	A-2-4	0	95-100	95-100	90-100	10-25	<25	NP-3
	22-43	Sandy clay loam, loam, fine sandy loam.	SC, CL, SM-SC, CL-ML	A-4, A-6, A-2-4, A-2-6	0	95-100	95-100	80-100	30-55	20-40	4-22
	43-65	Sandy clay loam, loam, fine sandy loam.	SC, CL, SM-SC, CL-ML	A-4, A-6, A-2-4, A-2-6	0	95-100	85-100	70-100	22-55	20-40	4-22
Slidell:											
69, 70	0-25	Clay	CH	A-7-6	0	95-100	95-100	95-100	85-100	51-68	28-42
	25-68	Silty clay, clay	CH, CL	A-7-6, A-6	0	95-100	95-100	85-100	75-100	40-60	20-38
[1]71:											
Slidell part	0-25	Clay	CH	A-7-6	0	95-100	95-100	95-100	85-100	51-68	28-42
	25-68	Silty clay, clay	CH, CL	A-7-6, A-6	0	95-100	95-100	85-100	75-100	40-60	20-38
San Saba part	0-33	Clay	CH, MH	A-7-5, A-7-6	0	90-100	85-100	80-100	75-100	55-70	30-45
	33-35	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Teller:											
72	0-22	Fine sandy loam	SM, SC, ML, CL	A-4	0	100	100	94-100	36-85	<30	NP-10
	22-68	Sandy clay loam, clay loam.	SC, CL	A-6, A-4	0	100	100	90-100	45-85	24-40	7-18
	68-80	Fine sandy loam, very fine sandy loam, loam.	SM, SC, ML, CL	A-4, A-6	0	100	100	94-100	45-85	20-34	3-13
Tinn:											
73, [1]74	0-9	Clay	CH, CL	A-7	0	100	98-100	85-100	80-95	41-60	20-40
	9-60	Clay, silty clay	CH	A-7	0	100	98-100	85-100	80-95	51-60	30-40
Venus:											
75, 76	0-12	Loam	CL, CL-ML	A-4, A-6	0	100	95-100	85-100	50-80	20-40	5-20
	12-46	Loam, clay loam, sandy clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	50-80	20-40	5-20
	46-70	Fine sandy loam, loam, sandy clay loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0	80-100	70-100	65-100	40-80	20-40	5-20
Wilson:											
77, 78, 79	0-7	Clay loam	CL	A-4, A-6	0	95-100	85-100	80-100	60-96	25-36	10-20
	7-62	Silty clay, clay, clay loam.	CL, CH	A-7-6, A-6	0	90-100	80-100	80-100	65-96	40-55	21-35
	62-70	Silty clay, clay	CL, CH	A-7-6, A-6	0	95-100	90-100	85-100	70-90	40-57	24-35
Windthorst:											
80, 81	0-12	Loamy fine sand	SM, SM-SC	A-4, A-2-4	0	95-100	90-100	80-95	15-40	<21	NP-4
	12-40	Clay, sandy clay, clay loam.	CL, CH	A-6, A-7-6	0	95-100	95-100	85-100	51-90	35-53	20-35
	40-50	Sandy clay loam, clay, fine sandy loam.	SC, CL	A-4, A-6, A-7-6	0	85-100	80-100	75-100	36-90	25-45	8-28

See footnote at end of table.

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

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Windthorst:											
82, 83	0-10	Fine sandy loam	SM, ML SM-SC, CL-ML	A-4	0	95-100	90-100	75-100	36-75	<28	NP-7
	10-40	Clay, sandy clay, clay loam.	CL, CH	A-6, A-7-6	0	95-100	95-100	85-100	51-90	35-53	20-35
	40-48	Sandy clay loam, clay, fine sandy loam.	SC, CL	A-4, A-6, A-7-6	0	85-100	80-100	75-100	36-90	25-45	8-28
Yahola:											
84	0-15	Fine sandy loam	SM, SC, ML, CL	A-4	0	100	95-100	90-100	36-85	<30	NP-10
	15-65	Fine sandy loam, loam.	SM, SC, ML, CL	A-4	0	100	95-100	90-100	36-85	<30	NP-10

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

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors	
							Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH	Mmhos/cm					
Arenosa:										
1----------	0-80	>20	0.05-0.08	5.6-7.3	<2	Very low--	Low------	Low------	0.17	5
Aubrey:										
2, 3----------	0-7	2.0-6.0	0.11-0.17	5.6-7.3	<2	Low-------	Low------	High-----	0.32	3
	7-44	0.06-0.2	0.15-0.20	4.5-6.0	<2	Moderate	High-----	High-----	0.32	
	44-60	---	---	---	---	----------	---------	---------	---	
Bastrop:										
4, 5----------	0-6	2.0-6.0	0.11-0.17	5.6-7.3	<2	Low-------	Low------	Low------	0.24	5
	6-80	0.6-2.0	0.15-0.19	6.1-8.4	<2	Low-------	Moderate	Low------	0.32	
Birome:										
16:										
Birome part-----	0-9	0.6-2.0	0.08-0.15	5.6-7.3	<2	Low-------	Low------	Moderate	0.32	2
	9-30	0.2-0.6	0.15-0.20	5.1-6.0	<2	Moderate	High-----	Moderate	0.28	
	30-36	0.6-2.0	0.12-0.18	5.1-6.0	<2	Moderate	High-----	Moderate	0.28	
	36-44	---	---	---	---	----------	---------	---------	---	
Aubrey part-----	0-7	2.0-6.0	0.09-0.15	5.6-7.3	<2	Low-------	Low------	High-----	0.32	3
	7-44	0.06-0.2	0.15-0.20	4.5-6.0	<2	Moderate	High-----	High-----	0.32	
	44-60	---	---	---	---	----------	---------	---------	---	
Rayex part------	0-6	0.6-2.0	0.07-0.15	5.6-7.3	<2	Low-------	Low------	Low------	0.37	1
	6-13	0.2-0.6	0.12-0.20	4.5-6.0	<2	Moderate	High-----	Moderate	0.32	
	13-30	---	---	---	---	----------	---------	---------	---	
Bolar:										
7, 8----------	0-14	0.6-2.0	0.11-0.20	7.9-8.4	<2	Moderate	High-----	Low------	0.32	2
	14-39	0.6-2.0	0.11-0.20	7.9-8.4	<2	Moderate	High-----	Low------	---	
	39-45	---	---	---	---	----------	---------	---------	---	
9----------	0-12	0.6-2.0	0.10-0.18	7.9-8.4	<2	Moderate	High-----	Low------	0.32	2
	12-36	0.6-2.0	0.11-0.20	7.9-8.4	<2	Moderate	High-----	Low------	---	
	36-45	---	---	---	---	----------	---------	---------	---	
1 10:										
Bolar part------	0-12	0.6-2.0	0.10-0.18	7.9-8.4	<2	Moderate	High-----	Low------	0.32	2
	12-36	0.6-2.0	0.11-0.20	7.9-8.4	<2	Moderate	High-----	Low------	---	
	36-45	---	---	---	---	----------	---------	---------	---	
Maloterre part--	0-5	0.2-0.6	0.13-0.16	7.9-8.4	<2	Low-------	High-----	Low------	0.15	1
	5-13	---	---	---	---	----------	---------	---------	---	
Aledo part------	0-7	0.6-2.0	0.07-0.18	7.9-8.4	<2	Moderate	Moderate	Low------	0.32	1
	7-16	0.6-2.0	0.05-0.12	7.9-8.4	<2	Low-------	Moderate	Low------	---	
	16-24	---	---	---	---	----------	---------	---------	---	
Callisburg:										
11, 12, 13--------	0-6	0.6-2.0	0.12-0.17	5.6-7.3	<2	Low-------	Low------	Moderate	0.37	5
	6-19	0.2-0.6	0.14-0.20	5.1-7.3	<2	Moderate	Moderate	Moderate	---	
	19-65	0.2-0.6	0.15-0.20	5.1-7.8	<2	Moderate	High-----	Moderate	---	
Crockett:										
14, 15, 16--------	0-5	0.6-2.0	0.11-0.20	5.6-7.3	<2	Low-------	Moderate	Low------	0.43	5
	5-50	<0.06	0.14-0.18	5.6-7.8	<2	High------	High-----	Low------	0.32	
	50-60	0.06-0.2	0.15-0.20	7.4-8.4	<2	Moderate	High-----	Low------	0.32	
Crosstell:										
17----------	0-7	0.6-2.0	0.10-0.14	5.6-7.8	<2	Low-------	Low------	Low------	0.43	3
	7-48	<0.06	0.14-0.18	5.1-8.4	<2	High------	High-----	Moderate	0.37	
	48-80	<0.06	0.14-0.18	6.6-8.4	<2	High------	High-----	Moderate	0.37	
Duffau:										
18----------	0-15	2.0-6.0	0.07-0.11	6.1-7.8	<2	Very low--	Low------	Low------	0.32	5
	15-70	0.6-2.0	0.12-0.19	6.1-7.8	<2	Low-------	Moderate	Low------	0.32	

See footnote at end of table.

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

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors	
							Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH	Mmhos/cm					
Duffau:										
19, 20	0-8	2.0-6.0	0.11-0.15	6.1-7.8	<2	Low	Low	Low	0.43	5
	8-70	0.6-2.0	0.12-0.19	6.1-7.8	<2	Low	Moderate	Low	0.32	
[1]21:										
Duffau part	0-8	2.0-6.0	0.11-0.15	6.1-7.8	<2	Low	Low	Low	0.43	5
	8-70	0.6-2.0	0.12-0.19	6.1-7.8	<2	Low	Moderate	Low	0.32	
Windthorst part	0-10	0.6-2.0	0.12-0.17	5.6-7.3	<2	Low	Low	Low	0.49	5
	10-40	0.2-0.6	0.15-0.20	5.6-7.3	<2	Moderate	High	Low	0.37	
	40-48	0.2-0.6	0.12-0.20	5.6-8.4	<2	Moderate	Moderate	Low	0.37	
Frio:										
22, [1]23	0-42	0.2-0.6	0.15-0.22	7.9-8.4	<2	Moderate	High	Low	---	---
	42-60	0.2-0.6	0.11-0.22	7.9-8.4	<2	Moderate	High	Low	---	
Gaddy:										
24, [1]25	0-22	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low	Low	Low	---	---
	22-65	6.0-20	0.06-0.10	7.9-8.4	<2	Low	Low	Low	---	
Gasil:										
26, 27	0-11	6.0-20	0.07-0.11	6.1-7.8	<2	Low	Low	Low	0.20	5
	11-61	0.6-2.0	0.12-0.19	5.1-6.5	<2	Moderate	Low	Moderate	---	
28, 29, 30	0-17	2.0-6.0	0.11-0.15	6.1-7.8	<2	Low	Low	Low	0.24	5
	17-75	0.6-2.0	0.12-0.19	5.1-6.5	<2	Moderate	Low	Moderate	---	
Gladewater:										
31	0-9	0.06-0.2	0.15-0.20	5.6-7.3	<2	High	High	Low	0.32	5
	9-60	<0.06	0.15-0.18	4.5-7.3	<2	High	High	Moderate	0.32	
Gowen:										
32, 33, [1]34	0-28	0.6-2.0	0.15-0.20	6.6-8.4	<2	Moderate	Moderate	Low	---	---
	28-60	0.6-2.0	0.15-0.20	6.6-8.4	<2	Moderate	Moderate	Low	---	
Heaton:										
35	0-35	2.0-6.0	0.05-0.09	5.6-7.3	<2	Very high	Low	Low	0.17	5
	35-70	0.6-2.0	0.14-0.16	5.6-7.3	<2	Low	Moderate	Low	0.24	
Hensley:										
36	0-4	0.2-0.6	0.12-0.20	6.1-7.8	<2	Low	High	Low	0.37	1
	4-13	0.06-0.2	0.10-0.20	6.6-8.4	<2	Moderate	High	Low	0.32	
	13-15	---	---	---	---	---	---	---	---	
Konsil:										
37, 38	0-10	6.0-20	0.07-0.11	6.1-7.8	<2	Low	Low	Low	0.20	5
	10-71	0.6-2.0	0.12-0.19	5.1-6.5	<2	Moderate	Low	Moderate	0.32	
	71-80	---	---	---	---	---	---	---	---	
39, 40	0-12	2.0-6.0	0.11-0.15	6.1-7.8	<2	Low	Low	Low	0.24	5
	12-71	0.6-2.0	0.12-0.19	5.1-6.5	<2	Moderate	Low	Moderate	0.32	
	71-80	---	---	---	---	---	---	---	---	
Lewisville:										
41, 42	0-13	0.6-2.0	0.16-0.20	7.9-8.4	<2	High	High	Low	0.32	5
	13-40	0.6-2.0	0.14-0.18	7.9-8.4	<2	High	High	Low	0.37	
	40-60	0.6-2.0	0.14-0.18	7.9-8.4	<2	High	High	Low	---	
Lindy:										
43	0-10	0.6-2.0	0.12-0.20	6.1-7.8	<2	Low	High	Low	0.37	2
	10-30	0.06-0.2	0.10-0.20	6.1-7.8	<2	Moderate	High	Low	0.32	
	30-40	---	---	---	---	---	---	---	---	
Mabank:										
44, 45, 46	0-7	0.6-2.0	0.11-0.15	5.6-7.3	<2	Low	Moderate	Moderate	0.43	5
	7-60	<0.06	0.12-0.18	5.6-8.4	<2	High	High	Moderate	0.32	
Maloterre:										
[1]47:										
Maloterre part	0-5	0.2-0.6	0.13-0.16	7.9-8.4	<2	Low	High	Low	0.15	1
	5-13	---	---	---	---	---	---	---	---	

See footnote at end of table.

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

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors	
							Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH	Mmhos/cm					
Maloterre:										
Aledo part------	0-7	0.6-2.0	0.07-0.18	7.9-8.4	<2	Moderate	Moderate	Low------	0.32	1
	7-16	0.6-2.0	0.05-0.12	7.9-8.4	<2	Low-------	Moderate	Low------	---	
	16-24	---	---	---	---	----------	---------	---------	---	
[1]48:										
Maloterre part--	0-5	0.2-0.6	0.13-0.16	7.9-8.4	<2	Low-------	High-----	Low------	0.15	1
	5-13	---	---	---	---	----------	---------	---------	---	
Venus part------	0-12	0.6-2.0	0.15-0.20	7.9-8.4	<2	Low-------	High-----	Low------	0.28	5
	12-46	0.6-2.0	0.15-0.20	7.9-8.4	<2	Low-------	High-----	Low------	0.28	
	46-70	0.6-2.0	0.13-0.18	7.9-8.4	<2	Low-------	High-----	Low------	0.28	
Medlin:										
49, 50, 51-------	0-16	<0.06	0.12-0.18	7.4-8.4	<2	High------	High-----	Low------	0.32	4
	16-60	<0.06	0.12-0.18	7.4-8.4	<2	High------	High-----	Low------	0.32	
Miller:										
[1]52, [1]53----------	0-18	0.06-0.2	0.16-0.2	7.4-8.4	<2	High------	High-----	Low------	---	---
	18-42	<0.06	0.15-0.19	7.4-8.4	<2	High------	High-----	Low------	---	
	42-60	0.06-0.2	0.15-0.19	7.9-8.4	<2	High------	High-----	Low------	---	
Minco:										
54, 55----------	0-40	.6-2.0	0.13-0.24	5.6-7.3	<2	Low-------	Low------	Low------	0.28	5
	40-80	.6-2.0	0.11-0.24	6.1-8.4	<2	Low-------	Low------	Low------	---	
Normangee:										
56, 57----------	0-7	0.06-0.2	0.15-0.20	5.6-7.3	<2	Moderate	High-----	Low------	0.43	3
	7-59	<0.06	0.12-0.18	5.6-8.4	<2	High------	High-----	Low------	0.37	
	59-65	<0.06	0.12-0.18	6.1-8.4	<2	High------	High-----	Low------	---	
[1]58:										
Normangee part--	0-7	0.06-0.2	0.15-0.20	5.6-7.3	<2	Moderate	High-----	Low------	0.43	3
	7-59	<0.06	0.12-0.18	5.6-8.4	<2	High------	High-----	Low------	0.37	
	59-65	<0.06	0.12-0.18	6.1-8.4	<2	High------	High-----	Low------	---	
Crockett part---	0-5	0.6-2.0	0.11-0.20	5.6-7.3	<2	Low-------	Moderate	Low------	0.43	5
	5-50	<0.06	0.14-0.18	5.6-7.8	<2	High------	High-----	Low------	0.32	
	50-60	0.06-0.2	0.15-0.20	7.4-8.4	<2	Moderate	High-----	Low------	0.32	
Pulexas:										
[1]59----------	0-6	2.0-6.0	0.11-0.15	5.6-8.4	<2	Low-------	Low------	Low------	0.28	5
	6-40	2.0-6.0	0.11-0.15	5.6-8.4	<2	Low-------	Low------	Low------	0.28	
	40-66	2.0-6.0	0.08-0.15	6.1-8.4	<2	Low-------	Low------	Low------	0.28	
Purves:										
60, 61----------	0-12	0.2-0.6	0.12-0.18	7.9-8.4	<2	High------	High-----	Low------	0.32	1
	12-15	---	---	---	---	----------	---------	---------	---	
San Saba:										
[1]62:										
San Saba part---	0-33	<0.06	0.15-0.20	7.4-8.4	<2	Very high-	High-----	Low------	0.32	2
	33-35	---	---	---	---	----------	---------	---------	---	
Slidell part----	0-25	<0.06	0.15-0.20	7.4-8.4	<2	High------	High-----	Low------	0.32	4
	25-68	<0.06	0.15-0.20	7.4-8.4	<2	High------	High-----	Low------	0.32	
Sanger:										
63, 64, 65-------	0-40	<0.06	0.12-0.18	7.4-8.4	<2	High------	High-----	Low------	0.32	5
	40-65	<0.06	0.12-0.18	7.9-8.4	<2	High------	High-----	Low------	0.32	
66----------	0-38	<0.06	0.10-0.18	7.4-8.4	<2	High------	High-----	Low------	0.28	5
	38-60	<0.06	0.12-0.18	7.9-8.4	<2	High------	High-----	Low------	0.32	
Silstid:										
67, 68----------	0-22	6.0-20	0.05-0.10	5.6-6.5	<2	Low-------	Low------	Moderate	0.17	5
	22-43	0.6-2.0	0.12-0.17	5.6-6.5	<2	Low-------	Moderate	Moderate	0.24	
	43-65	0.6-2.0	0.10-0.16	5.6-6.5	<2	Low-------	Moderate	Moderate	0.24	

See footnote at end of table.

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

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors	
							Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH	Mmhos/cm					
Slidell:										
69, 70	0-25	<0.06	0.15-0.20	7.4-8.4	<2	High	High	Low	0.32	4
	25-68	<0.06	0.15-0.20	7.4-8.4	<2	High	High	Low	0.32	
[1]71:										
Slidell part	0-25	<0.06	0.15-0.20	7.4-8.4	<2	High	High	Low	0.32	4
	25-68	<0.06	0.15-0.20	7.4-8.4	<2	High	High	Low	0.32	
San Saba part	0-33	<0.06	0.15-0.20	7.4-8.4	<2	Very high	High	Low	0.32	2
	33-35	---	---	---	---	---	---	---	---	
Teller:										
72	0-22	2.0-6.0	0.12-0.16	5.6-6.5	<2	Low	Low	Moderate	0.28	5
	22-68	0.6-2.0	0.14-0.18	5.6-6.5	<2	Low	Low	Moderate	---	
	68-80	2.0-6.0	0.13-0.17	5.6-7.3	<2	Low	Low	Moderate	---	
Tinn:										
73, [1]74	0-9	0.06-0.2	0.15-0.20	7.4-8.4	<2	High	High	Low	0.32	5
	9-60	<0.06	0.15-0.20	7.4-8.4	<2	High	High	Low	0.32	
Venus:										
75, 76	0-12	0.6-2.0	0.15-0.20	7.9-8.4	<2	Low	High	Low	0.28	5
	12-46	0.6-2.0	0.15-0.20	7.9-8.4	<2	Low	High	Low	0.28	
	46-70	0.6-2.0	0.13-0.18	7.9-8.4	<2	Low	High	Low	0.28	
Wilson:										
77, 78, 79	0-7	0.2-0.6	0.15-0.20	5.6-7.8	<2	Low	High	Low	0.43	5
	7-62	<0.06	0.14-0.20	5.6-7.8	<2	High	High	Low	0.37	
	62-70	<0.06	0.12-0.15	6.6-8.4	<2	High	High	Low	0.37	
Windthorst:										
80, 81	0-12	2.0-6.0	0.07-0.11	5.6-7.3	<2	Very low	Low	Low	0.24	5
	12-40	0.2-0.6	0.15-0.20	5.6-7.3	<2	Moderate	High	Low	0.37	
	40-50	0.2-0.6	0.12-0.20	5.6-8.4	<2	Moderate	Moderate	Low	0.37	
82, 83	0-10	0.6-2.0	0.12-0.17	5.6-7.3	<2	Low	Low	Low	0.49	5
	10-40	0.2-0.6	0.15-0.20	5.6-7.3	<2	Moderate	High	Low	0.37	
	40-48	0.2-0.6	0.12-0.20	5.6-8.4	<2	Moderate	Moderate	Low	0.37	
Yahola:										
84	0-15	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low	Low	Low	---	---
	15-65	2.0-6.0	0.12-0.16	7.9-8.4	<2	Low	Low	Low	---	

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

TABLE 17.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. The symbol > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
Arenosa:									
1	A	None	---	---	>6.0	---	---	>60	---
Aubrey:									
2, 3	C	None	---	---	>6.0	---	---	40-60	Rippable
Bastrop:									
4, 5	B	None	---	---	>6.0	---	---	>60	---
Birome:									
[1]6:									
Birome part	C	None	---	---	>6.0	---	---	20-40	Rippable
Aubrey part	C	None	---	---	>6.0	---	---	40-60	Rippable
Rayex part	D	None	---	---	>6.0	---	---	10-20	Rippable
Bolar:									
7, 8, 9	C	None	---	---	>6.0	---	---	20-40	Rippable
[1]10:									
Bolar part	C	None	---	---	>6.0	---	---	20-40	Rippable
Maloterre part	D	None	---	---	>6.0	---	---	3-10	Hard
Aledo part	C	None	---	---	>6.0	---	---	8-20	Hard
Callisburg:									
11, 12, 13	C	None	---	---	>6.0	---	---	>60	---
Crockett:									
14, 15, 16	D	None	---	---	>6.0	---	---	>60	---
Crosstell:									
17	D	None	---	---	>6.0	---	---	>60	---
Duffau:									
18, 19, 20	B	None	---	---	>6.0	---	---	>60	---
[1]21:									
Duffau part	B	None	---	---	>6.0	---	---	>60	---
Windthorst part	C	None	---	---	>6.0	---	---	>60	---
Frio:									
22, [1]23	B	Common	Brief	Oct-May	>6.0	---	---	>60	---
Gaddy:									
24, [1]25	A	Common	Very brief	Oct-May	>6.0	---	---	>60	---
Gasil:									
26, 27, 28, 29, 30	B	None	---	---	>6.0	---	---	>60	---
Gladewater:									
31	D	Frequent	Long	Nov-May	0-3.5	Apparent	Nov-May	>60	---
Gowen:									
32, 33	B	Rare	Brief	Oct-May	>6.0	---	---	>60	---
[1]34	B	Frequent	Brief	---	>6.0	---	---	>60	---
Heaton:									
35	A	None	---	---	>6.0	---	---	>60	---

See footnote at end of table.

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

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
Hensley: 36	D	None	---	---	>6.0	---	---	10-20	Hard
Konsil: 37, 38, 39, 40	B	None	---	---	>6.0	---	---	>60	---
Lewisville: 41, 42	B	None	---	---	>6.0	---	---	>60	---
Lindy: 43	C	None	---	---	>6.0	---	---	20-40	Hard
Mabank: 44, 45, 46	D	None	---	---	0.6-1.0	Perched	Dec-Mar	>60	---
Maloterre: [1]47:									
Maloterre part	D	None	---	---	>6.0	---	---	3-10	Hard
Aledo part	C	None	---	---	>6.0	---	---	8-20	Hard
[1]48:									
Maloterre part	D	None	---	---	>6.0	---	---	3-10	Hard
Venus part	B	None	---	---	>6.0	---	---	>60	---
Medlin: 49, 50, 51	D	None	---	---	>6.0	---	---	>60	---
Miller: [1]52, [1]53	D	Common	Brief	Oct-May	>6.0	---	---	>60	---
Minco: 54, 55	B	None	---	---	>6.0	---	---	>60	---
Normangee: 56, 57	D	None	---	---	>6.0	---	---	>60	---
[1]58:									
Normangee part	D	None	---	---	>6.0	---	---	>60	---
Crockett part	D	None	---	---	>6.0	---	---	>60	---
Pulexas: [1]59	B	Frequent	Brief	Oct-May	>6.0	---	---	>60	---
Purves: 60, 61	D	None	---	---	>6.0	---	---	10-20	Hard
San Saba: [1]62:									
San Saba part	D	None	---	---	>6.0	---	---	24-40	Hard
Slidell part	D	None	---	---	>6.0	---	---	>60	---
Sanger: 63, 64, 65, 66	D	None	---	---	>6.0	---	---	>60	---
Silstid: 67, 68	A	None	---	---	>6.0	---	---	>60	---
Slidell: 69, 70	D	None	---	---	>6.0	---	---	>60	---
[1]71:									
Slidell part	D	None	---	---	>6.0	---	---	>60	---
San Saba part	D	None	---	---	>6.0	---	---	24-40	Hard

See footnote at end of table.

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

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
Teller:									
72	B	None	---	---	>6.0	---	---	>60	---
Tinn:									
73	D	Rare	Brief	Oct-May	0-3.0	Apparent	Nov-Feb	>60	---
[1]74	D	Frequent	Brief	Oct-May	0-3.0	Apparent	Nov-Feb	>60	---
Venus:									
75, 76	B	None	---	---	>6.0	---	---	>60	---
Wilson:									
77, 78, 79	D	None	---	---	0-1.0	Perched	Nov-Mar	>60	---
Windthorst:									
80, 81, 82, 83	C	None	---	---	>6.0	---	---	>60	---
Yahola:									
84	B	Common	Very brief	Oct-May	>6.0	---	---	>60	---

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

TABLE 18.--ENGINEERING TEST DATA

[Dashes indicate data were not available]

Soil name, report number, horizon, and depth in inches	Classification		Grain size distribution[1]									Liquid limit[2]	Plasticity index[2]	Moist density	Shrinkage		
			Percentage passing sieve--						Percentage smaller than--						Limit	Linear	Ratio
	AASHTO	Unified	5/8 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm						
												Pct		G/cc	Pct	Pct	Pct
Callisburg fsl:[3] (S71TX-049-005)																	
Ap--------0 to 6	A-4 (00)	SM-SC	100	100	100	99	96	42	--	13	11	22	4	2.62	17.0	3.0	1.7
B22t-------19 to 31	A-7-6(13)	CL	100	98	96	92	86	62	--	40	36	43	25	2.67	14.0	13.6	1.9
B3--------44 to 65	A-6 (09)	CL	100	100	100	100	99	63	--	32	27	32	19	2.67	15.0	8.9	1.8
Gasil fsl:[4] (S71TX-049-001)																	
Ap--------0 to 8	A-4 (00)	SM	100	100	100	100	99	50	--	8	5	21	3	2.64	19.0	1.2	1.6
B21t-------17 to 30	A-4 (02)	SC	100	99	98	96	93	50	--	21	19	26	10	2.65	17.0	4.9	1.8
B23t-------53 to 75	A-6 (06)	CL	100	100	100	99	93	54	--	27	24	30	17	2.67	15.0	7.9	1.8
San Saba c:[5] (S71TX-049-003)																	
A1--------0 to 15	A-7-5(36)	MH	100	100	100	100	100	97	--	43	34	63	30	2.61	18.0	18.0	1.8
AC1-------15 to 25	A-7-6(39)	CH	100	100	100	100	99	95	--	52	41	63	35	2.66	15.0	19.6	1.9
AC2-------25 to 30	A-7-6(38)	CH	100	99	98	97	94	91	--	55	45	64	36	2.70	14.0	20.2	1.9
Silstid lfs:[6] (S71TX-049-002)																	
A1--------0 to 10	A-2-4(00)	SP-SM	100	100	100	100	100	10	--	2	1	21	1	2.64	19.0	0.0	1.7
B21t-------22 to 30	A-6 (01)	SC	100	100	100	100	99	38	--	29	26	30	14	2.63	18.0	6.0	1.7
B3--------50 to 65	A-2-4(00)	SM-SC	100	100	100	100	99	22	--	15	14	22	4	2.64	21.0	2.3	1.6

See footnotes at end of table.

TABLE 18.--ENGINEERING TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classification		Grain size distribution[1]									Liquid limit[2]	Plasticity index[2]	Moist density	Shrinkage		
			Percentage passing sieve--						Percentage smaller than--								
	AASHTO	Unified	5/8 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm				Limit	Linear	Ratio
												Pct		G/cc	Pct	Pct	Pct
Wilson cl:[7] (S71TX-049-004)																	
Ap--------0 to 7	A-6 (17)	CL	100	100	100	100	99	96	--	33	25	36	18	2.61	18.0	8.9	1.7
B21tg-----7 to 20	A-6 (21)	CL	100	100	100	100	99	96	--	38	30	40	21	2.64	16.0	11.2	1.8
B23tg----36 to 62	A-7-6(31)	CH	100	100	96	91	87	85	--	49	41	57	34	2.67	14.0	18.5	1.9

[1]For soil materials larger than 3/8 inch, square mesh wire sieves were used that are slightly larger than equivalent round sieves, but these differences do not seriously affect the data.

[2]Liquid limit and plastic index values were determined by the AASHTO-89 and AASHTO-90 methods except that soil was added to water.

[3]Callisburg fine sandy loam:
From the intersection of Farm Road 922 and Farm Road 372 in Mountain Springs, 0.3 mile north on Farm Road 372, 3.1 miles east, 0.1 mile north on county road, and 30 feet west in idle cropland.

[4]Gasil fine sandy loam:
From the intersection of Farm Road 372 and U.S. Highway 82 in Gainesville, 9.5 miles east on U.S. Highway 82, 2.7 miles south on county road, and 50 feet east in pasture.

[5]San Saba clay:
From the intersection of Interstate Highway 35 and Texas Highway 51 in Gainesville, 7.0 miles southwest on Texas Highway 51, 0.1 mile east on county road, and 30 feet north in pasture.

[6]Silstid loamy fine sand:
From the intersection of Farm Road 372 and Farm Road 922 in Mountain Springs, 0.4 mile west on Farm Road 922, 0.5 mile north, 0.25 mile west, 0.1 mile north on county road, and 70 feet east in pasture.

[7]Wilson clay loam:
From the intersection of Farm Road 922 and Interstate Highway 35 in Valley View, 0.9 mile north on Interstate Highway 35 service road, 1.7 miles east on county road, and 40 feet south in cultivated field.

TABLE 19.--CLASSIFICATION OF THE SOILS

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

Soil name	Family or higher taxonomic class
Aledo	Loamy-skeletal, carbonatic, thermic Lithic Haplustolls
Arenosa	Thermic, coated Typic Quartzipsamments
*Aubrey	Fine, mixed, thermic Ultic Paleustalfs
Bastrop	Fine-loamy, mixed, thermic Udic Paleustalfs
Birome	Fine, mixed, thermic Ultic Paleustalfs
Bolar	Fine-loamy, carbonatic, thermic Typic Calciustolls
Callisburg	Fine, mixed, thermic Udic Paleustalfs
Crockett	Fine, montmorillonitic, thermic Udertic Paleustalfs
Crosstell	Fine, montmorillonitic, thermic Udertic Paleustalfs
Duffau	Fine-loamy, siliceous, thermic Udic Paleustalfs
Frio	Fine, mixed, thermic Cumulic Haplustolls
Gaddy	Sandy, mixed, thermic Typic Ustifluvents
Gasil	Fine-loamy, siliceous, thermic Ultic Paleustalfs
Gladewater	Fine, montmorillonitic, nonacid, thermic Vertic Haplaquepts
Gowen	Fine-loamy, mixed, thermic Cumulic Haplustolls
Heaton	Loamy, siliceous, thermic Arenic Paleustalfs
Hensley	Clayey, mixed, thermic Lithic Rhodustalfs
Konsil	Fine-loamy, siliceous, thermic Ultic Paleustalfs
Lewisville	Fine-silty, mixed, thermic Typic Calciustolls
Lindy	Fine, mixed, thermic Udic Haplustalfs
Mabank	Fine, montmorillonitic, thermic Vertic Albaqualfs
Maloterre	Loamy, carbonatic, thermic Lithic Ustorthents
Medlin	Fine, montmorillonitic, thermic Udorthentic Chromusterts
Miller	Fine, mixed, thermic Vertic Haplustolls
Minco	Coarse-silty, mixed, thermic Udic Haplustolls
Normangee	Fine, montmorillonitic, thermic Vertic Haplustalfs
Pulexas	Coarse-loamy, mixed, nonacid, thermic Typic Ustifluvents
Purves	Clayey, montmorillonitic, thermic Lithic Calciustolls
Rayex	Clayey, mixed, thermic, shallow Ultic Haplustalfs
San Saba	Fine, montmorillonitic, thermic Udic Pellusterts
Sanger	Fine, montmorillonitic, thermic Udic Chromusterts
Silstid	Loamy, siliceous, thermic Arenic Paleustalfs
Slidell	Fine, montmorillonitic, thermic Udic Pellusterts
Teller	Fine-loamy, mixed, thermic Udic Argiustolls
Tinn	Fine, montmorillonitic (calcareous), thermic Vertic Haplaquolls
Venus	Fine-loamy, mixed, thermic Typic Calciustolls
Wilson	Fine, montmorillonitic, thermic Vertic Ochraqualfs
Windthorst	Fine, mixed, thermic Udic Paleustalfs
Yahola	Coarse-loamy, mixed (calcareous), thermic Typic Ustifluvents

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