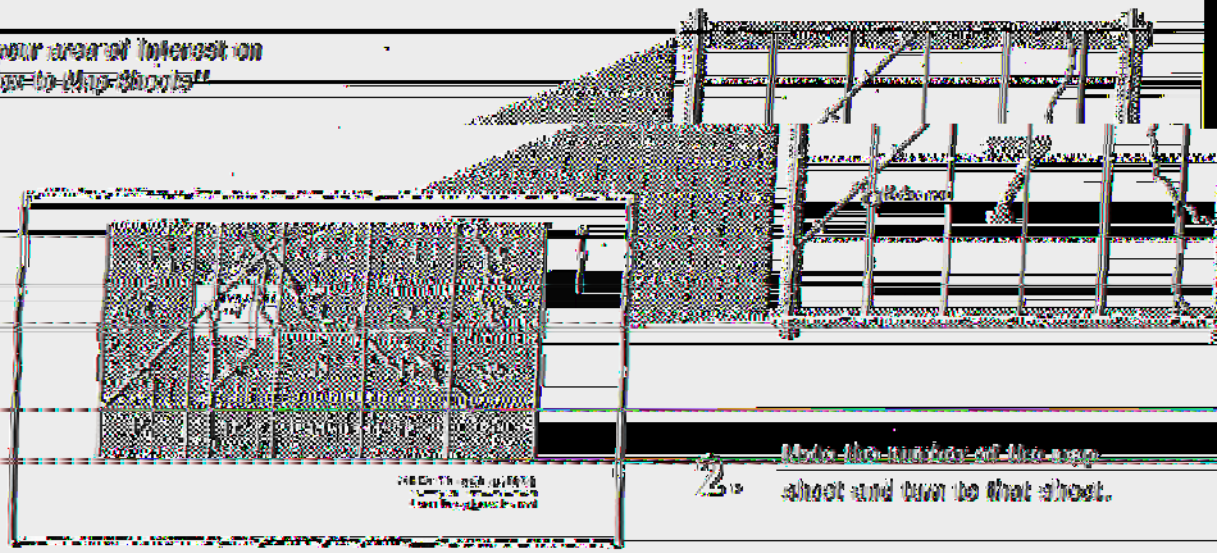
Soil Survey Of

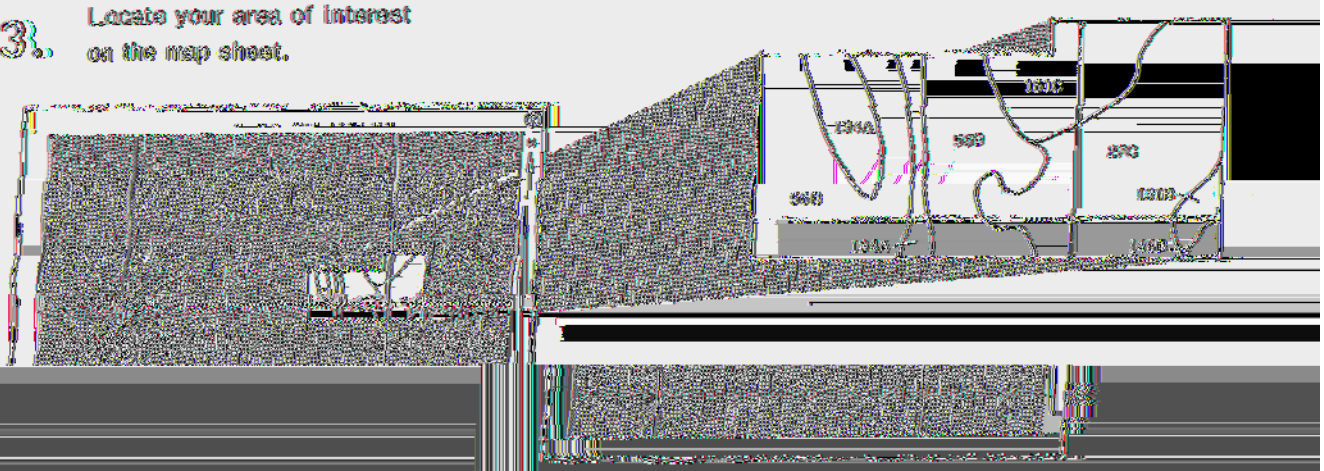
HOW TO USE

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



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

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

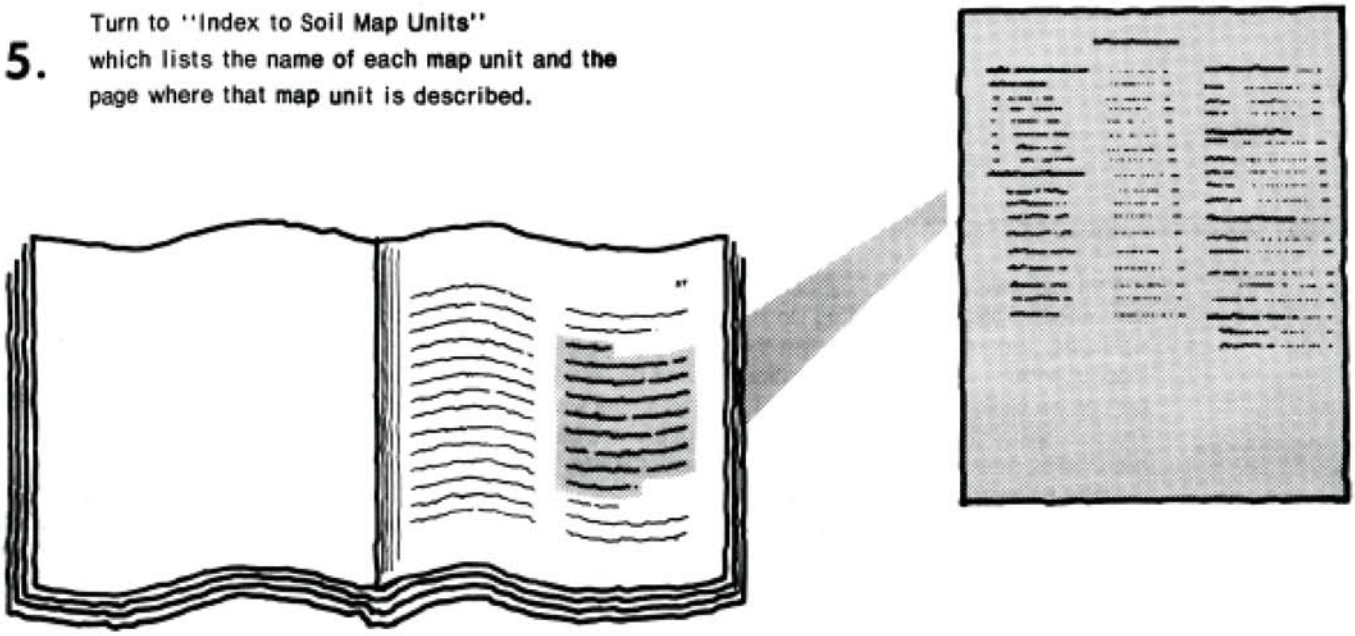


4. List the map unit symbols and acreage of your area.

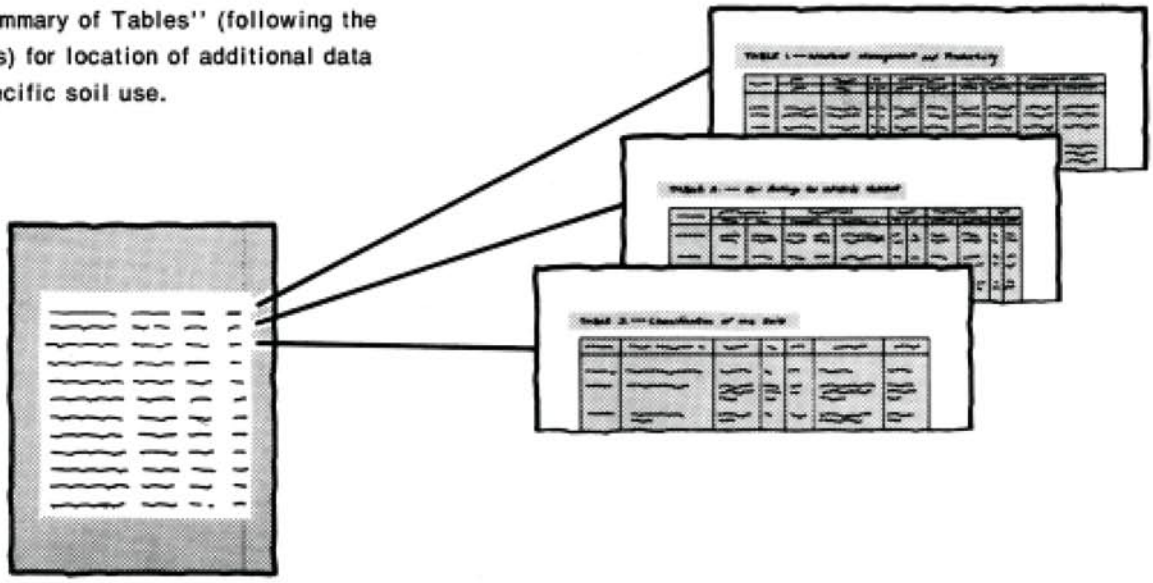
Symbols	
27C	
56B	
134B	
134A	
149B	
151C	

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

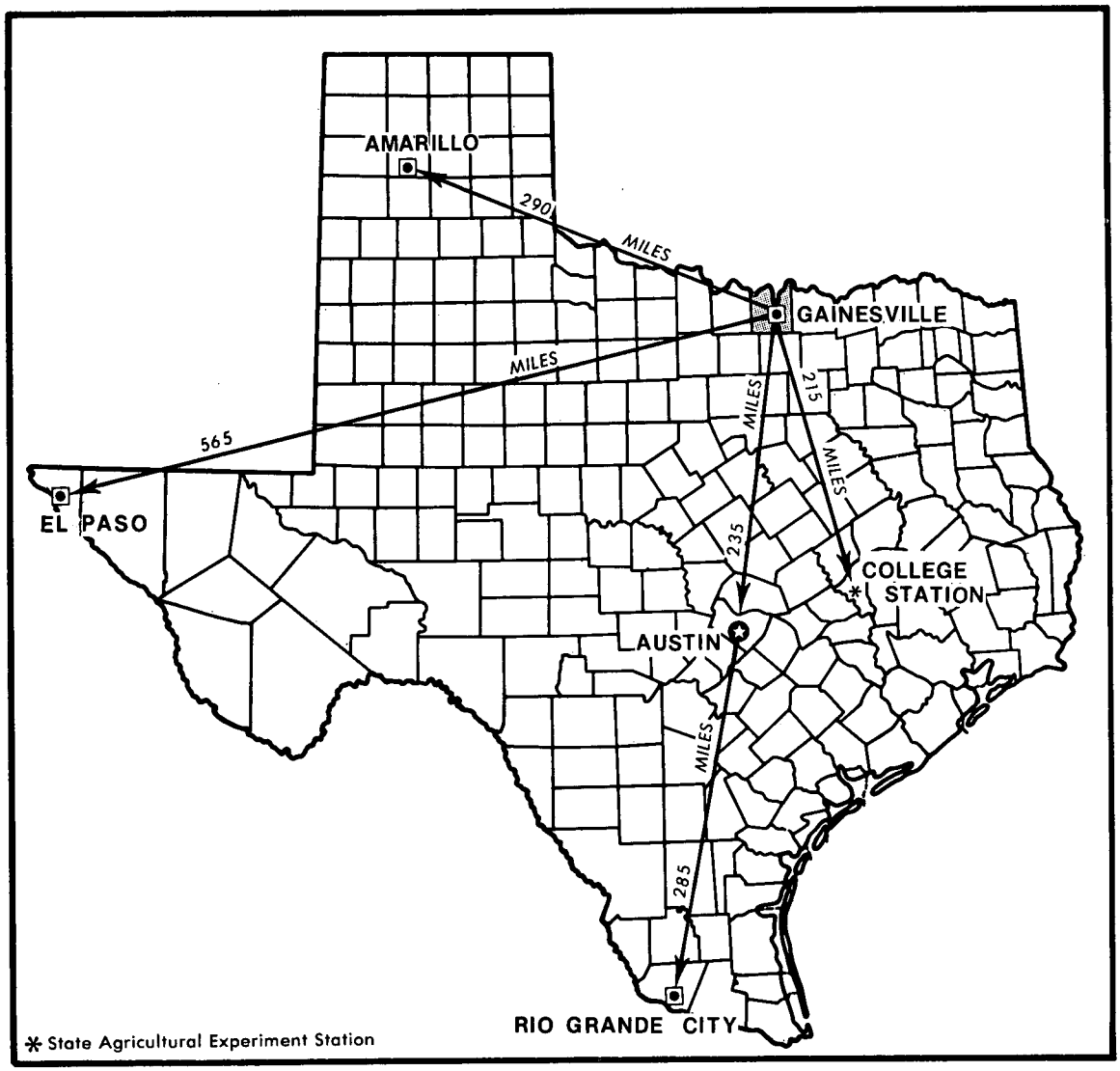
The Soil Survey of Cooke County, Texas, contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome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



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

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 assem-

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, [illegible] 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 corro-

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.

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.

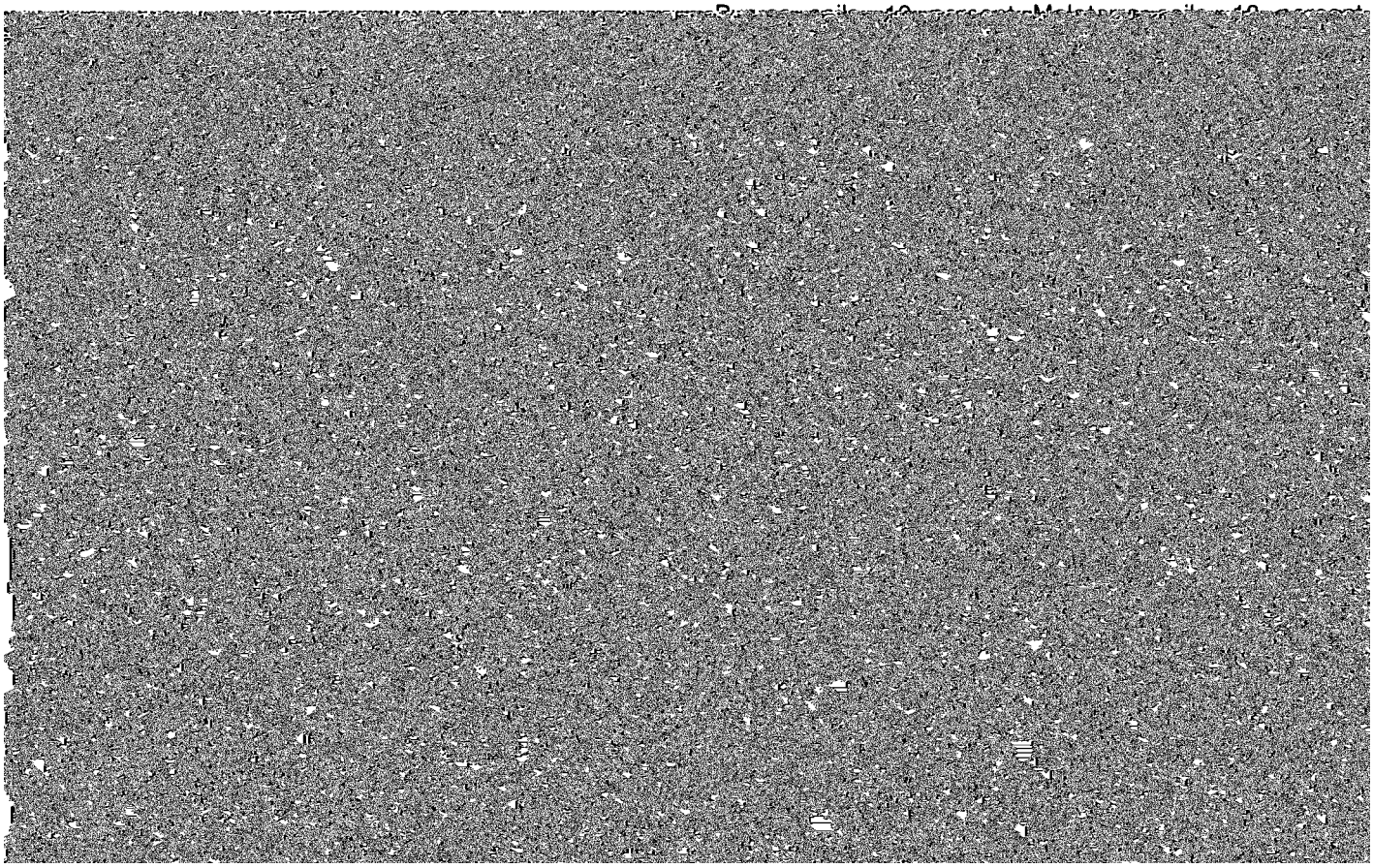
The potential is only medium for improved bermudagrass because of the excess lime. Maloterre soils are not suited to improved pasture because they are very shallow and sloping.

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



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

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. Aren-

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

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

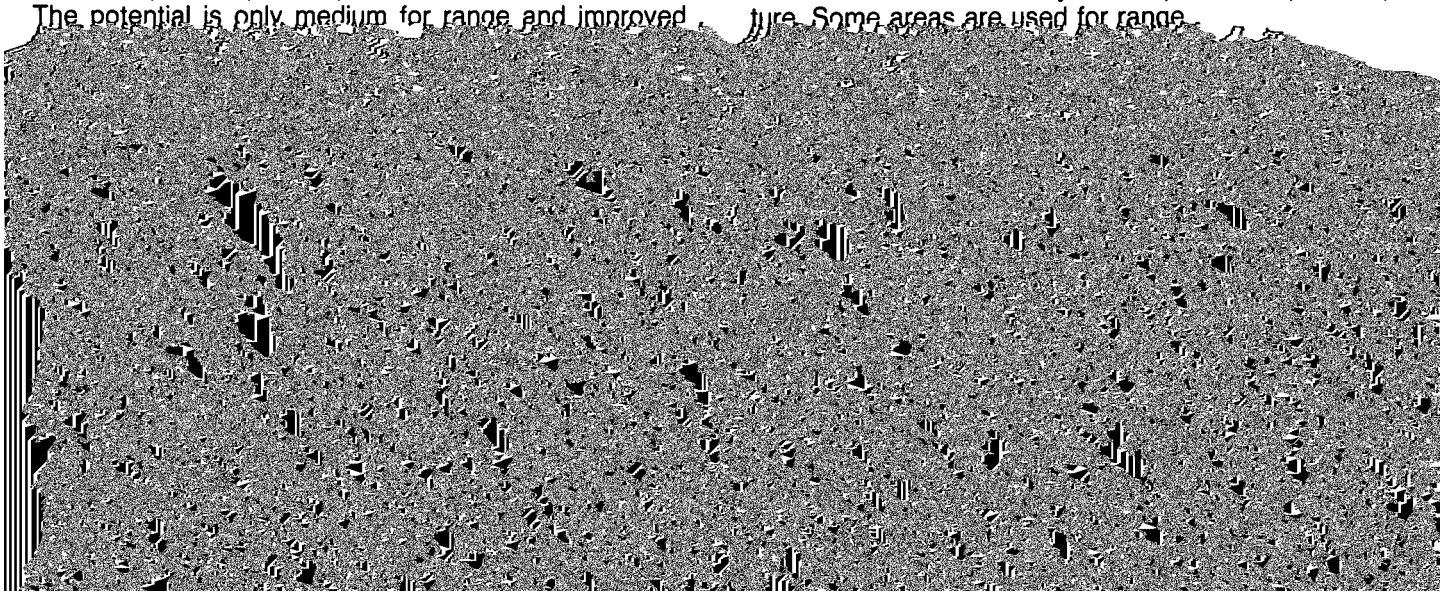
This unit consists of soils on flood plains of major streams in the county where slopes are 0 to 1 percent. It makes up about 6 percent of the county. It is about 75 percent Tinn soils, 10 percent Frio soils, and 15 percent other soils. These soils are flooded once in 3 years to 3 times each year.

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.

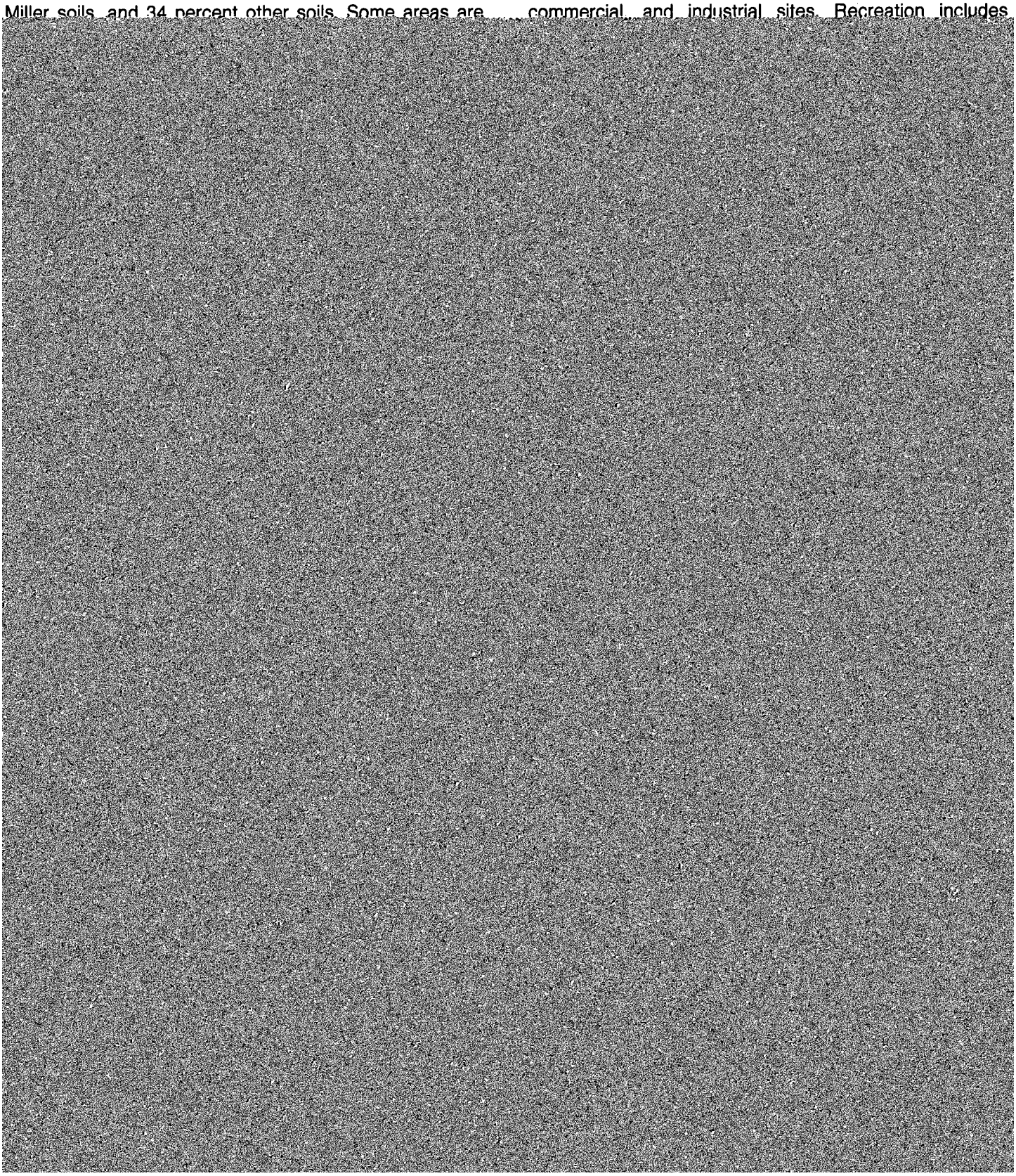
The surface layer of Frio soils is moderately alkaline, very dark grayish brown clay loam about 18 inches thick. Between 18 and 42 inches is moderately alkaline, dark grayish brown clay loam. The underlying material to 60 inches is moderately alkaline, brown clay loam.

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.

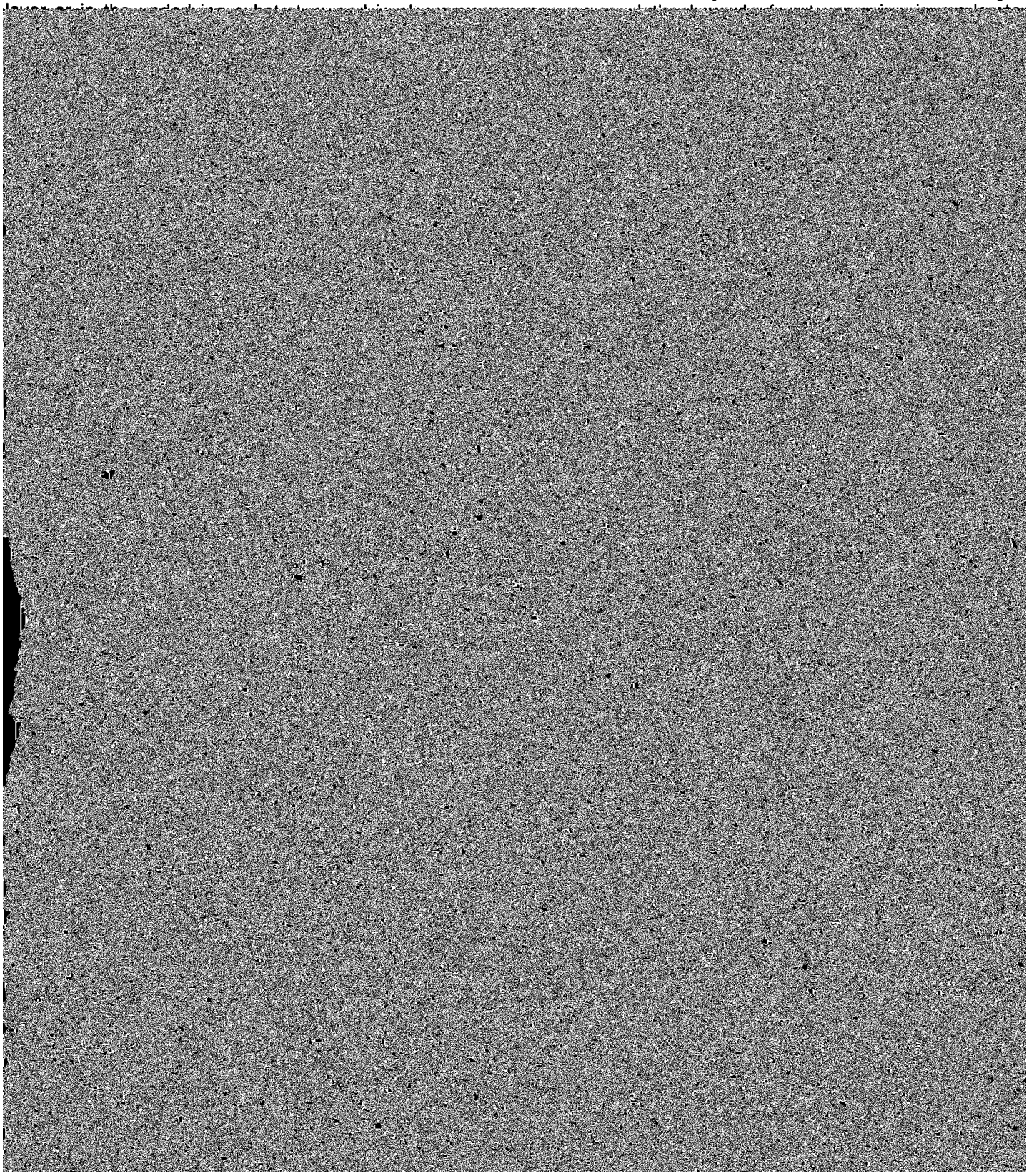


Miller soils and 34 percent other soils. Some areas are commercial, and industrial sites. Recreation includes



Soils of one series can differ in texture of the surface

Surface runoff is very slow. The hazard of soil blowing is



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.

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

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

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.

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.

dish 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.

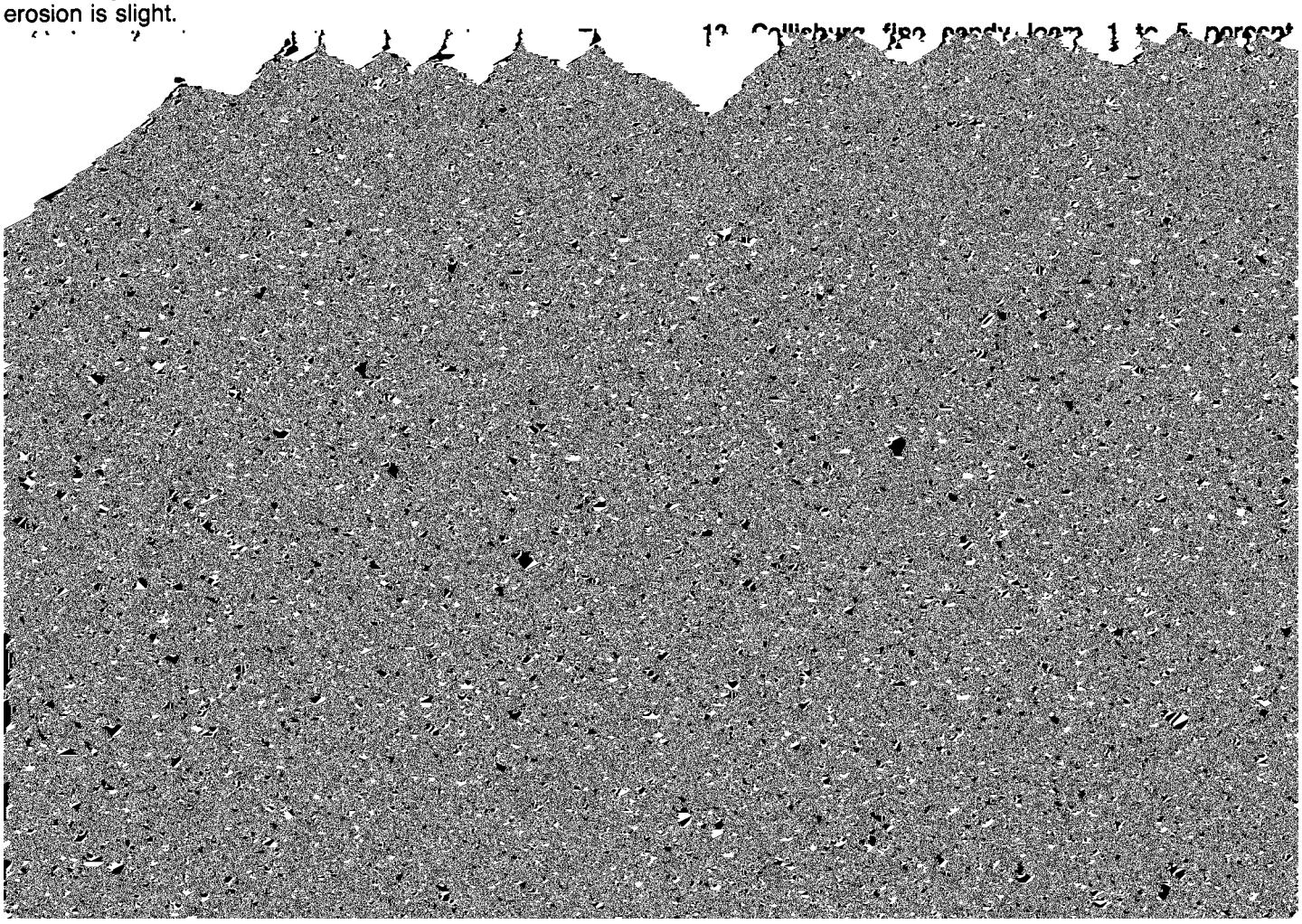
Included in mapping are small areas of Aubrey, Crosstell, Gasil, and Konsil soils. These included soils make up about 20 percent of any one mapped area.

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.



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

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.

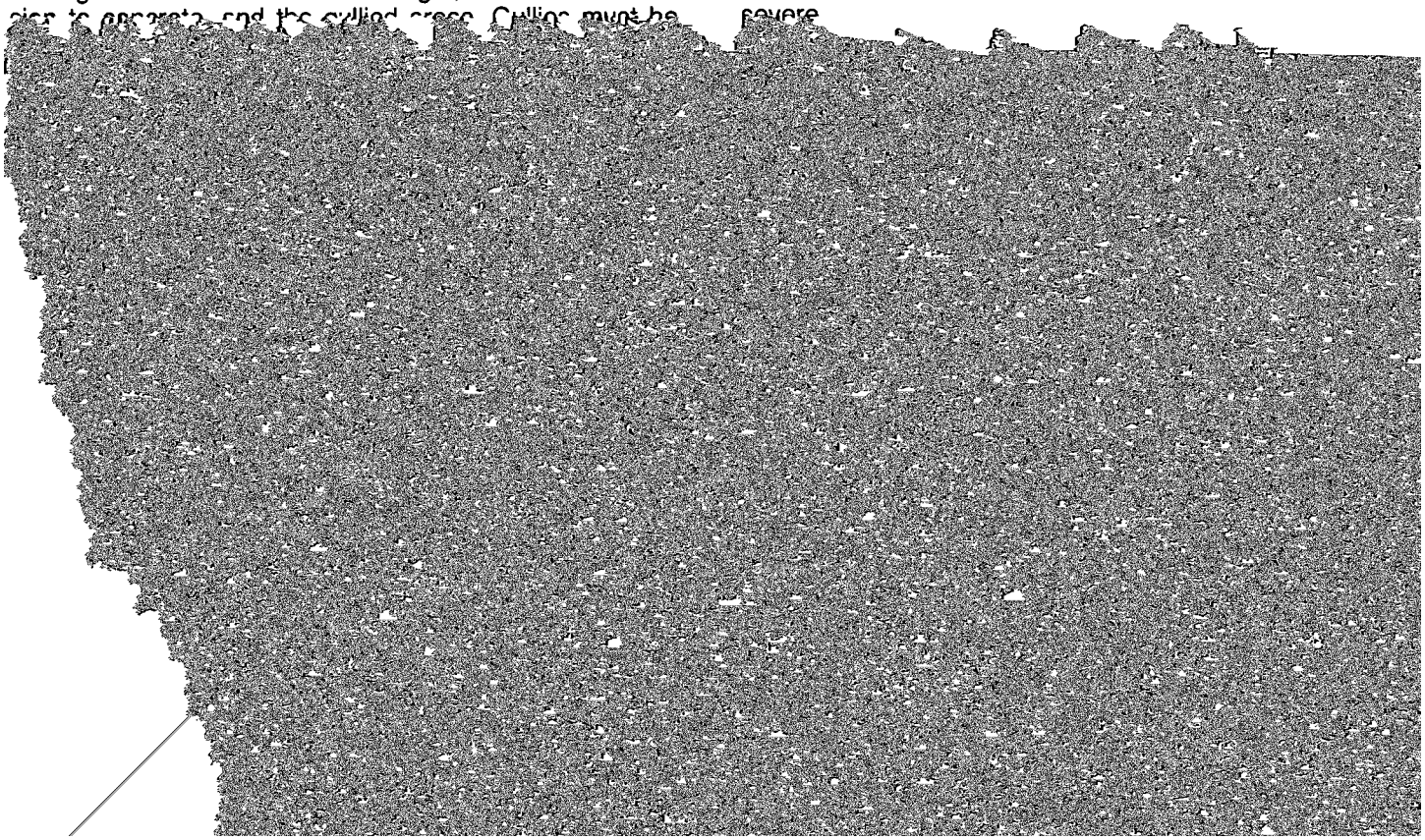
The potential is low for most urban uses. The main limiting features are the low strength, the risk of corrosion to uncoated steel, and the shrinking and swelling with changes in moisture content. The potential is medium for recreational use because of the slow percolation.

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.



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

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.

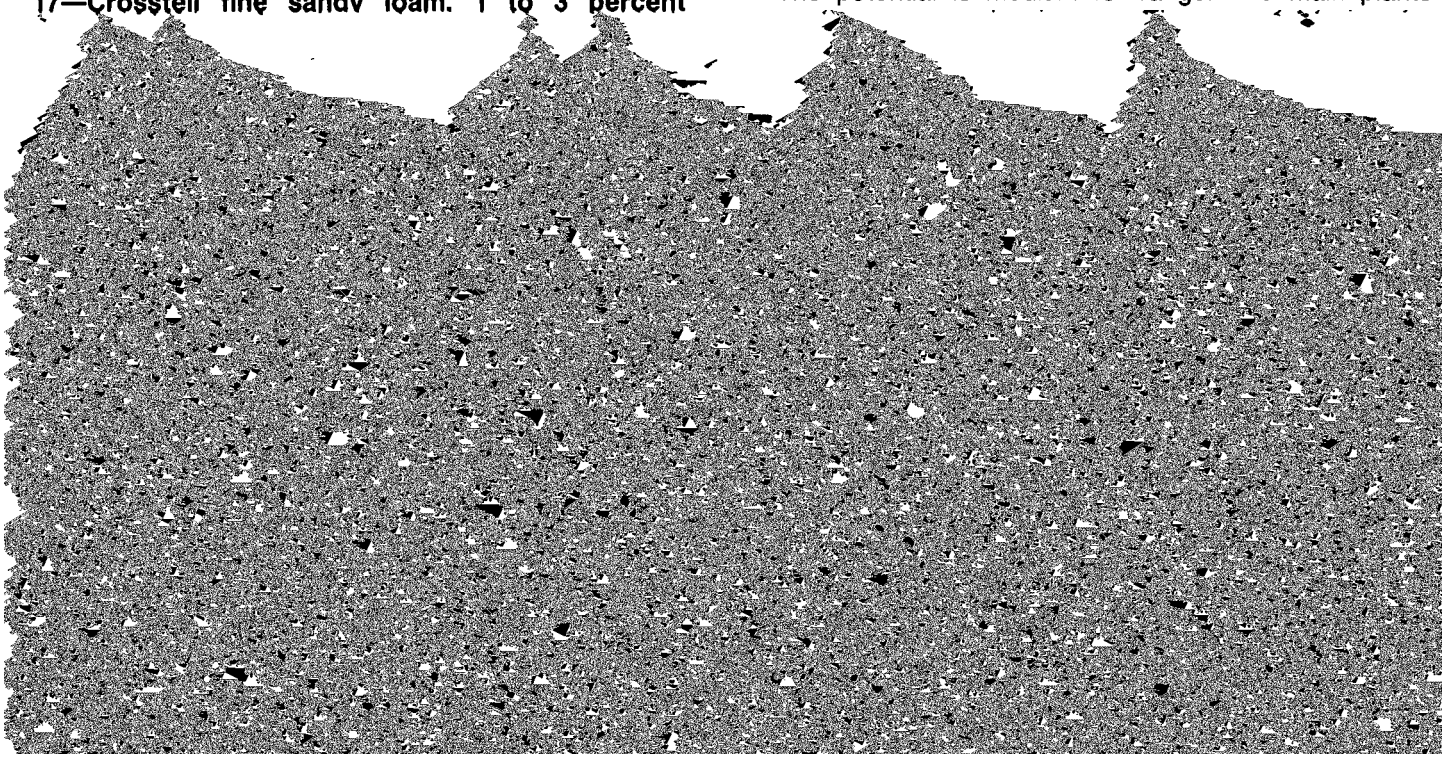
The surface layer is neutral, light brown loamy fine sand about 15 inches thick. Below that is slightly acid, yellowish red sandy clay loam to 70 inches.

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



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

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.

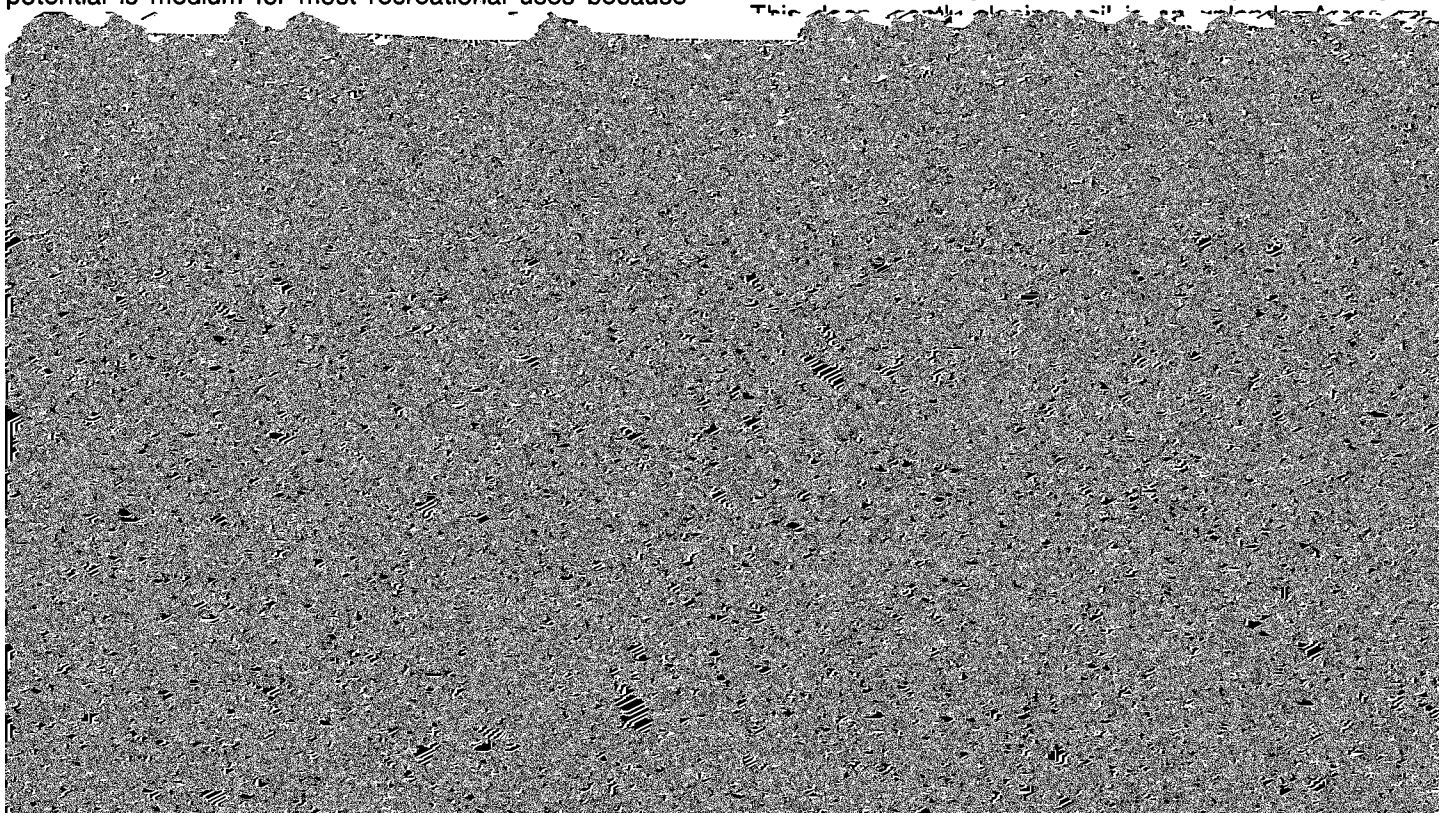
This unit is used for range and crops. The main crops are alfalfa and small grain because they are not damaged by flooding as much as are other crops.

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.



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.

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 neu-

SOIL SURVEY

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

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

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

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, Cros-

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.

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

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 [illegible]

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. [illegible]

The surface layer is neutral, dark grayish brown clay [illegible] of a soil that is similar to this Normangee soil but has a

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. [illegible]

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, Malotarre, and San Saba soils and a soil that is similar to this

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

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, 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

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.

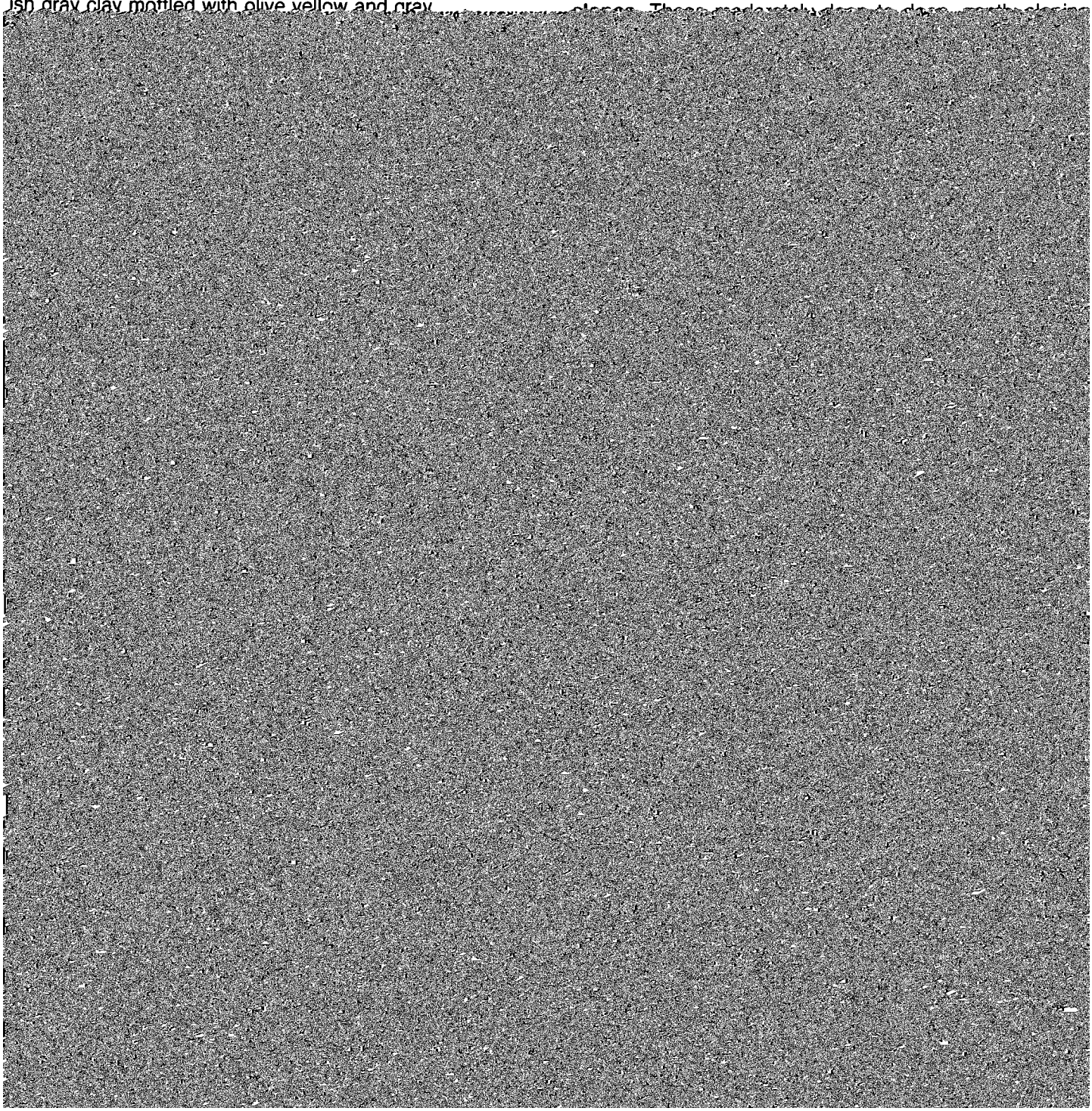
The soil is well drained. The available water capacity is

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.

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



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

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

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.

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

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

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

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.

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

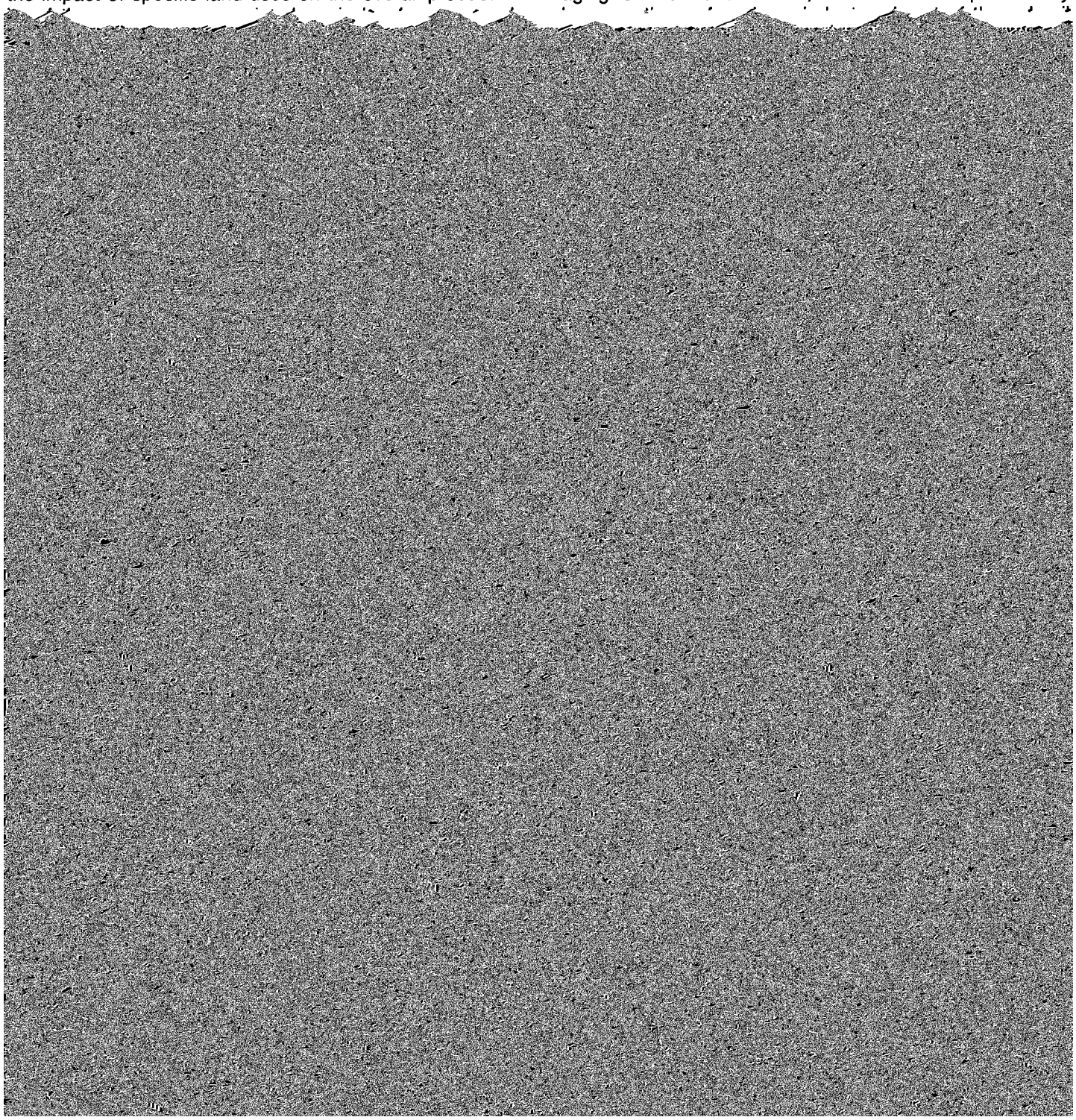
The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and

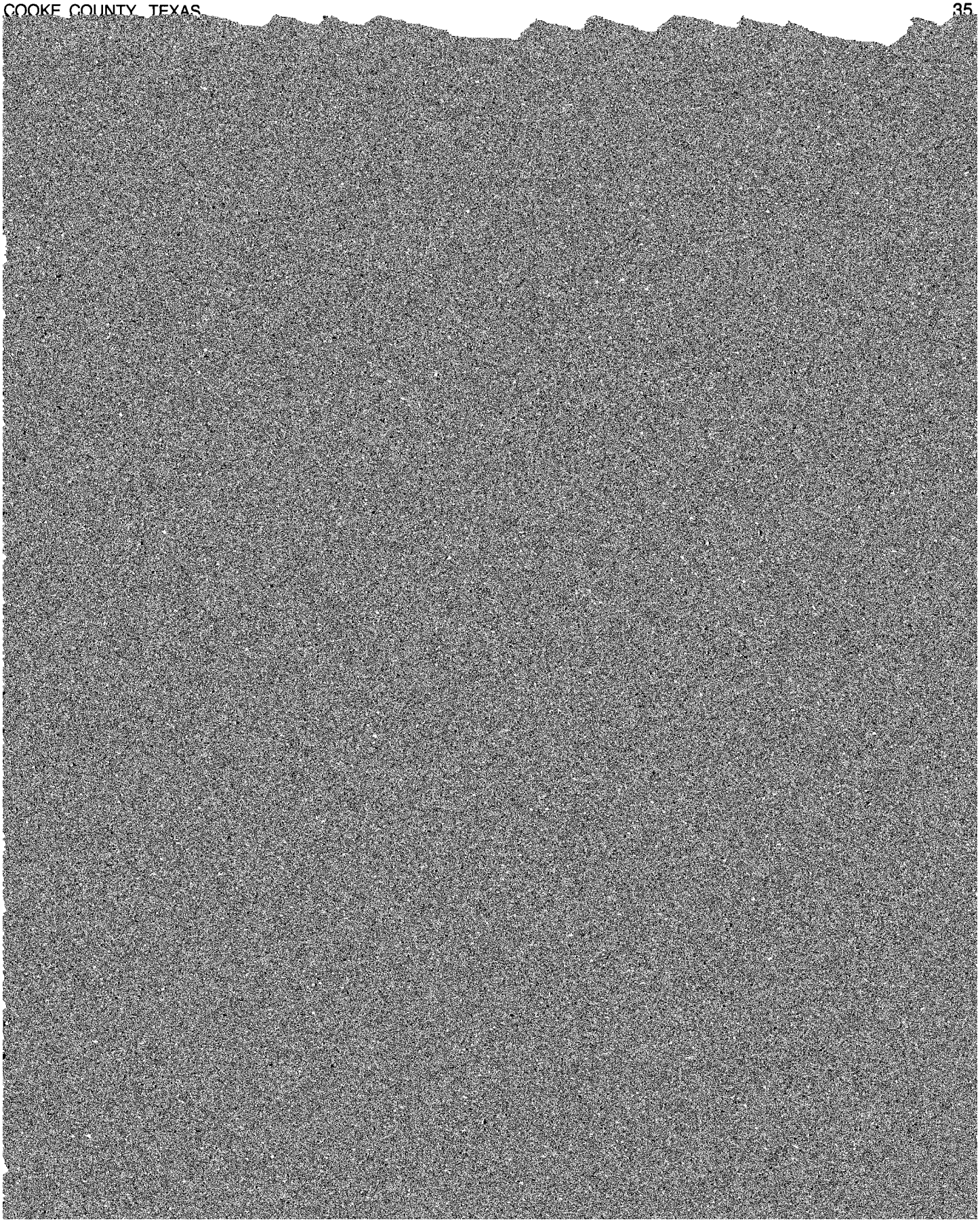
and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productiv-

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





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

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

species in the composition of the potential natural plant natural plant community for that site. Such management

(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 irriga-

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

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 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

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

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,

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

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.

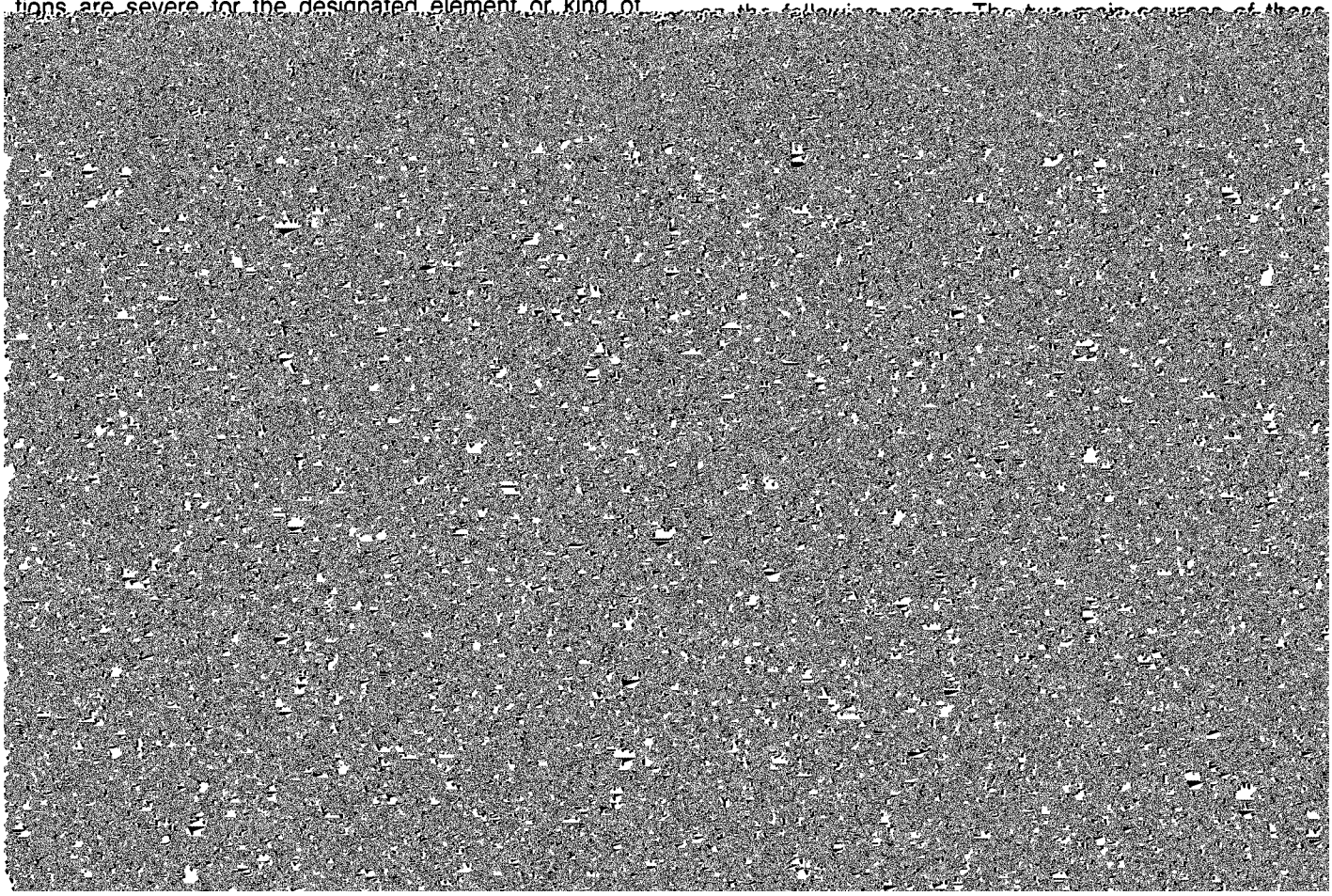
The kinds of wildlife habitat are briefly described in the following paragraphs.

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



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

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

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 sec-

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 horizon, plus *ustoll*, the suborder of Mollisols that

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

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 limes-

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, 7.0 miles east on U.S.

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

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.

Bolar series

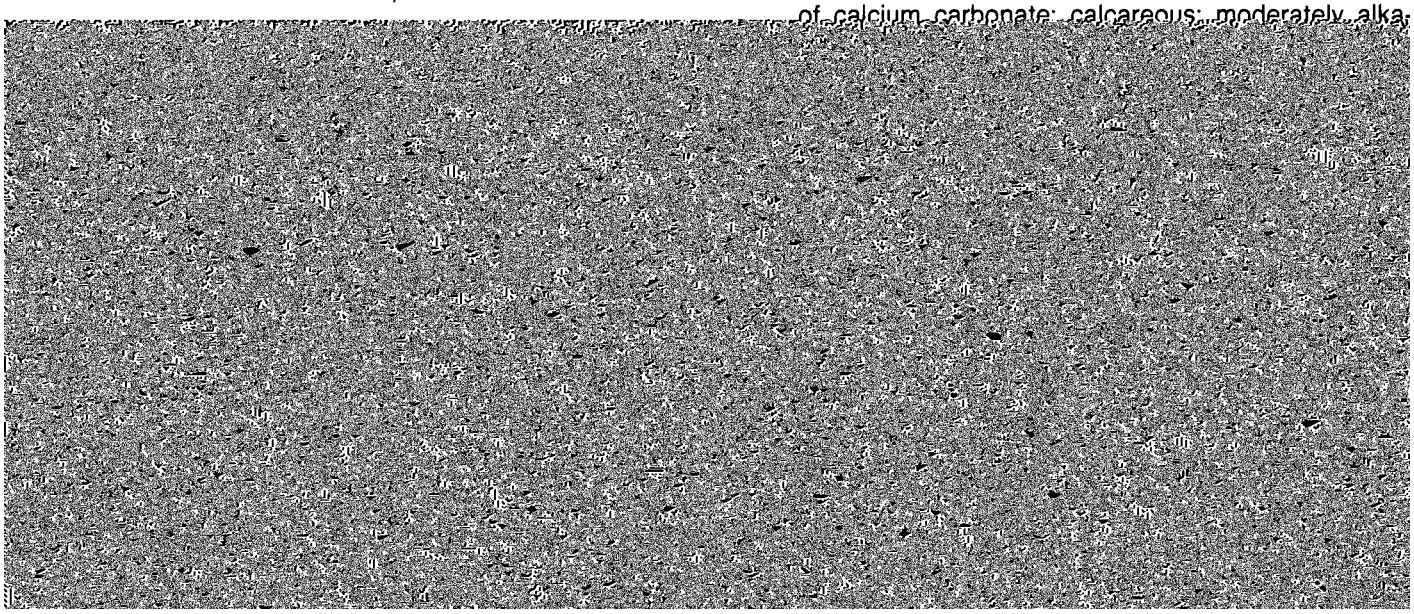
The Bolar series consists of moderately deep, well drained loamy soils on uplands. These soils formed in coarsely fractured limestone. Slope ranges from 1 to 12 percent.

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 51, 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 alka-



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

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

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 37I, 2.1 miles northeast on Farm Road 2896, 0.4 mile east on oil field road to oil well No. 6, 0.1 mile

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.

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:

These soils formed in calcareous, loamy and sandy alluvial sediments. Slope is 0 to 1 percent.

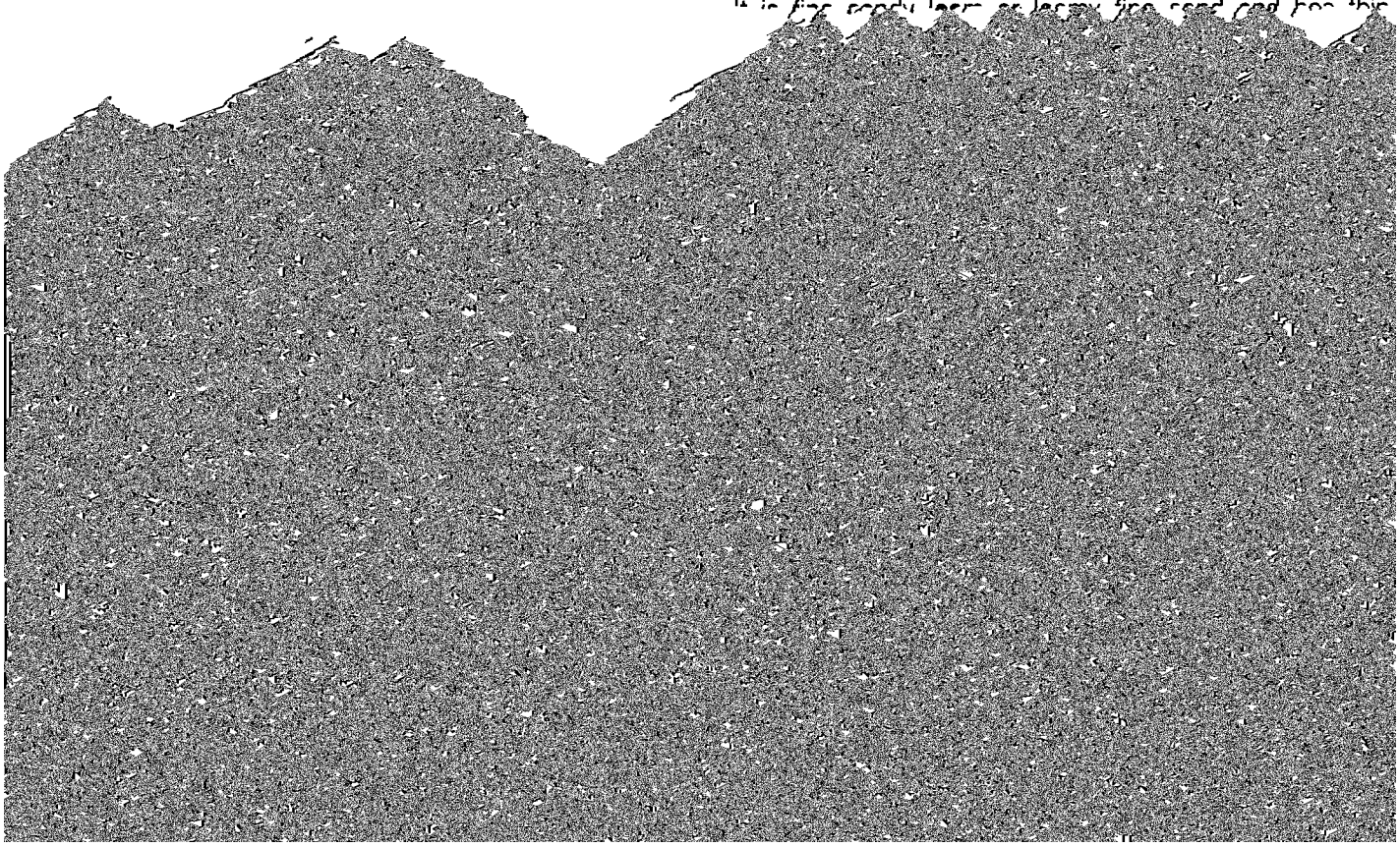
Typical pedon of Gaddy fine sandy loam; from the intersection of Interstate Highway 35 and U.S. Highway 82 in Gainesville, 1.5 miles west on U.S. Highway 82, 15.6 miles north on Farm Road 1201 (Sivells Bend Methodist Church), 1.3 miles west, 0.2 mile south, 0.6 mile west, 3.1 miles north and west on 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



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

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 pas-

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;

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

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 suban-

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.

(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

The solum ranges from 60 to more than 80 inches in thickness.

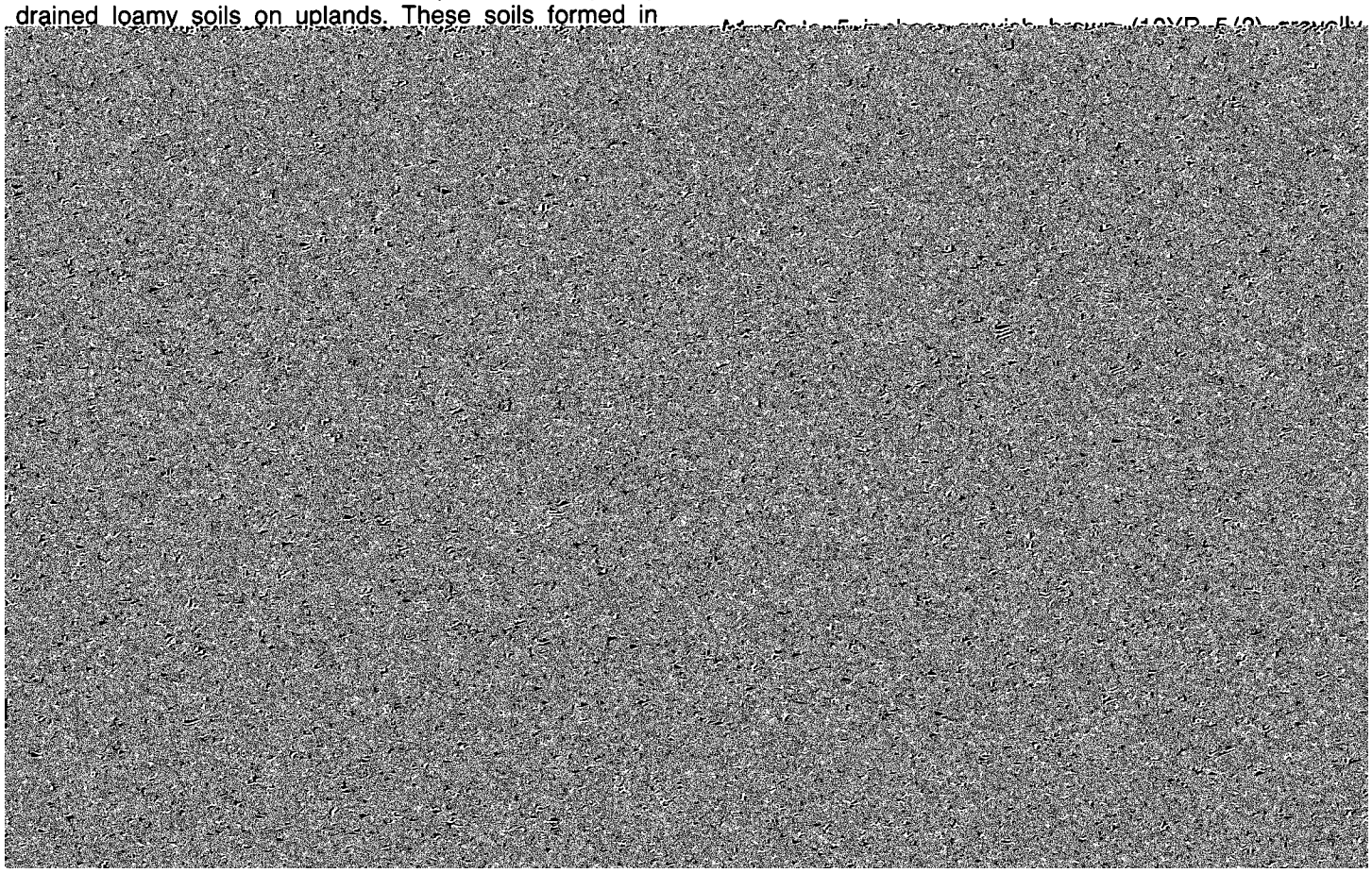
The A1 horizon is light brownish gray, grayish brown, dark grayish brown, gray, dark gray, or very dark gray. It is medium acid through neutral.

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:



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:

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.

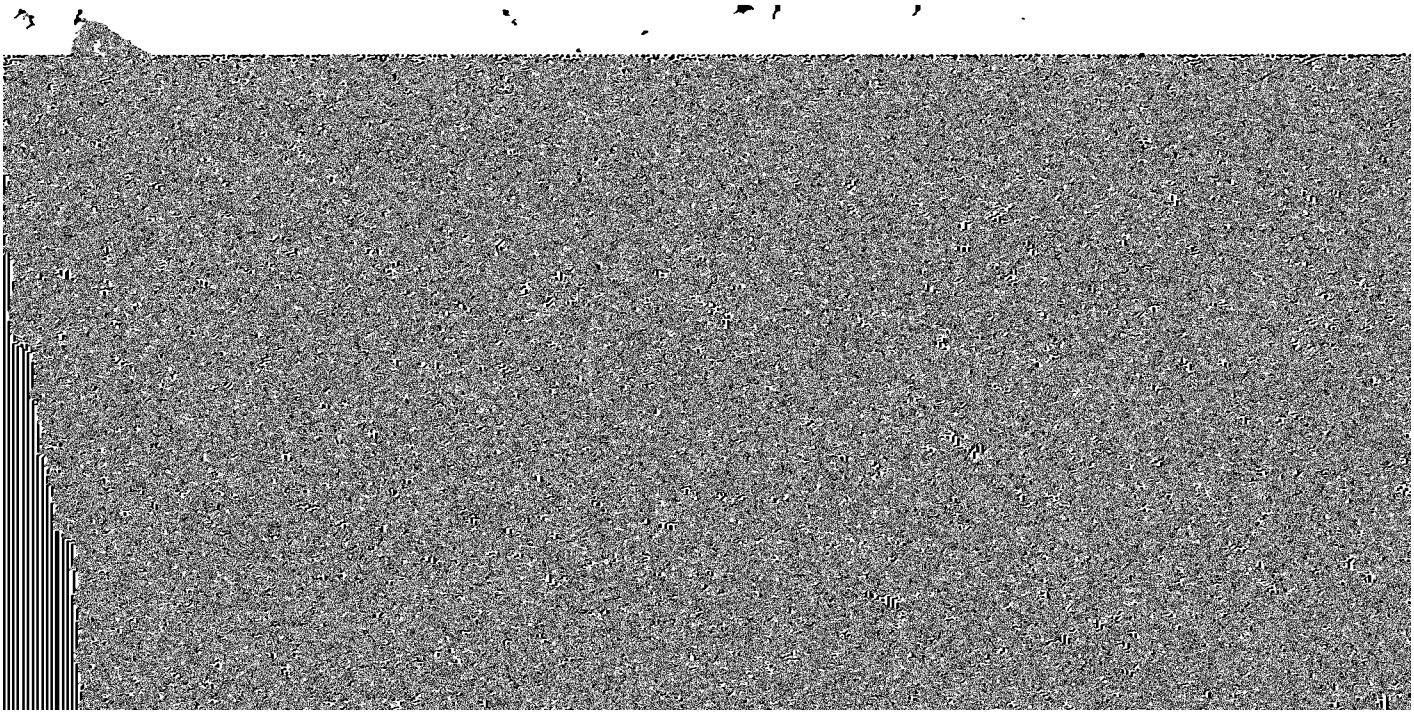
C—59 to 65 inches; light olive brown (2.5Y 5/4) shaly clay, common coarse distinct yellowish brown (10YR 5/6) mottles; massive; very hard, firm; few concretions of calcium carbonate; few gypsum crystals; moderately alkaline.

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.



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,

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

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

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.

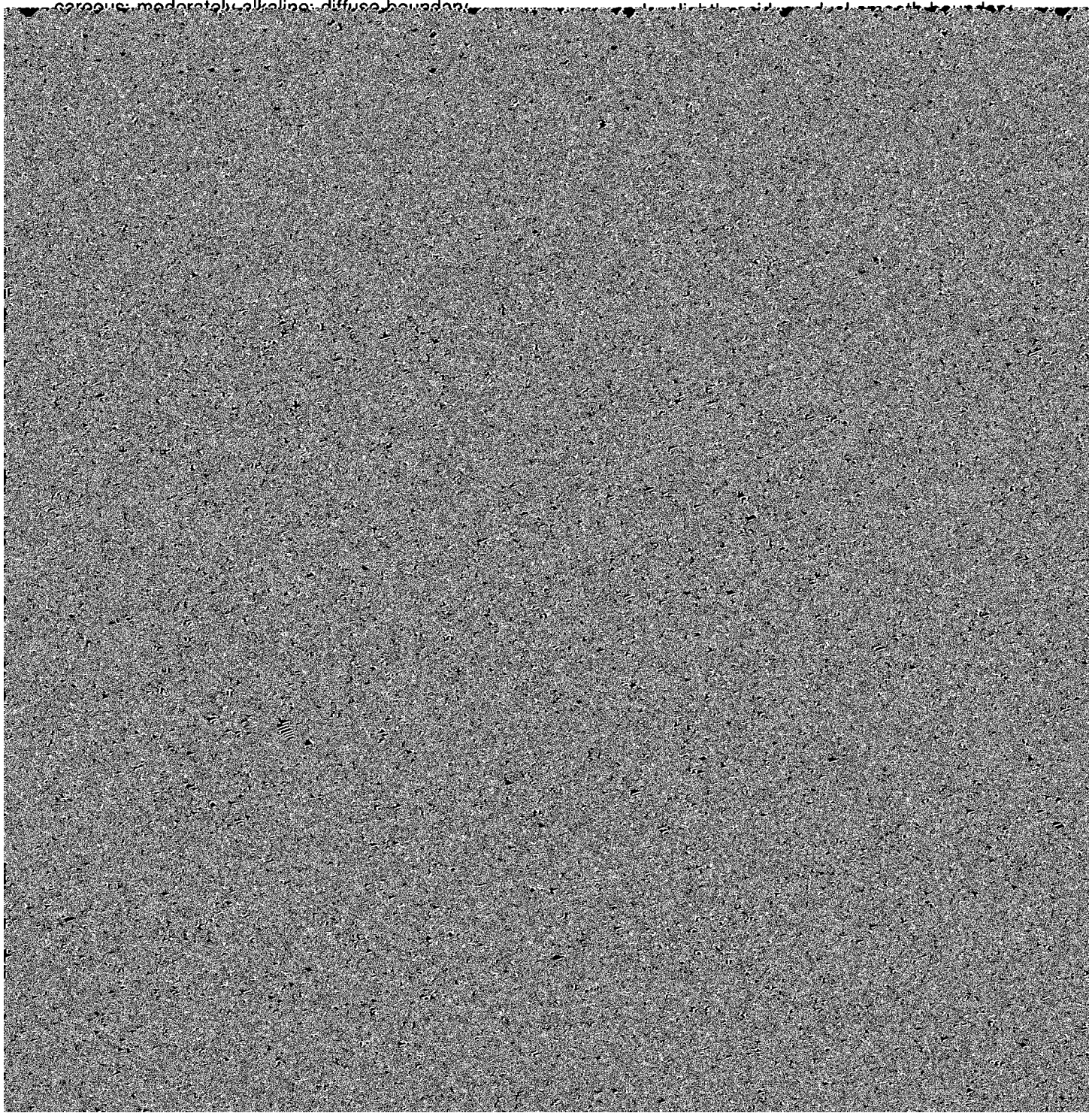
The B2t horizon and B3 horizon are brownish yellow, yellow, reddish yellow, yellowish red, yellowish brown, or strong brown. Mottles are in shades of red or gray. The B2t horizon is sandy clay loam, loam, or fine sandy loam. Clay content in the control section is 18 to 32 percent.

Slidell series

The Slidell series consists of deep, well drained clayey soils on uplands. These soils formed in calcareous,

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.

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.



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;

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

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 42 inches; yellowish red (5YR 5/6) sandy [illegible]

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, [illegible]

(6) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. Supplements replacing pp. 173-188 issued May 1962

(7) United States Department of Agriculture. 1965. Predicting rainfall-erosion losses from cropland east of the rocky mountains. Agric. Res. Serv. U.S. Dep. Agric. Handb. no. 282, 47 pp.

(8) United States Department of Agriculture. 1975. Soil

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

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 artificially drained. 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

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

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 tex-

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

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

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

[illegible]

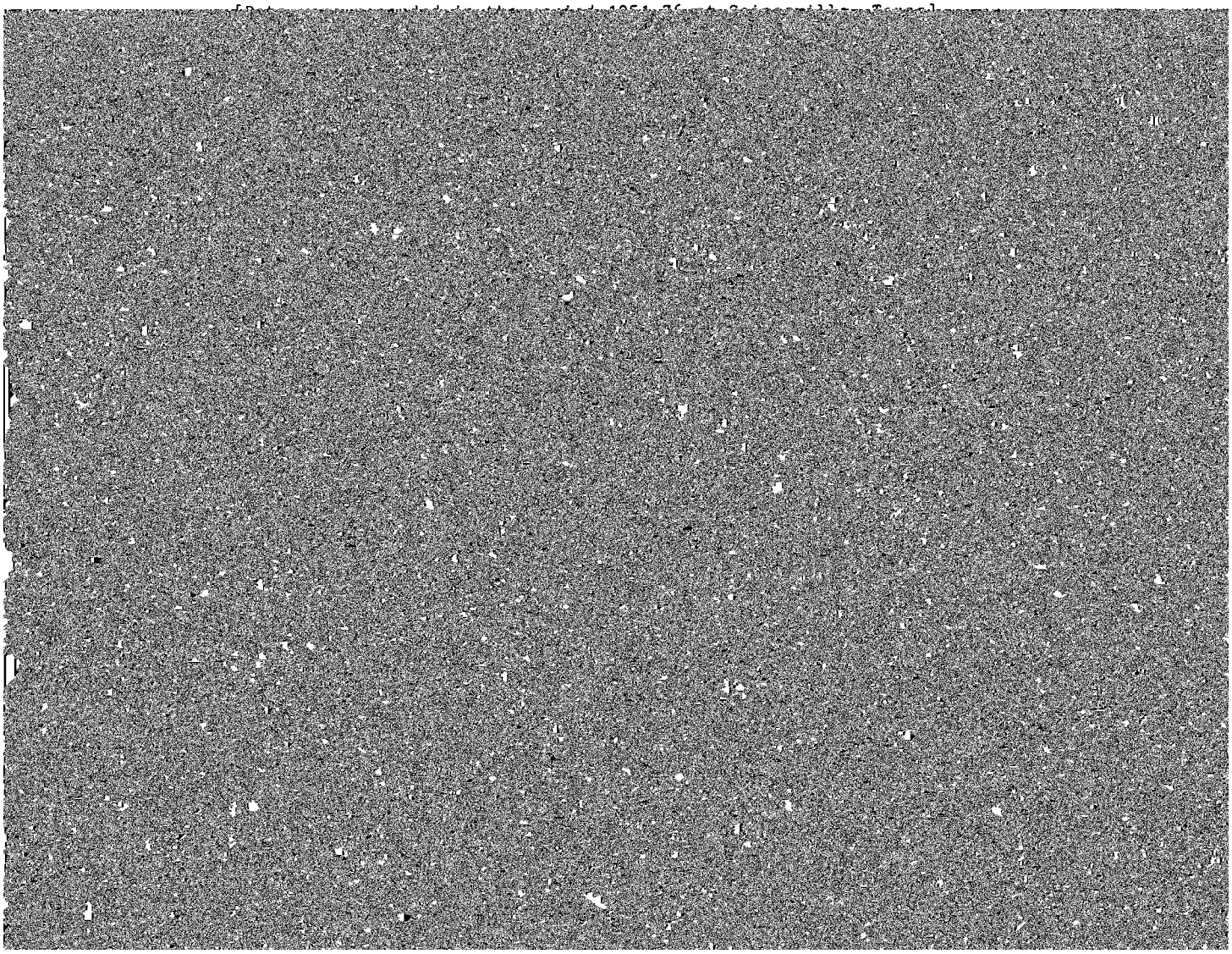


TABLE 2.--FREEZE DATES IN SPRING AND FALL

[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
[illegible]	[illegible]	600	0.1

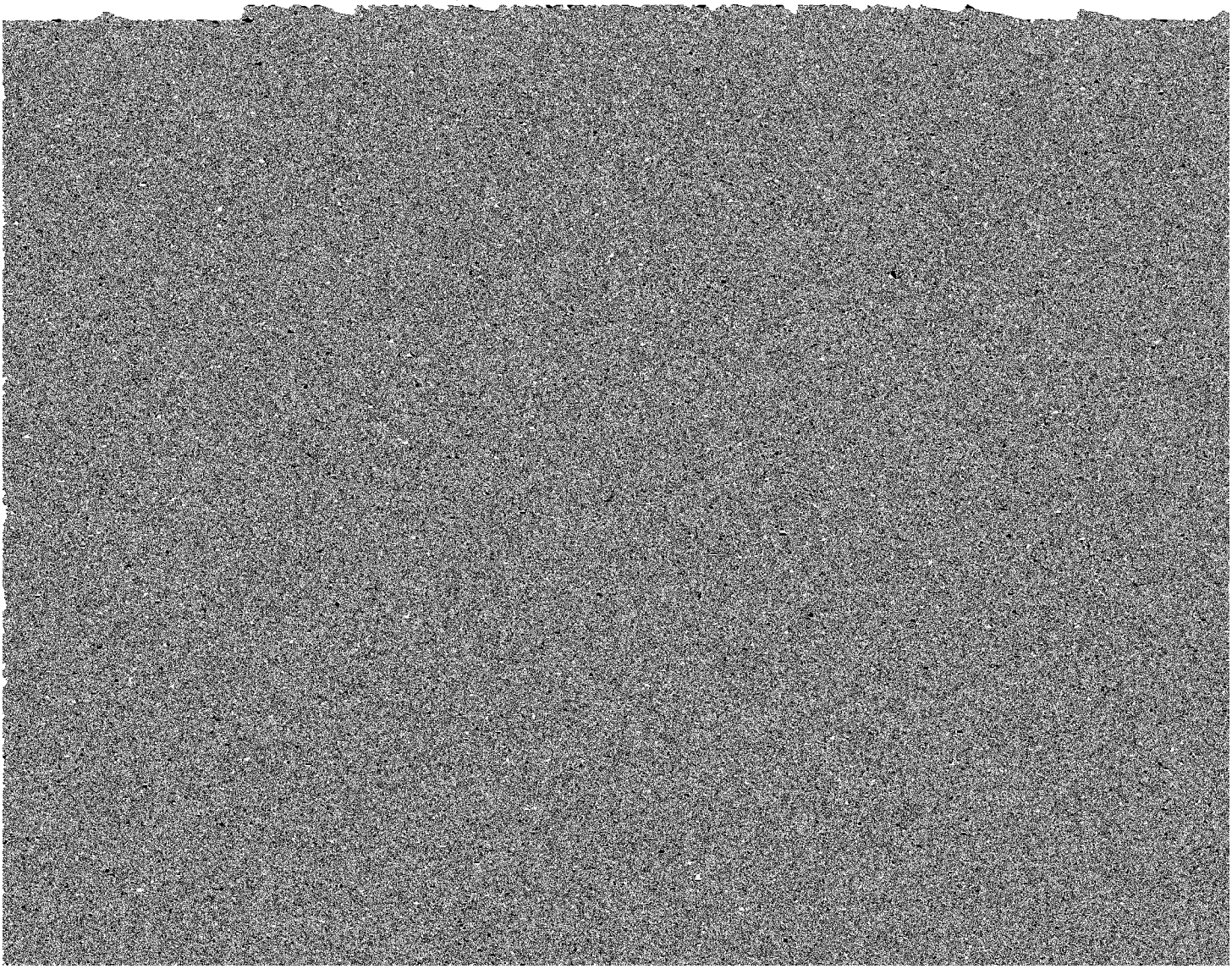


TABLE 7.--YIELDS PER ACRE OF CROPS AND PASTURE

[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:				
[2]6	---	---	---	---
Bolar:				
7	---	35	25	5.0
8	---	30	20	4.5
9	---	---	---	---
[2]10	---	---	---	---
Callisburg:				
11	300	50	30	5.5

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
[2]34	---	---	---	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:				
[2]47	---	---	---	---
[2]48	---	---	---	---
Medlin:				
49	300	50	35	5.0
50	---	35	20	4.5
51	---	---	---	4.0
Miller:				
[2]52	450	60	35	6.5
[2]53	---	---	---	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: Kind of year	Potential production: Dry weight	Common plant name	Composition
			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: Kind of year	Potential production: Dry weight	Common plant name	Composition
			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		

TABLE 8.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production: Kind of year	Potential production: Dry weight	Common plant name	Composition
			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: Kind of year	Potential production: Dry weight	Common plant name	Composition
			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:					
147:					
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
148:					
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: Kind of year	Potential production: Dry weight	Common plant name	Composition
			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

TABLE 8.--RANGE PRODUCTIVITY AND COMPOSITION--Continued

Soil name and map symbol	Range site name	Potential production: Kind of year	Potential production: Dry weight	Common plant name	Composition
			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

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

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:	Moderate:	Moderate:	Moderate:	Moderate:

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.
[1]21:					
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.
[1]23	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.
[1]25	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.
[1]34	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:					
[1]62:					
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.
[1]71:					
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.
[1]74----------	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	[illegible]

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

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:	Severe:	Severe:	Moderate:	Poor:

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:					
147:					
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.
148:					
Maloterre part	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer.

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]33	Poor: [illegible]	Unsuited: [illegible]	Unsuited: [illegible]	Good.

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:				

TABLE 11.--CONSTRUCTION MATERIALS--Continued

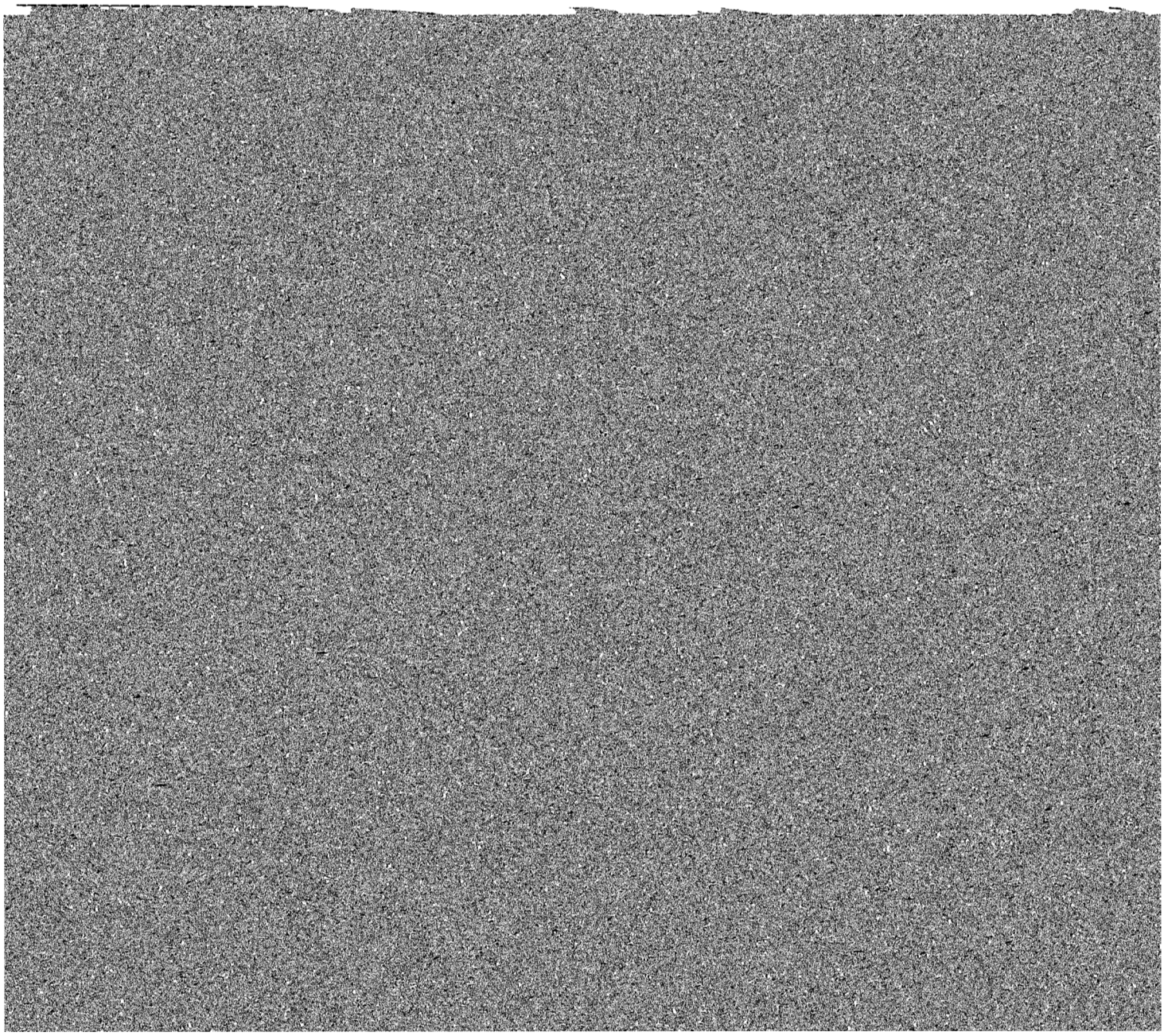


TABLE 12.--WATER MANAGEMENT

["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.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- 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-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- 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:	Slow intake	Percs slowly	Percs slowly,

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:	Moderate:	Severe:	Moderate:

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: [illegible]	Moderate: [illegible]	Severe: [illegible]	Moderate: [illegible]

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	Camp areas	Picnic areas	Playgrounds	Paths and trails
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Tinn:				
[1]74	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		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity 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	CL, SC	A-6	0	95-100	80-100	80-100	40-70	26-40	11-22

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	
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.	---	---	---	---	---	---	---	---	---

TABLE 15.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
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: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	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: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	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	10-35	<25	NP-3

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: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: 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:										
[1]6:										
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

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: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: 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: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: 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: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: 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:									
6:									
Birome part	C	None	---	---	>6.0	---	---	20-40	Rippable

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:									

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	---
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	---

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--								
	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
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.

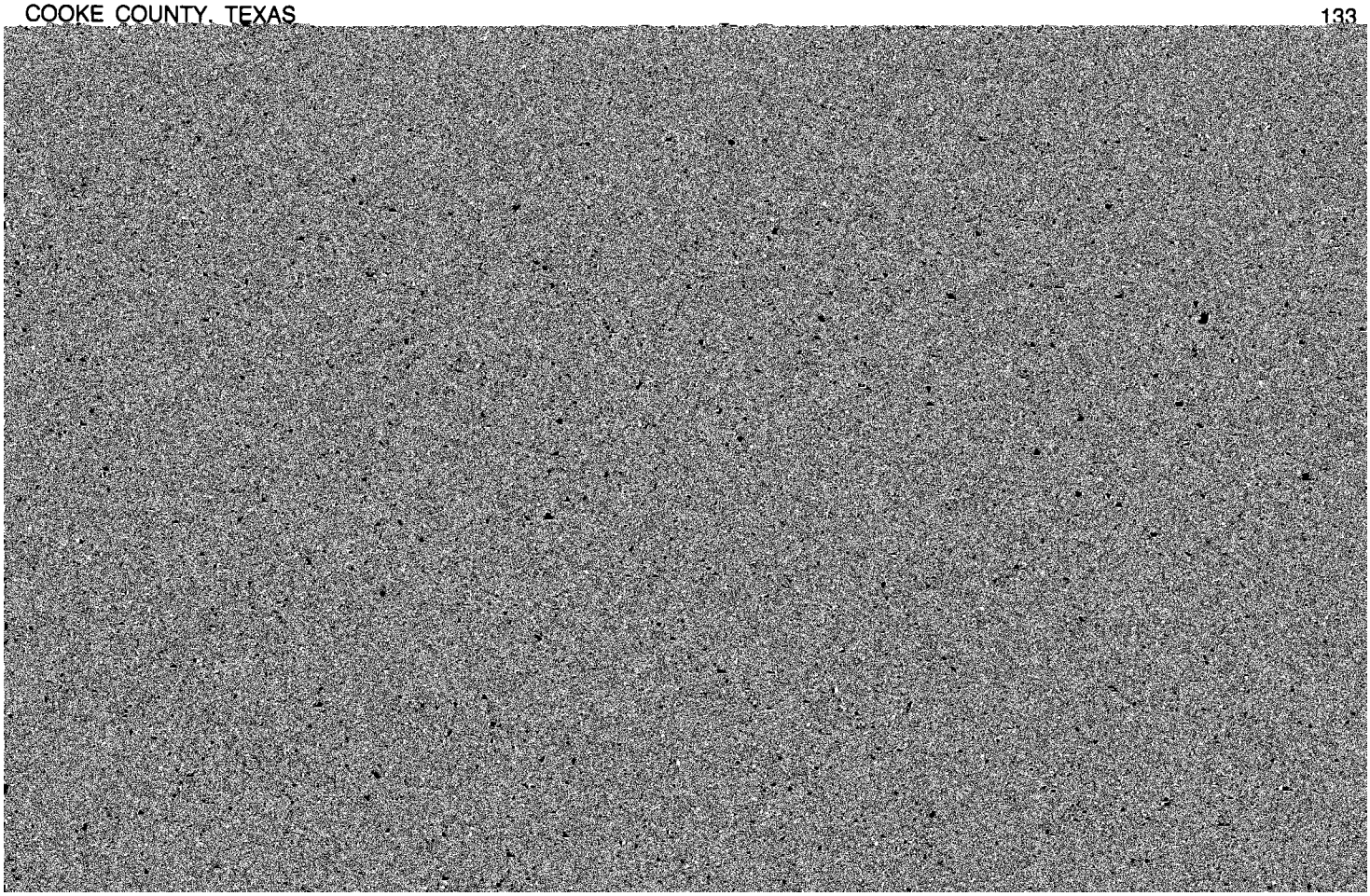


TABLE 19.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those

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