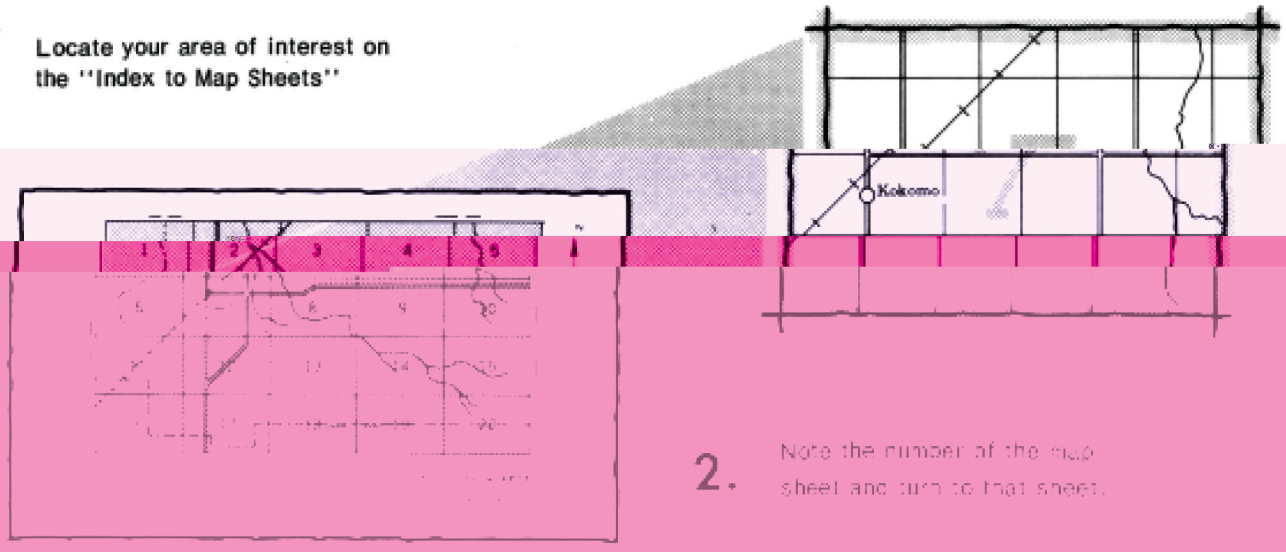
SOIL SURVEY OF

Hood and Somervell Counties, Texas

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

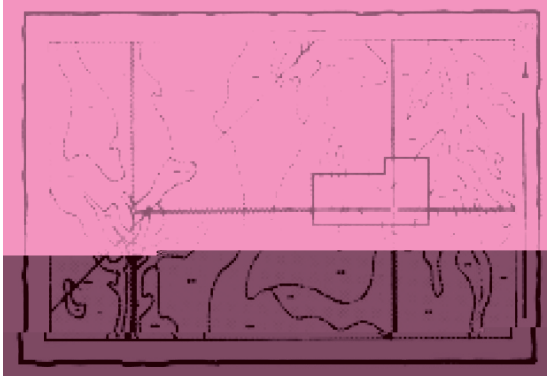
HOW TO USE

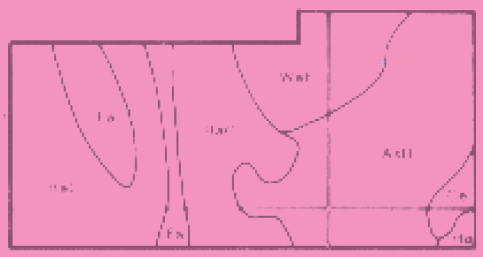
1. Locate your area of interest on the "Index to Map Sheets"



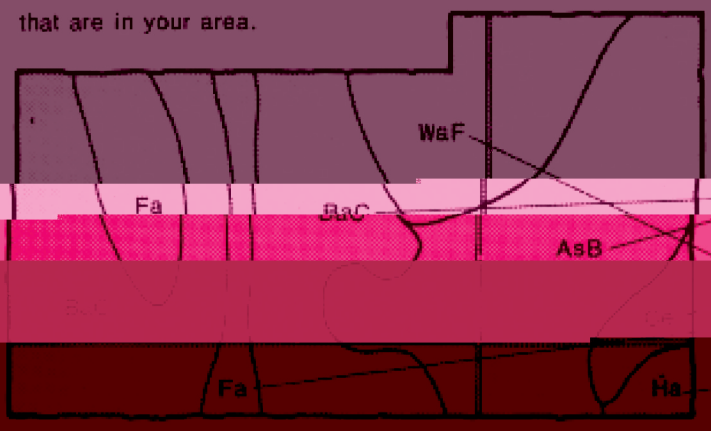
2. Note the number of the map sheet and turn to that sheet.

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





4. List the map unit symbols that are in your area.



Symbols

AsB
BaC
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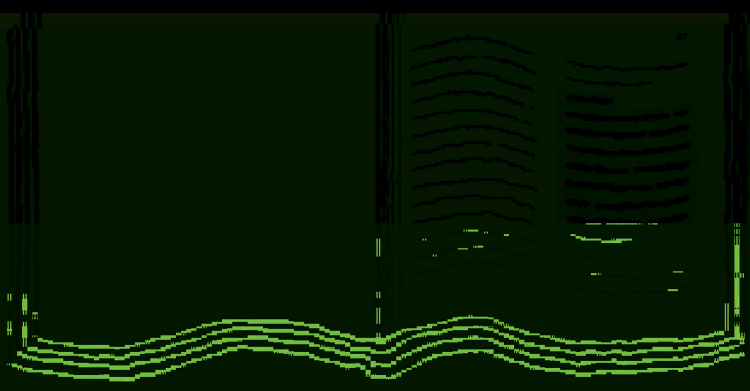
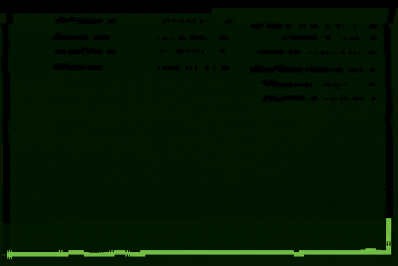
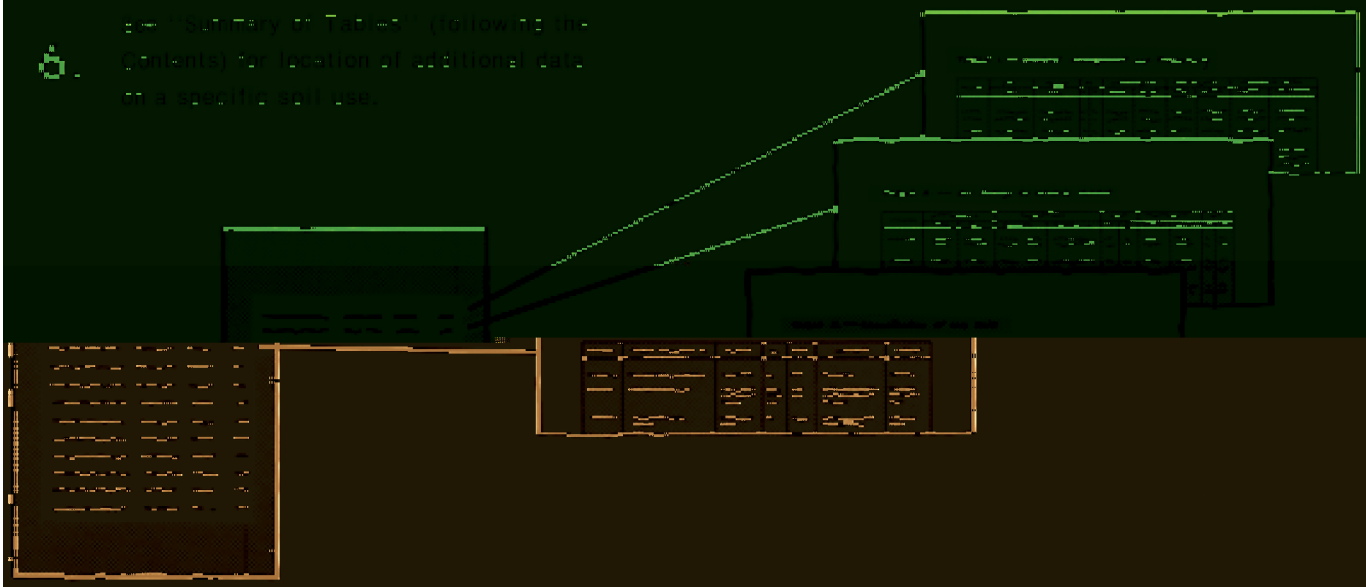
THIS SOIL SURVEY

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





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



"Contents" for page of the publication that will meet your specific needs.

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 1970-74. Soil names and descriptions were approved in 1974. 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 Hood-Parker Soil and Water Conservation District and the Bosque 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: A bend in the Brazos River. The Yahola-Gaddy complex, frequently flooded, is on the flood plain.

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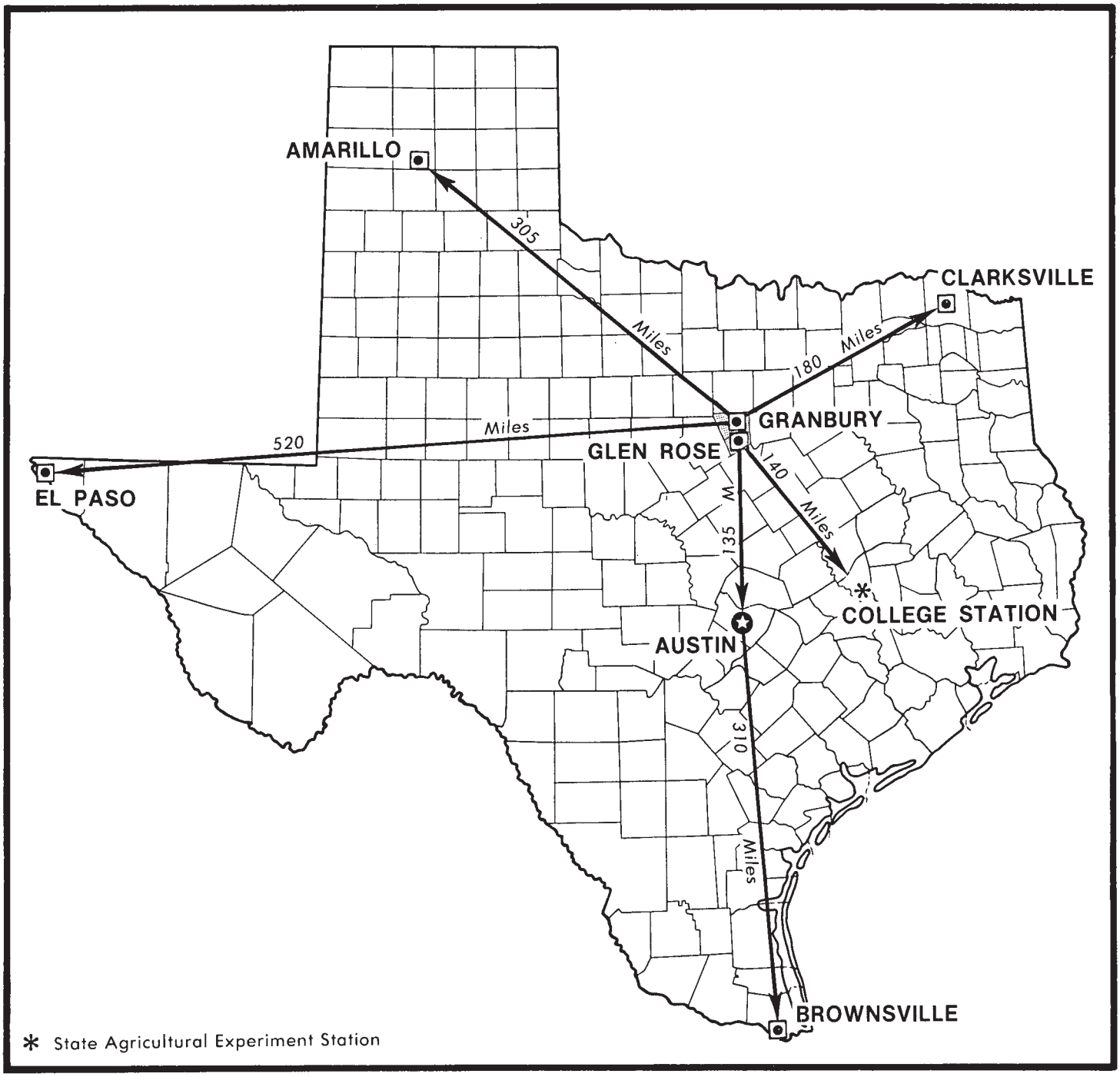
Foreword

The Soil Survey of Hood and Somervell Counties, 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, foresters, 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 un-



Location of Hood and Somervell Counties in Texas.

SOIL SURVEY OF HOOD AND SOMERVELL COUNTIES, TEXAS

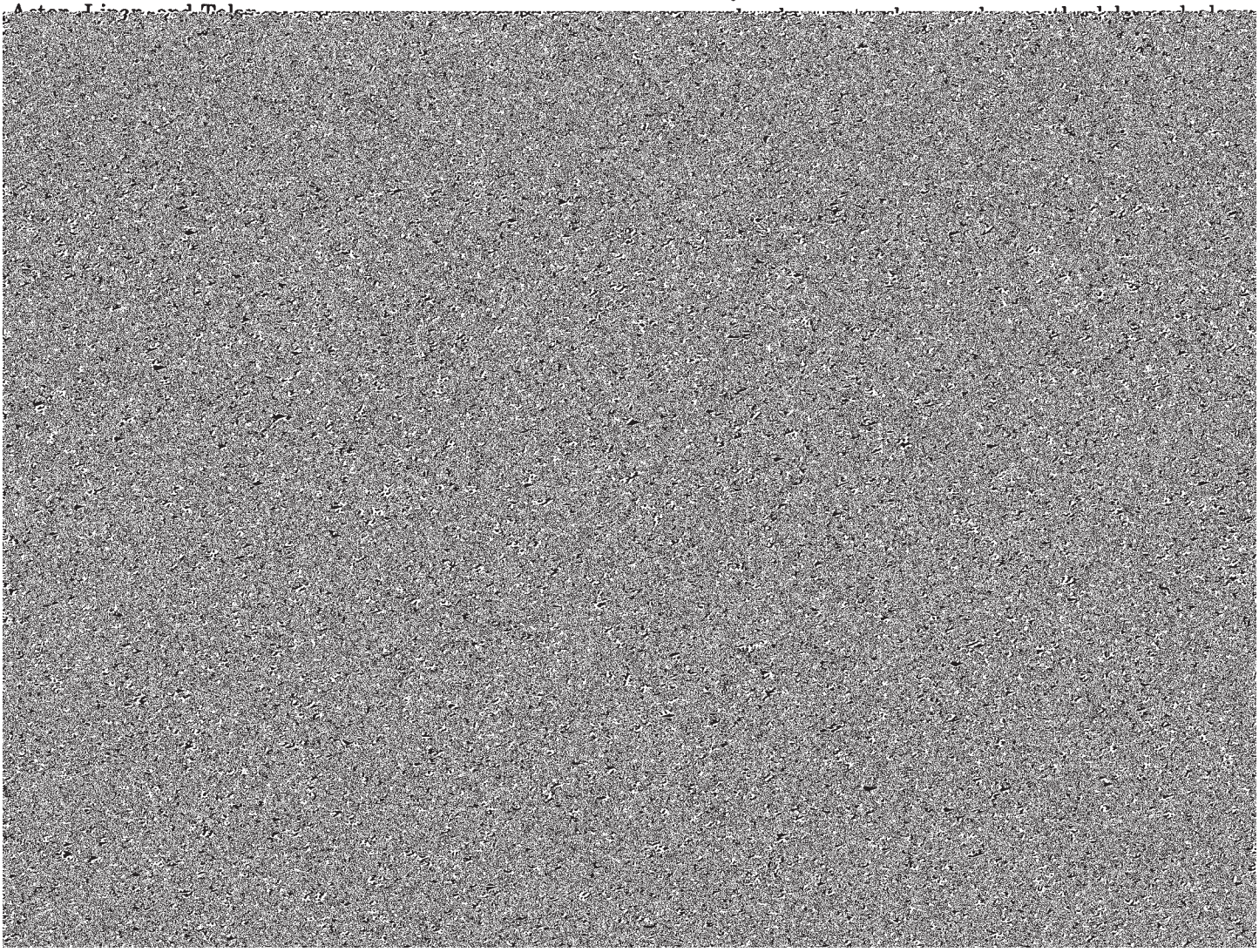
By Winfred C. Coburn, Soil Conservation Service

Soils surveyed by Winfred C. Coburn, James E. Bower,
Ernesto DeLeon, Harold W. Hyde, J. David Kelley, and Billy J. Wagner,
Soil Conservation Service

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

HOOD AND SOMERVELL COUNTIES are in north-central Texas (see map on facing page). The counties have a total area of 398,720 acres, or 623 square miles. Granbury, with a population of 2,473, is the seat of Hood County; Glen Rose, with a population of 1,554, is the seat of Somervell County. Other towns in the survey area include

Population in Hood County increased until about 1910, when the population reached 10,008. Population decreased from 1910 to 1950, mainly because of the two world wars, droughts, and the depression. From 1950 until about 1970, population rose slightly. Since the completion of Lake Granbury on the Brazos River in September 1969, nu-

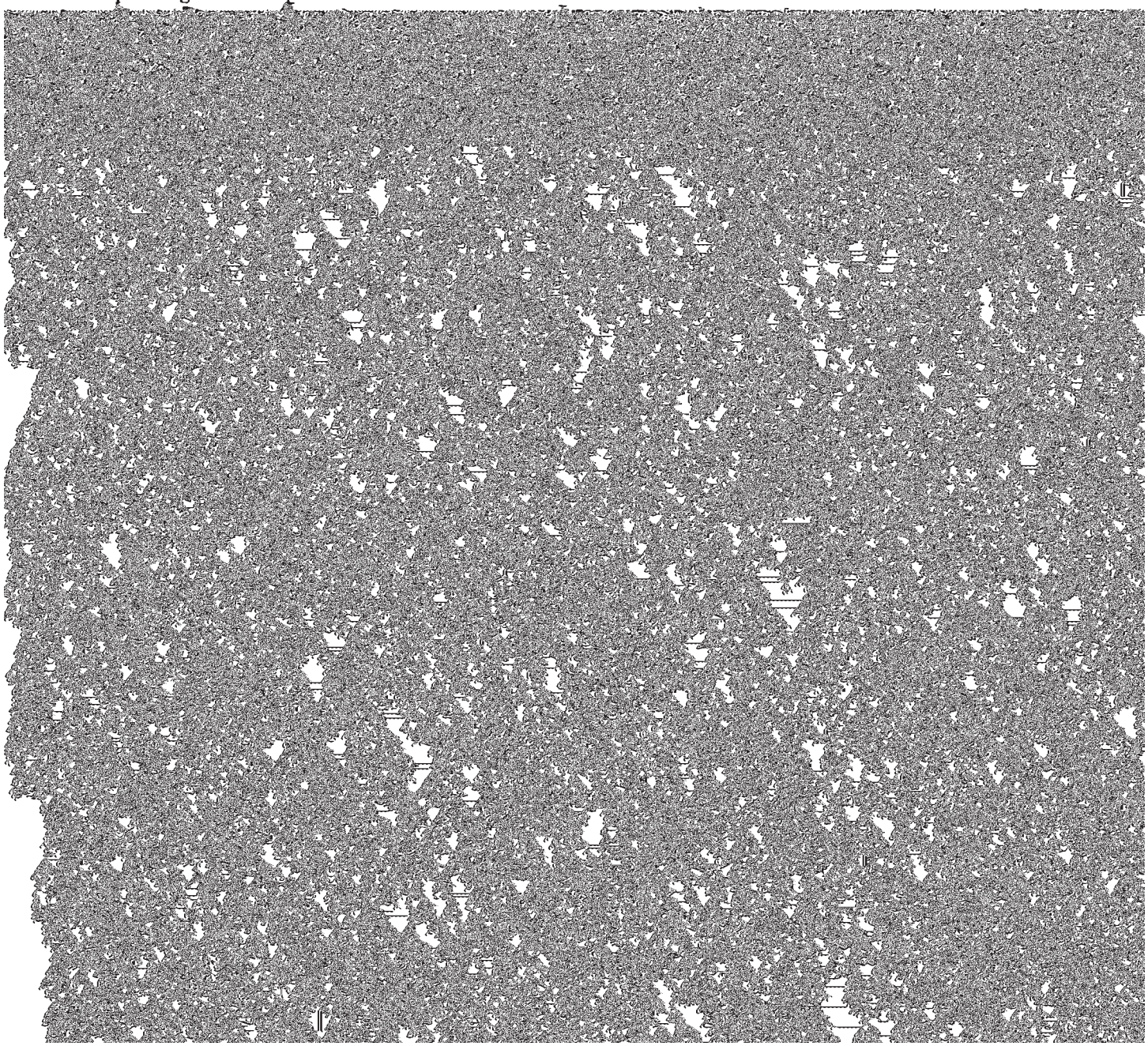


In winter the average temperature is 48 degrees F, and the average daily minimum temperature is 35 degrees. The lowest temperature on record, which occurred at Granbury on January 12, 1973, is 1 degree. In summer the average temperature is 84 degrees, and the average daily maximum temperature is 96 degrees. The highest recorded temperature, which occurred on July 25, 1964, is 110 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 1941. Their main objectives at that time were conserving soil and water and improving the living conditions of the rural family.

Cattle production is still the main farm enterprise in the survey area. Livestock operations are primarily cow-calf. Goats, sheep, hogs, dairy cattle, chickens, and a few herds of exotic animals are also raised.

Peanuts and grain sorghum are the main crops. Cotton and corn have declined in importance because of insect and disease problems. On most of the larger peanut farms, livestock is a secondary enterprise. Since about 1958, many acres of cultivated land have been converted to pastureland.



with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

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

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

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

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

General soil map for broad land use planning

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

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

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

The soils in the survey area vary widely in their potential for major land uses. Table 4 shows the extent of the map units shown on the general soil map and gives general ratings of the potential of each, in relation to the other map units, for major land uses. Soil properties that pose limitations to the use are indicated. The ratings of soil potential are based on the assumption that practices in common use in the survey area are being used to overcome soil limitations. These ratings reflect the ease of overcoming the soil limitations and the probability of soil problems persisting after such practices are used.

Each map unit is rated for *cultivated farm crops*, *pasture grasses*, *range grasses*, *urban uses*, and *recreation areas*. Cultivated farm crops are those grown extensively by farmers in the survey area. Pasture grasses include improved bermudagrass, lovegrass, and Kleingrass. Range grasses include little bluestem, sideoats grama, indiangrass, silver bluestem, King Ranch bluestem, and Texas wintergrass. Urban uses include residential, commercial, and industrial developments. Recreation areas include nature study trails, wilderness areas, hunting and fishing areas, camp areas, playgrounds, and paths and trails.

Descriptions of map units

1. Tarrant-Purves

Very shallow to shallow, undulating to hilly, clayey soils that formed in limestone; on uplands

The soils of this unit are undulating to hilly. They are on broad ridgetops and hillsides (fig. 1).

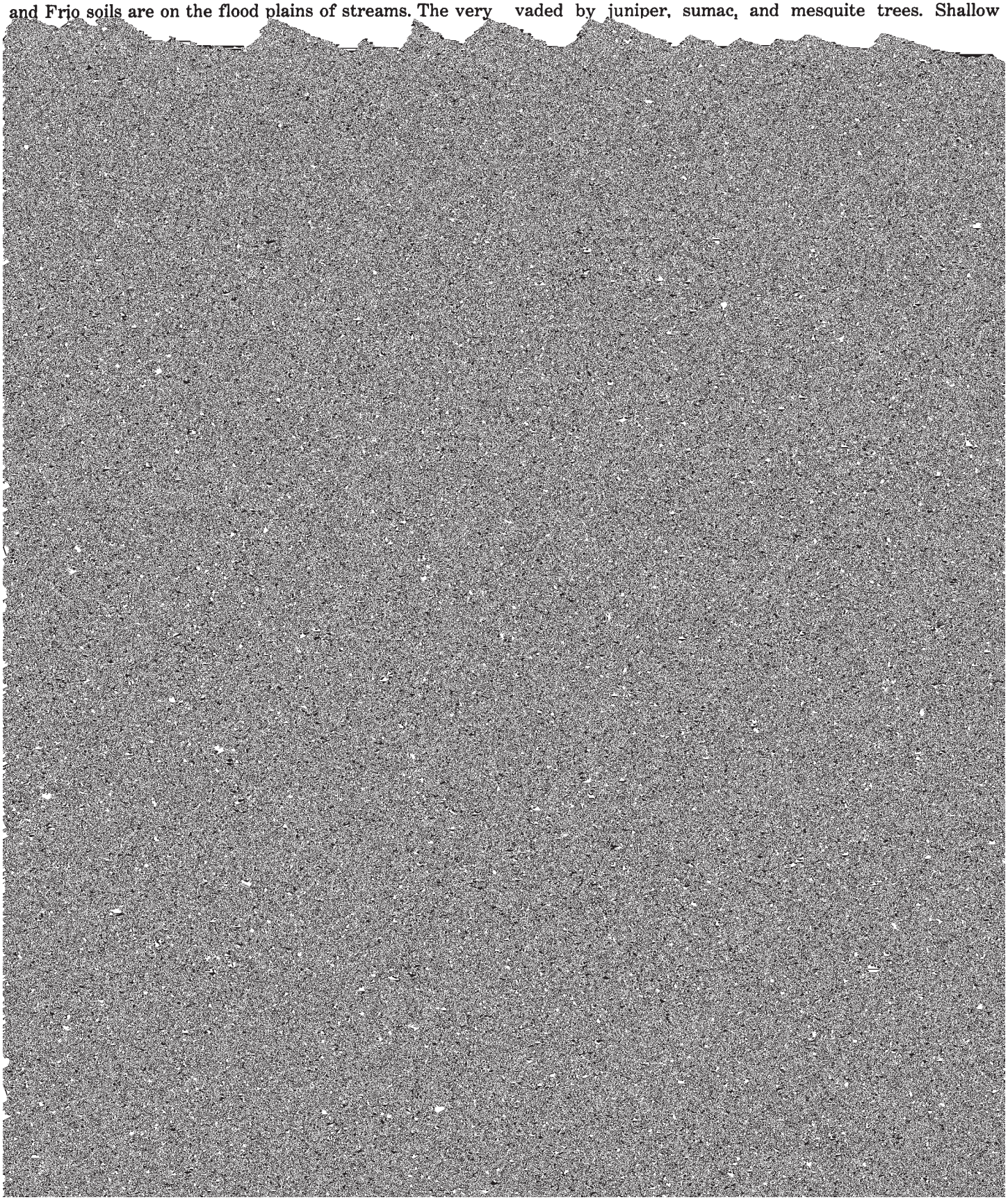
This unit makes up about 39 percent of the survey area. Tarrant soils make up about 50 percent of the unit; Purves soils, about 11 percent; and minor soils, the remaining 39 percent.

Tarrant soils have a surface layer of dark grayish brown and brown, calcareous cobbly clay and very cobbly clay about 14 inches thick. Fractured and platy limestone bedrock that contains brown clay in vertical and horizontal cracks is at a depth of 14 inches.

Purves soils have a surface layer about 13 inches thick. The upper part is dark grayish brown, calcareous stony clay; the middle part is brown, calcareous clay; and the lower part is brown, calcareous very gravelly clay. Fractured limestone is at a depth of 13 inches.

Minor soils in this unit are Aledo, Bolar, Bosque, Brackett, Denton, Frio, Hensley, Krum, Maloterre, Pedernales, Seawillow, Sunev, Venus, and Windthorst soils. The undulating Aledo soils are on limestone hills and support open grassland vegetation. Bolar soils are on hillsides and foot slopes between limestone ridges. Bosque

and Frio soils are on the flood plains of streams. The very vaded by juniper, sumac, and mesquite trees. Shallow



This unit is used mainly as pasture, but a considerable acreage is cropland. The main limitation is the slow water intake rate of most of the soils, and in addition the soils are highly erodible.

potential because of the hazard of occasional overflow. This unit has high potential for habitat for small animals and birds. The recreation potential is high on the Brazos River and Lake Granbury. Pecan orchards are well suited

This unit is used mainly for cropland. Soil blowing and the slow water intake rate are limitations for cultivated crops.

This unit has high potential for cultivated farm crops and improved pasture. To achieve this potential, a good fertilization program and weed control are required. The unit has medium potential for most residential uses. Soil wetness and shrinking and swelling of the subsoil are limitations. The unit has high potential for wildlife habitat, especially for quail and dove. This unit has high potential for vegetables and truck crops such as watermelons, cantaloupes, and peas.

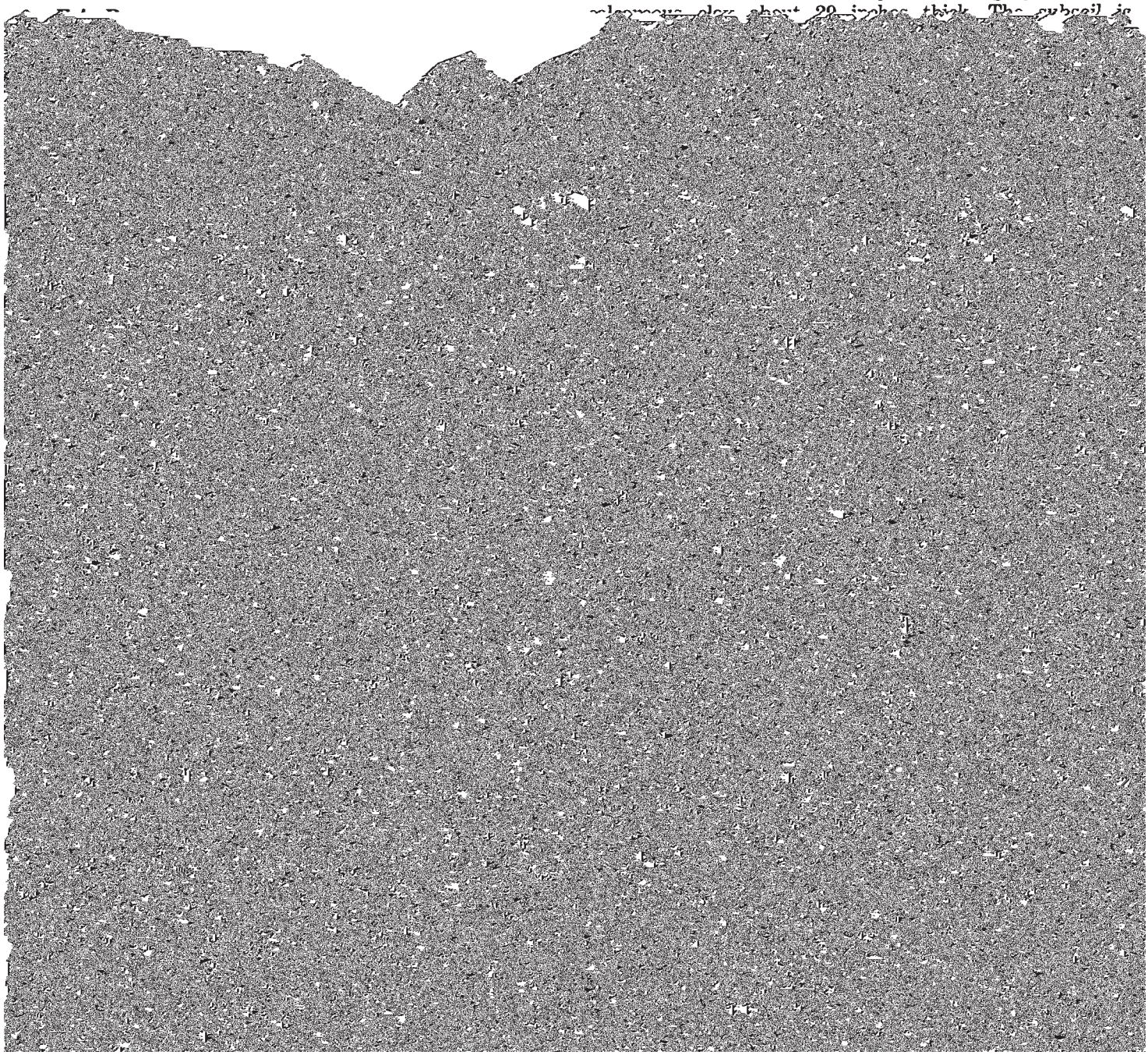
7. Krum-Sunev

Deep, nearly level to sloping, clayey and loamy soils that formed in calcareous, clayey and loamy sediments; on uplands

The soils of this unit are nearly level to sloping. They are in filled valleys and on foot slopes below soils underlain by limestone.

This unit makes up about 3 percent of the survey area. Krum soils make up about 32 percent of the unit; Sunev soils, about 31 percent; and minor soils, the remaining 37 percent.

Krum soils have a surface layer of dark grayish brown, [illegible]



in units 3, 4, and 5 are mainly farmed to peanuts, grain sorghums, forage sorghums, and peach and pecan orchards. The deep, clayey and loamy soils in units 6 and 7 are mainly farmed to forage sorghums, grain sorghums, and oats.

All map units in the survey area have medium to high potential for pasture. Improved pasture grasses are dominantly bermudagrass, Kleingrass, and lovegrass. Well managed pasture requires proper grazing use to maintain adequate stubble height, fertilization to replace soil nutrients, and spraying or shredding to control weeds.

All map units have medium to high potential for range. The climax plant communities range from open prairies with tall and mid grasses to dense stands of scrub oak trees with tall grasses. Map units used as range also provide suitable habitat for wildlife. Units 1 and 2 furnish most of the habitat for deer and turkey. Units 4 and 6 furnish excellent habitat for small animals, such as birds and squirrels, and for larger animals such as deer.

Approximately 28,000 acres have been developed for urban uses in Hood and Somervell Counties. Granbury, Glen Rose, and the area around Lake Granbury are the major urban areas. Each year considerable land is being developed for urban uses in these areas, particularly around Lake Granbury. Much of this acreage had been well suited as cropland.

Most units in the survey area have limitations that affect urban development. Shallow depth to rock is a limitation in units 1 and 2. Occasional flooding is a limitation in units 4 and 6 and is difficult to overcome. The other units have limitations that can be overcome by proper design and careful installation procedures.

All units have high to low potentials for most recreational uses. Units 1 and 2 are on rugged terrain and support juniper, live oak, and other trees. These units are good nature study areas, wilderness areas, and hunting

Soil maps for detailed planning

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

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

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

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

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or manage-

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because there is little value in separating them. The pattern and proportion of the soils are not uniform.

cluded are a few outcrops of limestone bedrock. The steep Brackett soils are along breaks at higher elevations. Maloterre soils are on the outer edges of benches. Purves and Tarrant soils are in oblong areas on ridgetops and on

Potential is high for range production. The climax plant community is a mixture of tall and mid grasses with post oak and blackjack oak trees. The soil has high potential for fruit and pecan trees.

This soil has high potential for most urban uses. Low strength is a limitation for local roads and streets, but this limitation can be easily overcome by good design and careful installation. Capability subclass IIIe; Loamy Sand range site.

3—Bastrop fine sandy loam, 0 to 1 percent slopes. This deep, well drained, nearly level soil is on geologic terraces, mostly along the Brazos River. Areas are irregular in shape and range from 10 to 40 acres in size, but average about 15 acres.

Typically, the surface layer is brown, slightly acid fine sandy loam about 14 inches thick. The subsoil is yellowish red, slightly acid sandy clay loam to a depth of 36 inches and yellowish red, neutral sandy clay loam to a depth of 76 inches. The underlying material to a depth of 80 inches is reddish yellow, calcareous sandy clay loam.

Crops on this soil respond well to fertilization. Organic matter content is low. Permeability is moderate, and available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are small areas of Decordova, Hassee, Paluxy, and Pedernales soils. Decordova soils are on flood plains. Hassee soils are in small, circular to oblong depressions. Paluxy soils are in long, narrow bands adjacent to the flood plain. Pedernales soils are in oblong areas on low knolls. Included soils make up less than 10 percent of any mapped area.

This soil is dominantly used as cropland. It has high potential for row crops and small grains. Crop residues left on the surface help conserve moisture, reduce soil temperature, and maintain soil tilth and productivity. Soil blowing is a hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including

and medium acid in the lower part. The subsoil is yellowish red, slightly acid sandy clay loam that extends to a depth of 80 inches or more.

Crops on this soil respond well to fertilization. Organic matter content is low. Permeability is moderate, and available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are small areas of Decordova, Duffau, Hassee, Paluxy, and Pedernales soils. Decordova soils are on flood plains. Duffau soils are in transitional areas between alluvial soils and upland soils of other origin. Hassee soils are in small, circular to oblong depressions. Paluxy soils are in long, narrow bands adjacent to the flood plain. Pedernales soils are in oblong areas on low knolls and in other areas at slightly higher elevations. Included soils make up less than 15 percent of any mapped area.

This soil is dominantly used as cropland. It has high potential for row crops and small grains. Soil blowing is a hazard. Minimum tillage and the use of cover crops, including grasses and legumes, help control erosion. Crop residues left on the surface help conserve moisture, reduce soil temperature, and maintain soil tilth and productivity. Terraces and contour cultivation also help control erosion. This soil has high potential for fruit trees and pecan trees.

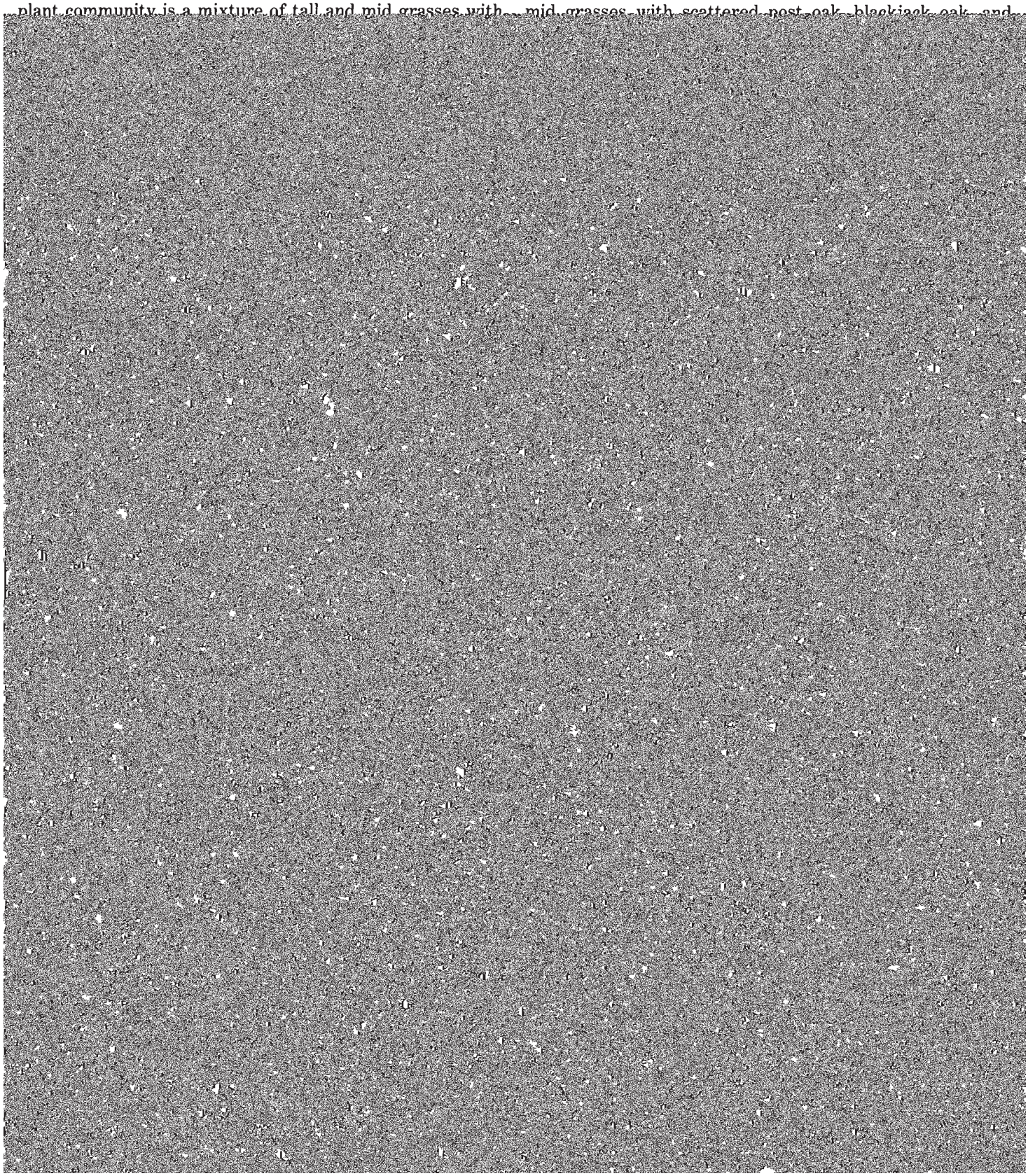
Potential is high as pastureland. Improved grasses such as bermudagrass and lovegrass are suited. The soil also has high potential for range production. The climax plant community is a mixture of tall and mid grasses with scattered post oak and blackjack oak trees.

This soil has high potential for most urban uses. Low strength is a limitation for local roads and streets, but this limitation can be easily overcome by good design and careful installation. Capability subclass IIe; Sandy Loam range site.

5—Bastrop fine sandy loam, 3 to 5 percent slopes.

This soil is dominantly used as range and pastureland. It has high potential for range production. The climax plant community is a mixture of tall and mid grasses with

trol weeds. This soil has high potential for range production. The climax plant community is a mixture of tall and mid grasses with scattered post oak, blackjack oak, and



About 50 percent of this unit is Bastrop soils; 30 percent is gullies, 4 to 30 feet wide and 2 to 12 feet deep, that have nearly vertical banks; and about 20 percent is minor soils. Areas between gullies are mostly noneroded Bastrop soils, but these areas are inaccessible because of the gullies (fig. 6). These gullies and the Bastrop soils are so intricately mixed or so small that they cannot be shown separately at the scale mapped.

Typically, the surface layer is brown, slightly acid fine sandy loam about 10 inches thick. The subsoil is reddish brown, neutral sandy clay loam to a depth of 34 inches and brown, neutral to mildly alkaline sandy clay loam to a depth of 80 inches or more.

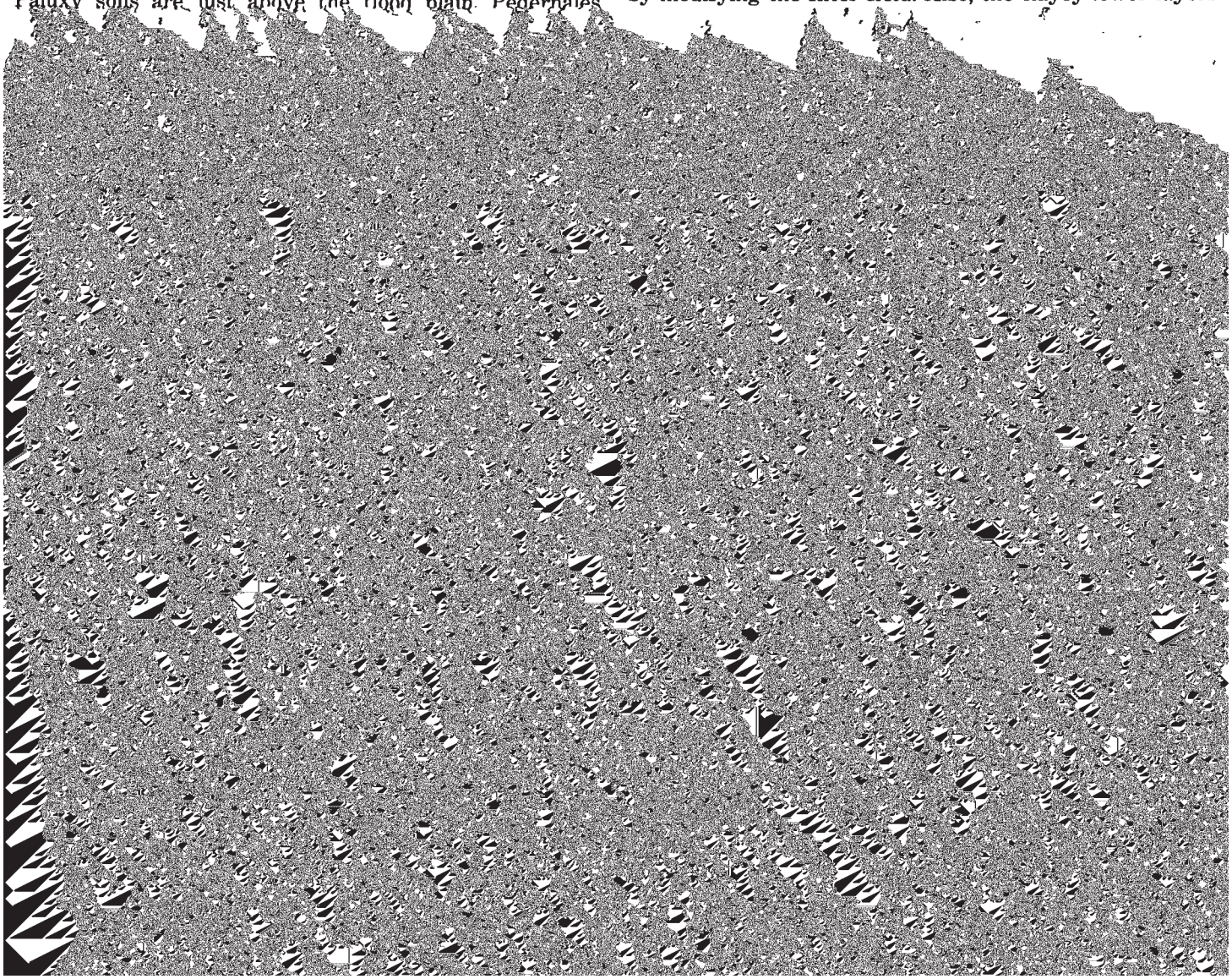
These soils are low in natural fertility and organic matter content. Permeability is moderate, and available water capacity is high. The root zone is deep, and the soil can be easily penetrated by plant roots.

Included with these soils in mapping are small areas of Paluxy, Pedernales, and Windthorst soils. The sloping Paluxy soils are just above the flood plain. Pedernales that is on the outer edges of areas joining sandy soils. Included soils make up less than 15 percent of any mapped area.

This soil is dominantly used as cropland. It has high potential for row crops and small grains. Crop residues left on the surface help conserve moisture, slow runoff, reduce soil temperature, and maintain soil tilth and productivity. Potential is high for pasture production. Kleingrass and bermudagrass are well suited.

Potential is high for range production. The climax plant community is a mixture of tall and mid grasses and scattered post oak, live oak, and elm trees.

This soil has medium potential for most urban uses. Shrinking and swelling upon wetting and drying and low strength are limitations, but these limitations can be overcome by good design and careful installation. The clayey lower layers take in water slowly. This is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the adsorption area or by modifying the filter field. Also, the clayey lower layers



Potential is high as cropland. Small grains are the main crop. Return of crop residue to the soil helps maintain productivity and tilth.

Potential for most urban uses is medium. Depth to rock is a limitation for septic tank absorption fields, sewage lagoons, and trench type sanitary landfills, and this limitation is very difficult to overcome. Low strength is a limitation for dwellings, small commercial buildings, and local roads and streets, but this limitation can be easily overcome by good design and careful installation. Capability subclass IIe; Clay Loam range site.

11—Bolar clay loam, 3 to 5 percent slopes. This moderately deep, well drained, gently sloping soil is on narrow side slopes of uplands. Areas are usually long, narrow bands between more sloping, shallow limestone soils. They range from 10 to 50 acres in size, but average about 30 acres.

Typically, the surface layer is dark grayish brown and grayish brown, calcareous clay loam about 12 inches thick. The subsoil is light yellowish brown, calcareous clay loam to a depth of 38 inches. This is underlain by fractured limestone bedrock interbedded with calcareous clayey marl.

This is a productive soil. Organic matter content is high. Permeability is moderate, and available water capacity is medium. The soil has fair tilth and can be worked well under only a narrow range of moisture con-

12—Bosque loam, occasionally flooded. This deep, well drained, nearly level soil is on the flood plains of major streams. It is flooded occasionally for short periods. Areas are long and oblong in shape and range from 10 to 150 acres in size, but average about 50 acres.

Typically, the surface layer is dark grayish brown, calcareous loam to a depth of 20 inches and grayish brown, calcareous clay loam to a depth of 30 inches. The subsoil is light brownish gray, calcareous clay loam that extends to a depth of 46 inches. The underlying material to a depth of 62 inches is pale brown, calcareous clay loam.

This is a productive soil. Organic matter content is high. The soil is flooded occasionally for short periods. Permeability is moderate, and available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are small areas of Frio, Venus, and Yahola soils. Frio soils are in lower lying areas. Venus soils are on the outer edge of the flood plain or in oblong to circular areas throughout mapped areas. Yahola soils are in long, narrow, oblong areas close to the stream's edge in a position several feet below the Bosque soils. Included soils make up less than 20 percent of the map unit.

This soil is dominantly used as cropland. It has high potential for row crops and small grains. Crop residues

of 16 inches. The underlying material to a depth of 40 inches is very pale brown, calcareous gravelly clay loam.

This soil is dominantly used as pastureland. It has high potential for pasture production. Management concerns

ing is a hazard. Minimum tillage, stripcropping, and the use of cover crops, including grasses and legumes, help control erosion. Crop residues left on the surface help conserve moisture, reduce soil temperature, and maintain soil tilth and productivity. This soil has high potential for pasture production. Improved grasses, such as bermudagrass and lovegrass, are well suited.

Potential is medium for range production. The climax plant community is a mixture of tall and mid grasses and thick stands of scrub post oak and blackjack oak.

This soil has medium potential for most urban uses. The clayey lower layers take in water slowly. This is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption area or by modifying the filter field. Low strength is a limitation for local roads and streets, but this limitation can be overcome by good design and careful installation. Capability subclass IIIe; Loamy Sand range site.

16—Chaney loamy fine sand, 1 to 5 percent slopes, eroded. This deep, moderately well drained, gently sloping soil is on uplands and has a plane to convex surface. Areas are irregular in shape and range from 6 to 50 acres in size, but average about 12 acres. Erosion has thinned the surface layer to less than 6 inches and has left rills near the breaks of convex slopes.

Typically, the surface layer is light brown, slightly acid loamy fine sand about 3 inches thick. The subsoil is mottled yellowish red and strong brown, slightly acid sandy clay to a depth of 16 inches; mottled red, white, yellowish brown, and yellowish red, slightly acid sandy clay to a depth of 35 inches; and mottled white, light gray, red, dark red, yellowish brown, and brownish yellow, slightly acid sandy clay to a depth of 48 inches. The underlying material to a depth of 62 inches is coarsely mottled light gray, yellowish brown, and yellowish red, medium acid sandy clay loam.

Crops on this soil respond well to fertilization. Organic matter content is low. Permeability is slow, and available water capacity is high. The soil has fair tilth and can be worked best under a narrow range of moisture content. The root zone is deep, but root movement is restricted by the sandy clay lower layers. In places during wet seasons, a water table is perched above the sandy clay lower layers.

Included with this soil in mapping are small areas of Windthorst soils. Windthorst soils are on low knolls and ridges. Also included are small areas of soils in which deep tillage has mixed the sandy clay subsoil with the

Where the soil has a very thin surface layer, it is droughty; this causes plants to go into stress quickly.

Potential is low as range. The climax plant community is a mixture of tall and mid grasses with thick stands of scrub post oak and blackjack oak trees.

Potential for most urban uses is medium. The clayey lower layers take in water slowly. This is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption area or by modifying the filter field. Low strength is a limitation for local roads and streets, but this limitation can be overcome by good design and careful installation. Capability subclass IIIe; Loamy Sand range site.

17—Decordova loamy fine sand, 0 to 5 percent slopes. This deep, well drained, nearly level to gently sloping soil is on upland geologic terraces. Areas are irregular in shape and range from 20 to 300 acres in size.

Typically, the surface layer is light brown, slightly acid loamy fine sand about 14 inches thick. The subsoil is yellowish red, slightly acid fine sandy loam to a depth of 58 inches; reddish yellow, slightly acid fine sandy loam to a depth of 78 inches; and yellowish red, neutral fine sandy loam to a depth of 80 inches.

Crops on this soil respond well to fertilization. Organic matter content is low. Permeability is moderately rapid, and available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are small areas of Bastrop, Duffau, Paluxy, and Pedernales soils. Bastrop soils are in irregularly shaped areas in a random pattern. Duffau soils are at higher elevations and on knolls in oblong areas. Paluxy soils are at lower elevations above the soils on flood plains. Pedernales soils are on the upper parts of slopes on sharp slope breaks. Also included is a soil that is similar to Decordova soils except that the sandy surface layer is 20 to 30 inches thick. Included soils make up less than 20 percent of any mapped area.

This soil is dominantly used as cropland. It has medium potential for row crops, truck crops, and small grains. Soil blowing is a hazard. Minimum tillage, stripcropping, and the use of cover crops, including grasses and legumes, help control erosion. Crop residues left on the surface help conserve moisture, reduce soil temperature, and maintain soil tilth and productivity. Potential is medium for pasture production. Bermudagrass and lovegrass are

18—Demona loamy fine sand, 1 to 5 percent slopes. This deep, moderately well drained, gently sloping soil is [illegible] Soil areas are irregular in shape and range from 15 to 100 acres in size. The surface is plane to slightly concave.

This soil is dominantly used as rangeland. It has high potential for range production. The climax plant community is a mixture of tall and mid grasses with a few motts of live oak trees. Management concerns include proper grazing, adequate rest periods, and brush management. This soil has medium potential as pastureland. Kleingrass and bermudagrass are well suited to this soil.

Potential is medium as cropland mainly because of slope. Small grains are the main crop.

The soil has low potential for most urban uses. Depth to rock and shrinking and swelling upon wetting and drying are limitations that are very difficult to overcome. Capability subclass IIIe; Clay Loam range site.

21—Duffau loamy fine sand, 1 to 5 percent slopes. This deep, well drained, gently sloping soil is in shallow valleys of uplands. Areas are irregular in shape and range from 10 to 60 acres in size.

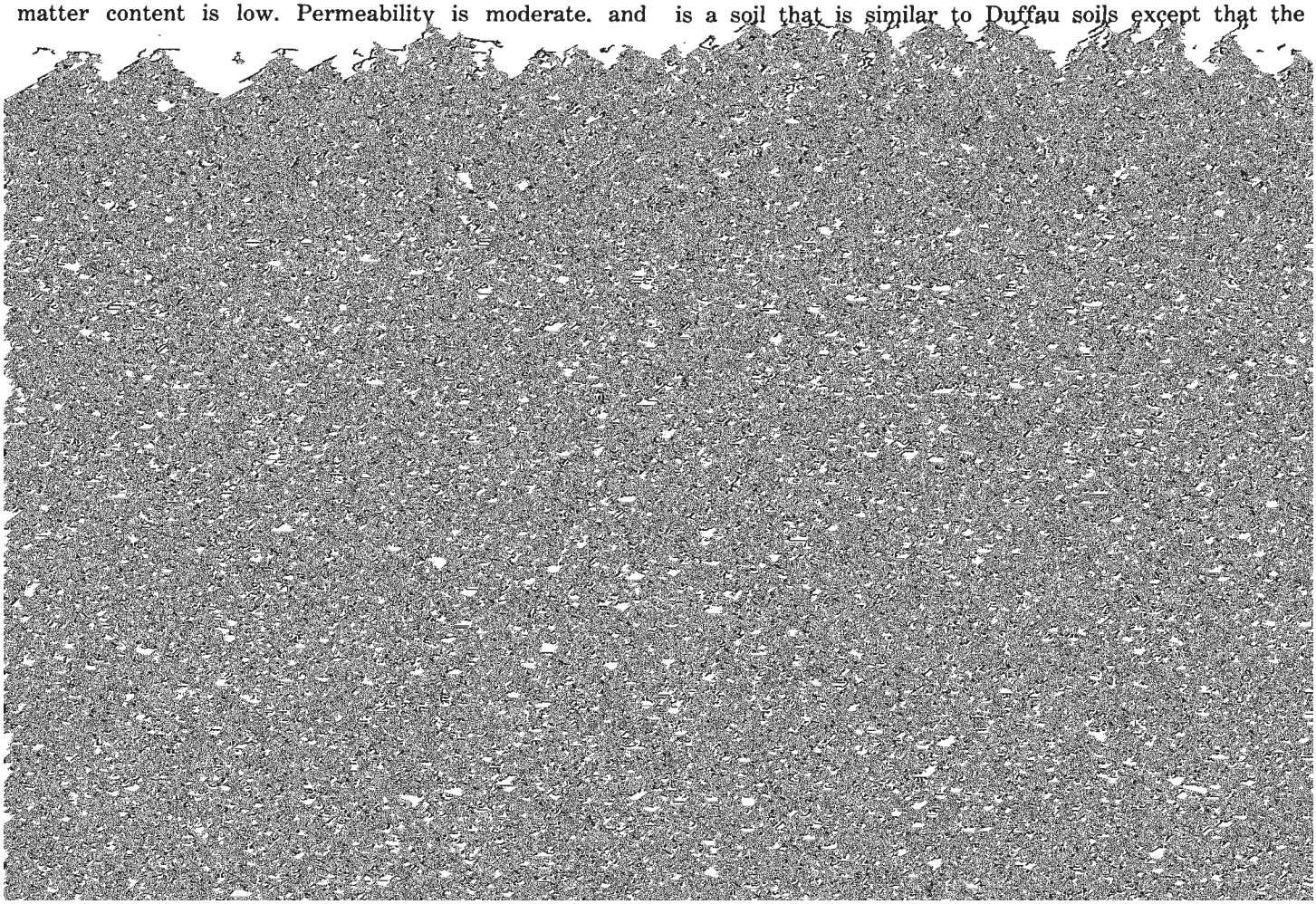
Typically, the surface layer is brown, neutral loamy fine sand about 12 inches thick. The subsoil is yellowish red, neutral sandy clay loam to a depth of 22 inches; reddish yellow, slightly acid sandy clay loam to a depth of 44 inches; and mottled very pale brown, yellowish red, and reddish yellow, medium acid sandy clay loam to a depth of 80 inches or more.

Crops on this soil respond well to fertilization. Organic matter content is low. Permeability is moderate. and valleys of uplands. Areas are irregular in shape and range from 5 to 50 acres in size.

Typically, the surface layer is brown, slightly acid fine sandy loam about 12 inches thick. The upper part of the subsoil is yellowish red, neutral sandy clay loam that extends to a depth of 32 inches. The middle part is reddish brown, neutral sandy clay loam that extends to a depth of 40 inches. The lower part is reddish yellow, neutral sandy clay loam that has brownish yellow and red mottles and that extends to a depth of 64 inches. The underlying material to a depth of 80 inches is mottled reddish yellow, very pale brown, and yellowish red, neutral fine sandy loam that contains thin, discontinuous bands of weakly cemented sandstone.

Crops on this soil respond well to fertilization. Organic matter content is low. Permeability is moderate, and available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are small areas of Chaney, Pedernales, and Windthorst soils. Chaney soils are on the lower parts of slopes. Pedernales and Windthorst soils occur in circular to oblong patterns on the higher parts of slopes and on low knolls. Also included is a soil that is similar to Duffau soils except that the



to a depth of 80 inches is reddish yellow, mildly alkaline sandy clay loam that contains pockets of fine sandy loam.

Crops on this soil respond well to fertilization. Organic matter content is low. Permeability is moderate, and available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are small areas of Pedernales, Seawillow, and Windthorst soils. Pedernales and Windthorst soils are on small knolls and narrow ridges. Seawillow soils are on the upper parts of slopes. Also included are soils that are similar to Duffau soils except that they have calcareous underlying material at a depth of less than 60 inches. Included soils make up less than 20 percent of any mapped area.

This soil is dominantly used as rangeland. It has high potential for range production. The climax plant community is a mixture of tall and mid grasses with scattered post oak and blackjack oak trees. Management concerns include proper grazing use, adequate rest periods, and brush management. The soil has high potential as pastureland. Bermudagrass and lovegrass are well suited.

Potential as cropland is medium. Terraces and contour cultivation help control erosion.

This soil has high potential for most urban uses. Low strength and slope are limitations for dwellings, small commercial buildings, local roads and streets, and sewage lagoon areas, but these limitations can be overcome by good design and careful installation. Capability subclass IIIe; Sandy Loam range site.

24—Duffau fine sandy loam, 1 to 5 percent slopes, eroded. This deep, well drained, gently sloping soil is on uplands. Areas are irregular in shape and range from 10 to 140 acres in size, but average about 20 acres. The soil has been subjected to moderate to severe sheet erosion and in places is dissected by small rills that can be obliterated by tillage. The rills are at varying intervals depending on water concentration and slope.

Typically, the surface layer is light brown, slightly acid fine sandy loam about 4 inches thick. The subsoil is yellowish red, neutral sandy clay loam to a depth of 46 loam caused by the mixing of the subsoil with the surface layer during plowing. Included soils make up less than 25 percent of any mapped area.

This soil is dominantly used as cropland. It has medium potential for row crops and small grains. Crop residues left on the surface help conserve moisture, slow runoff, reduce soil temperature, and maintain soil tilth and productivity. Terraces and contour cultivation help control erosion. Grain and forage sorghums are the best suited crops.

Potential is medium as pastureland. Well suited improved grasses are bermudagrass, lovegrass, and Kleingrass. The soil has medium potential for native plants.

This soil has high potential for most urban uses. Low strength and slope are limitations for dwellings, small commercial buildings, local roads and streets, and sewage lagoon areas, but these limitations can be overcome by good design and careful installation. Capability subclass IIIe; Sandy Loam range site.

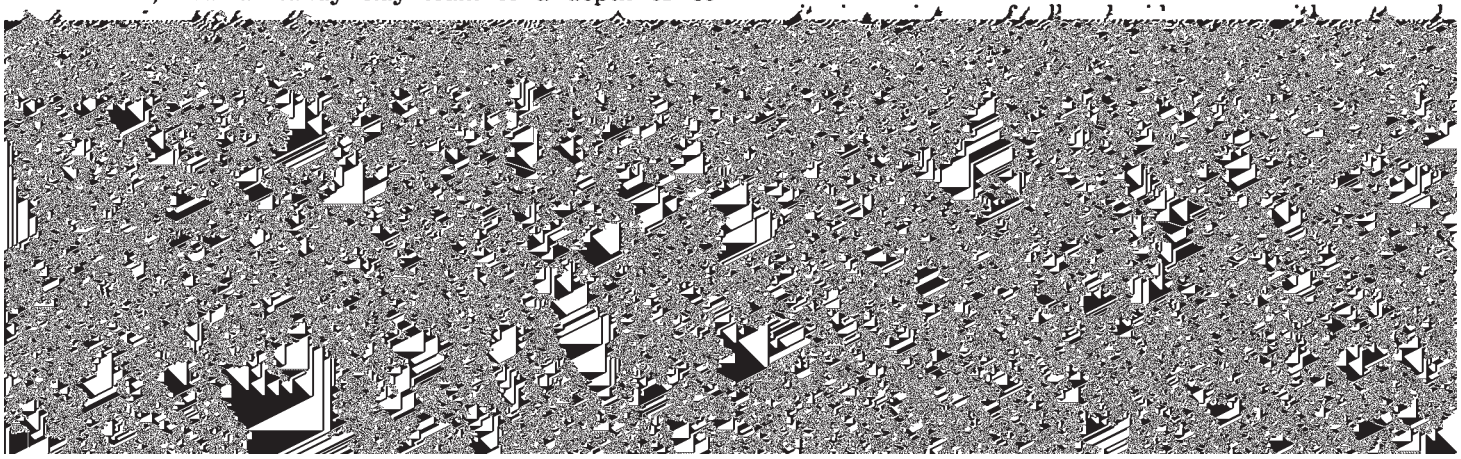
25—Duffau fine sandy loam, 5 to 8 percent slopes. This deep, well drained, sloping soil is on foot slopes on uplands. Areas are irregular in shape and range from 15 to 40 acres in size.

Typically, the surface layer is yellowish brown, slightly acid fine sandy loam about 4 inches thick. The subsurface layer is pale brown, slightly acid fine sandy loam to a depth of 10 inches. The subsoil is yellowish red, slightly acid sandy clay loam to a depth of 36 inches; and yellowish red, neutral sandy clay loam to a depth of 66 inches. The underlying material to a depth of 80 inches is pink, neutral, weakly cemented sandstone.

This soil is low in natural fertility and organic matter content. Permeability is moderate, and available water capacity is medium. The root zone is deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are small areas of Pedernales, Sunev, and Windthorst soils. Pedernales and Windthorst soils are on the higher parts of slopes. Sunev soils are below areas of limestone soils. Included soils make up less than 20 percent of any mapped area.

This soil is dominantly used as rangeland. It has medium potential for range production. The climax plant com-



Typically, the surface layer is dark grayish brown and very dark grayish brown, calcareous silty clay about 26 inches thick. The subsoil is grayish brown, calcareous silty clay that extends to a depth of 38 inches. The underlying material to a depth of 62 inches is pale brown, calcareous silty clay.

This is a productive soil. Organic matter content is high. Flooding occurs occasionally and very briefly, mostly in the period of May through October. Permeability is moderately slow, and available water capacity is high. The soil has good tilth but can be worked through only a narrow range of moisture content. The root zone is deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are small areas of Bosque, Venus, and Yahola soils. Bosque and Yahola soils are on flood plains. Venus soils are on uplands adjacent to flood plains. Included soils make up less than 20 percent of any mapped area.

This soil is dominantly used as cropland. It has high potential for row crops and small grains. Crop residues left on the surface help conserve moisture, slow runoff, reduce soil temperature, and maintain soil tilth and

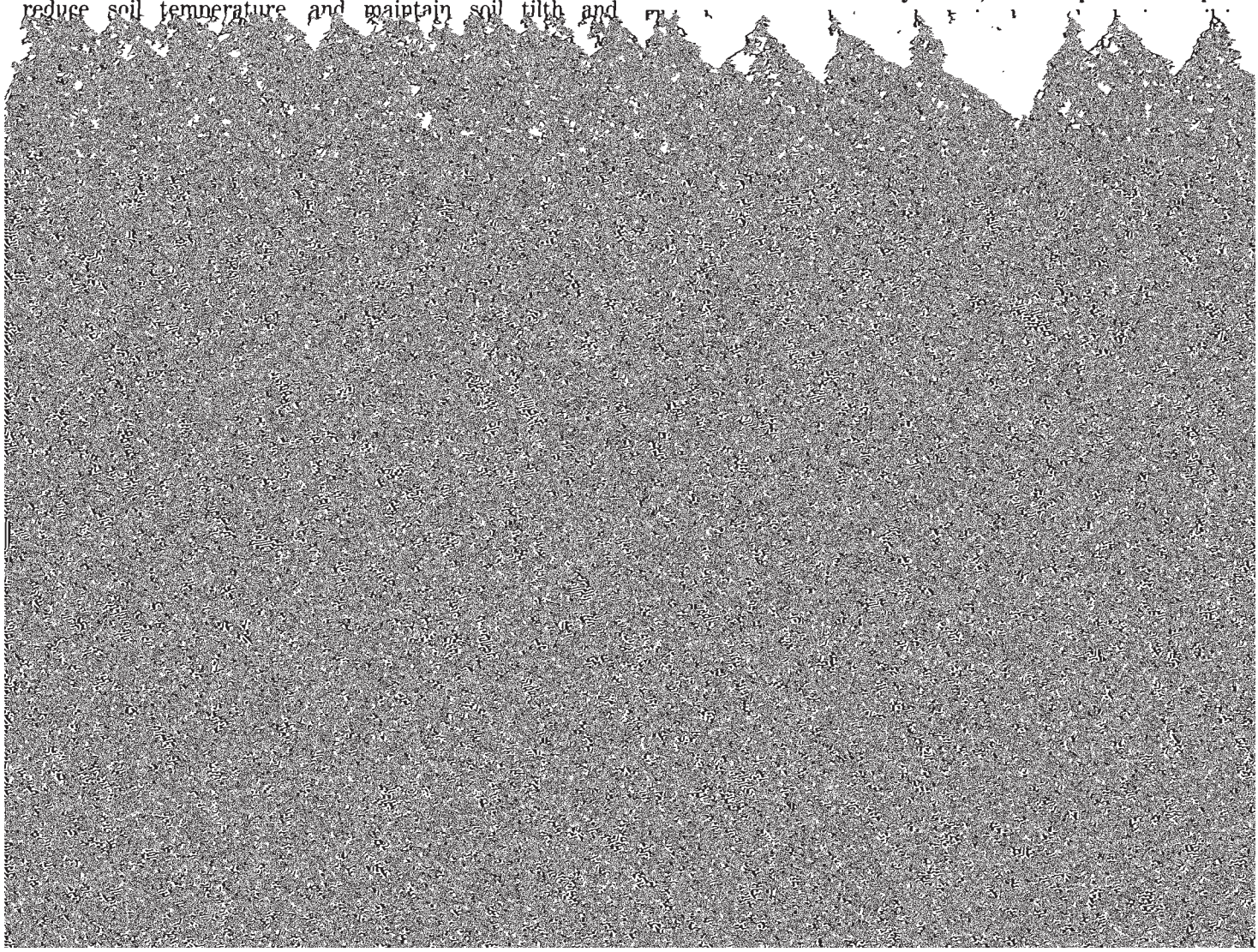
Included with this soil in mapping are small areas of Thurber soils. Also included are small areas of soils in which the surface layer is more than 20 inches thick and small areas of potholes or playas associated with soils on geologic terraces of the Brazos River. Some of these areas are more sandy than is typical for the series. Included soils make up less than 15 percent of any mapped area.

This soil is dominantly used as cropland. It has low potential for row crops or small grains. Crop residues left on the surface help maintain soil tilth and productivity. This soil has low potential as pastureland. Bermudagrass, lovegrass, and Kleingrass are suited.

Potential is low for native range plants. The soil is droughty and produces only moderate amounts of forage.

The soil has low potential for most urban uses. Shrinking and swelling with changes in moisture, low strength, and corrosivity to uncoated steel are the most restrictive features. Capability subclass IIIw; Claypan Prairie range site.

28—Hassee fine sandy loam, 1 to 3 percent slopes.



Potential is low as pastureland and for native range plants. The soil is droughty and produces only moderate amounts of forage.

This soil has low potential for most urban uses. Shrinking and swelling with changes in moisture, low strength, and corrosivity to uncoated steel are the most restrictive features. Capability subclass IIIe; Claypan Prairie range site.

ridges. Frio soils are in long, narrow, shallow drainageways close to large streams. Venus soils are in irregularly shaped areas and on small ridges adjacent to streams. Also included is a soil that is similar to Krum soils except that it has gilgai microrelief, and a soil that is noncalcareous in the upper 10 inches. Included soils make up less than 20 percent of any mapped area.

This soil is dominantly used as cropland. It has high

32—Maloterre gravelly clay loam, 1 to 8 percent slopes. This very shallow, somewhat excessively drained, gently sloping to sloping soil is on ridgetops. These ridgetops are mostly smooth but are benched in places. Fragments of limestone from 1 to 24 inches across cover from 1 to 30 percent of the surface. Areas are irregular in shape and range from 10 to 200 acres in size, but average about 50 acres.

Typically, the surface layer is light brownish gray, calcareous gravelly clay loam about 5 inches thick. Indurated limestone is at a depth of about 5 inches.

This soil is low in natural fertility. Permeability is moderately slow, and available water capacity is very low. The root zone is very shallow, and root movement is restricted by the limestone.

Included with this soil in mapping are small areas of Aledo, Bolar, Brackett, Purves, and Tarrant soils. Aledo temporary water table is perched above the sandy clay loam lower layers. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are small areas of Chaney, Demona, Patilo, and Windthorst soils. Chaney soils are in oblong areas on low knolls. Demona and Patilo soils are in no discernible pattern of occurrence. Windthorst soils are on high knolls and at the edges of mapped areas. Included soils make up less than 35 percent of any mapped area.

This soil is dominantly used as cropland. It has medium potential for row crops. Peanuts are well suited. Soil blowing is a hazard. Minimum tillage, stripcropping, and the use of cover crops, including grasses and legumes, help reduce runoff and control soil blowing. Crop residues

hazard. Crop residues left on the surface help conserve moisture, reduce soil temperature, and maintain soil tilth and productivity. Minimum tillage, stripcropping, and the use of cover crops, including grasses and legumes, help reduce runoff and control soil blowing. This soil has high potential as pastureland. Bermudagrass and lovegrass are well suited.

Potential as range is high. The climax plant community is a mixture of tall and mid grasses with scattered elm, hackberry, cottonwood, and pecan trees.

This soil has high potential for most urban uses. Seepage is a limitation for trench and area sanitary landfills and for sewage lagoon areas. Low strength is a limitation for local roads and streets, but this limitation can be overcome by good design and careful installation. Capability class I; Sandy Loam range site.

35—Paluxy very fine sandy loam, 1 to 3 percent limitation for local roads and streets, but this limitation can be overcome by good design and careful installation. Capability subclass IIe; Sandy Loam range site.

36—Paluxy very fine sandy loam, 5 to 8 percent slopes. This deep, well drained, sloping soil is on geologic terraces on banks or sharp rises adjacent to the flood plain of the Brazos River. Soil areas are long and very narrow in shape and range from 15 to 80 acres in size.

Typically, the surface layer is light brown, neutral very fine sandy loam about 12 inches thick. The subsoil is yellowish red, neutral very fine sandy loam to a depth of 21 inches and yellowish red, mildly alkaline very fine sandy loam to a depth of 37 inches. The underlying material to a depth of 62 inches is reddish yellow, calcareous very fine sandy loam.

Crops on this soil respond well to fertilization. Organic matter content is low. Permeability is moderately rapid,

and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots. In places during wet seasons, a temporary water table is perched above the sandy clay loam lower layers.

Included with the soil in mapping are small areas of Demona, Duffau, and Nimrod soils. Demona soils are in depressional areas. Duffau and Nimrod soils occur in a random pattern on the landscape. Also included is a soil that is similar to Patilo soils except that the sandy surface layer is thicker than 80 inches. Included soils make up less than 30 percent of any mapped area.

This soil is dominantly used as rangeland. It has low potential for range production. The climax plant community is a mixture of tall and mid grasses with scrub forests of post oak, blackjack oak, and greenbriers. Management concerns include proper grazing use, adequate rest periods, and brush management. This soil has medium potential as pastureland. Bermudagrass and lovegrass are well suited.

Potential is medium for row crops, especially peanuts, and for truck crops such as watermelons. Soil blowing is a hazard and can be controlled by planting cover crops, by stripcropping, and by using minimum tillage practices.

This soil has high potential for most urban uses. Seepage, sandy texture, and wetness are limitations. Capability subclass IIIe; Deep Sand range site.

38—Pedernales fine sandy loam, 1 to 3 percent slopes. This deep, well drained, gently sloping soil is on

climax plant community is a mixture of mid and tall grasses with scattered post oak and blackjack oak trees.

Potential is medium as cropland. Small grains and row crops such as grain or forage sorghums are well suited.

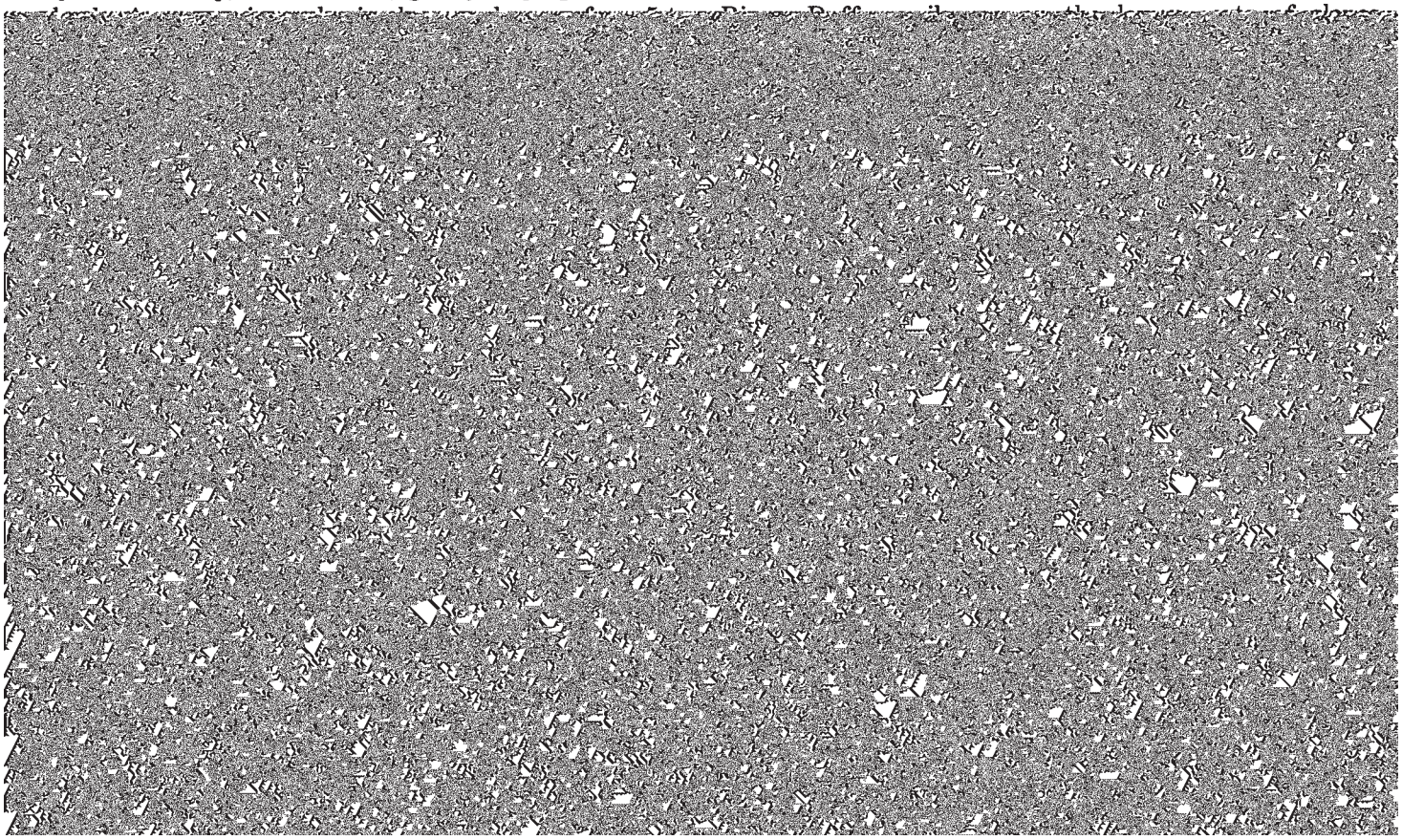
This soil has medium potential for most urban uses. The sandy clay subsoil takes in water slowly. This is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption area or by modifying the filter field. Capability subclass IIe; Tight Sandy Loam range site.

39—Pedernales fine sandy loam, 3 to 5 percent slopes. This deep, well drained, gently sloping soil is on plane to convex foot slopes. Areas are irregular in shape and range from 10 to 80 acres in size.

Typically, the surface layer is brown, slightly acid fine sandy loam about 13 inches thick. The subsoil is red, neutral sandy clay to a depth of 24 inches; yellowish red, mildly alkaline sandy clay to a depth of 37 inches; and reddish yellow, calcareous sandy clay to a depth of 45 inches. The underlying material to a depth of 62 inches is reddish yellow, calcareous sandy clay loam.

Crops on this soil respond well to fertilization. Organic matter content is low. Permeability is moderately slow, and available water capacity is high. The root zone is deep, but some root movement is restricted by the sandy clay lower layers.

Included with this soil in mapping are small areas of Bastrop, Duffau, Seawillow, and Windthorst soils. Bastrop soils are on the outer edges of terraces of the Brazos



neutral sandy clay to a depth of 18 inches; yellowish red, mildly alkaline sandy clay to a depth of 32 inches; and yellowish red, mildly alkaline sandy clay loam to a depth of 38 inches. The underlying material to a depth of 60 inches is reddish yellow, moderately alkaline sandy clay loam.

Crops on this soil respond well to fertilization. Organic matter content is low. Permeability is moderately slow, and available water capacity is high. The soil has fair tilth and can be worked best in only a narrow range of moisture content. The root zone is deep, but some root movement is restricted by the sandy clay lower layers.

Included with this soil in mapping are small areas of Duffau, Seawillow, and Windthorst soils. Duffau and Windthorst soils are in a random pattern. Seawillow soils are on the higher parts of slopes and on low knolls. Also included is a soil that is similar to Pedernales soils except that secondary carbonates occur within 28 inches of the surface. A soil in which the subsoil has been mixed with the surface layer to form a surface layer of loam or clay loam is included. Included soils make up less than 20 percent of any mapped area.

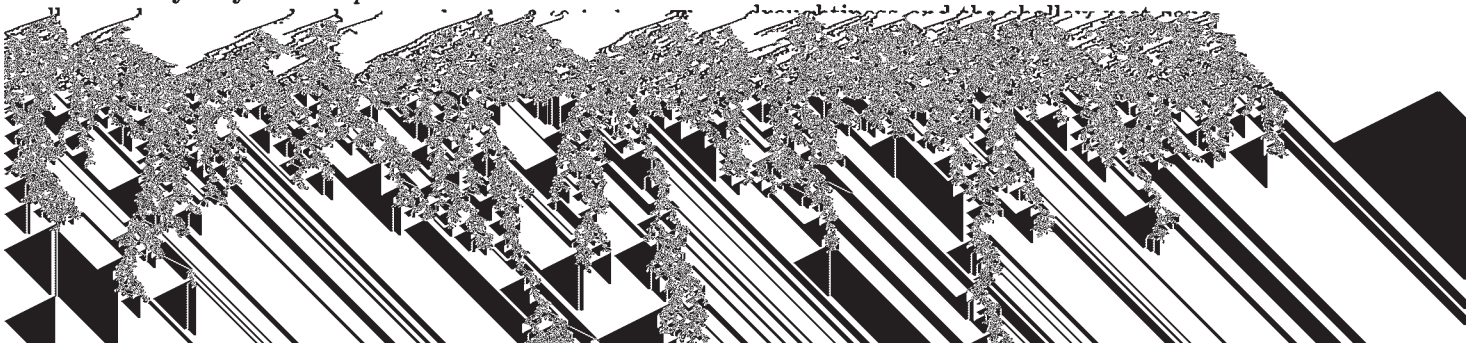
This soil is dominantly in old, abandoned cultivated fields and is used as range, but it has low potential for range production. The climax plant community is a mixture of mid and tall grasses with scattered post oak and blackjack oak trees. This soil has low potential for pastureland. Bermudagrass, lovegrass, and Kleingrass are suited.

Potential is low as cropland. Terraces and contour cultivation are needed to control erosion.

This soil has medium potential for most urban uses. The sandy clay subsoil takes in water slowly. This is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption area or by modifying the filter field. Capability subclass IIIe; Tight Sandy Loam range site.

41—Pedernales fine sandy loam, 5 to 8 percent slopes, eroded. This deep, well drained, sloping soil is on uplands on foot slopes and convex ridgetops. Areas are irregular in shape and range from 10 to 50 acres in size. There are a few shallow rills and gullies, and in some areas about 75 percent of the surface layer has been removed by sheet erosion.

Typically, the surface layer is brown, neutral fine sandy loam about 6 inches thick. The subsoil is yellowish red, neutral sandy clay to a depth of 34 inches and reddish



convex knolls. Windthorst soils are in a random pattern. Included soils make up less than 30 percent of any mapped area.

This soil is used as range. It has low potential for range production. The climax plant community is a mixture of mid and tall grasses with scattered post oak trees.

This soil has low potential as pastureland and cropland. The steeper slopes make it subject to erosion if natural vegetation is removed.

Potential for most urban uses is medium. The sandy clay subsoil takes in water slowly. This is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption area or by modifying the filter field. Slope is a limitation for sewage lagoons. Capability subclass VIe; Tight Sandy Loam range site.

42—Purves clay, 1 to 3 percent slopes. This shallow, well drained, gently sloping soil is in broad, plane to slightly convex areas on hilltops. Areas are irregular in shape and range from 5 to 90 acres in size.

Typically, the surface layer is very dark grayish brown, dark grayish brown, and brown, calcareous clay about 18 inches thick. Fractured limestone is at a depth of 18 inches.

This soil has high organic matter content. Permeability is moderately slow, and available water capacity is low. The soil has fair tilth and can be worked best under a narrow range of moisture content. The root zone is shallow, and root movement is restricted by the limestone bedrock.

Included with this soil in mapping are small areas of Bolar, Denton, Sunev, and Tarrant soils. Bolar soils are on the lower parts of slopes. Denton soils are on broad, plane slopes. Sunev soils are on the lower parts of slopes and in shallow drainageways. Tarrant soils are in oblong areas on the upper parts of slopes and on slightly higher ridges and knolls. Also included is a soil that is similar to Purves soils except that it is noncalcareous. Included soils make up less than 20 percent of any mapped area.

This soil is dominantly used as rangeland. It has medium potential for range production. The climax plant community is mainly mid grasses with a few live oak and mesquite trees. Management concerns include proper grazing use, adequate rest periods, and brush management.

Potential is low as pastureland and cropland because of

Typically, the surface layer is dark grayish brown and brown, calcareous clay to a depth of 12 inches and brown, calcareous very gravelly clay to a depth of about 17 inches. This is underlain by fractured limestone.

Potential as cropland is medium. Small grains are the main crop. Terraces are necessary on this gently sloping soil to control erosion.

This soil has medium potential for most urban uses.

are in narrow bands below the limestone hills. Pedernales soils are in areas intergrading between sandier soils and soils on limestone hills. Purves soils are in a circular pattern on low hills on knobs. Seawillow soils occur in a random pattern. Included soils make up less than 20 percent of any mapped area.

The soil is dominantly used as rangeland. It has high potential for range production. The climax plant community is a mixture of tall and mid grasses with scattered live oak trees. Management concerns include proper grazing use, adequate rest periods, and brush management. This soil has medium potential as pastureland. Kleingrass and bermudagrass are well suited.

48—Tarrant-Bolar association, hilly. This unit consists of hilly, stony soils on uplands. Areas have a complex surface and a slight stairstep appearance on longer slopes and a plane or convex appearance on shorter slopes. Tarrant soils typically have slopes of 10 to 30 percent. Bolar soils have slopes of 5 to 8 percent. Fragments of limestone from 3 inches to 3 feet across the long axis cover from 5 to 60 percent of the surface. Areas are irregular in shape and range from 25 to 1,000 acres in size, but average about 150 acres.

About 62 percent of this association is Tarrant soils, about 20 percent is Bolar soils, and about 18 percent is

Potential is low for most urban uses. Depth to rock, stones, and slope are limitations that are difficult to over-

These soils have low potential for most urban uses. Stones, depth to rock, and slope are limitations that are

ty is medium. The soil has poor tilth and can be worked well under only a narrow range of moisture content. The root zone is deep, but root movement is restricted by the clayey lower layers.

Included with this soil in mapping are small areas of Pedernales and Windthorst soils. These soils are underlain by sandstone at a depth of less than 40 inches and are generally on ridgetops. Pedernales and Windthorst soils are in similar positions as Truce soils but formed over different material. Also included are areas of Truce soils that have a surface layer of sandy clay loam. Included soils make up less than 30 percent of any mapped area.

This soil is dominantly used as range. It has low potential for range production. The climax plant community is a mixture of short and mid grasses with scattered post oak and elm trees. Management concerns include proper grazing use, adequate rest periods, and brush management.

These soils are used as range. They have low potential for range production. The climax plant community is a mixture of short and mid grasses in a post oak savannah that includes scattered elm trees. Management concerns include proper grazing use, adequate rest periods, and brush management.

Potential is low as cropland and pastureland. Large stones and slow water intake are limitations that are very difficult to overcome.

Potential for most urban uses is low. Large stones, clay content, low strength, and slope are limitations that are very difficult to overcome. Capability subclass VIs; Tight Sandy Loam range site.

53—Venus loam, 1 to 3 percent slopes. This deep, well drained, gently sloping soil is on geologic terraces along small streams. Areas are long and narrow and range from 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown, cal-

34 inches. The lower part is reddish yellow, slightly acid sandy clay loam that has mottles of red and pale brown and extends to a depth of 46 inches. The underlying material to a depth of 62 inches is very pale brown, neutral fine sandy loam that contains pockets and lenses of reddish yellow sandy clay loam.

Crops on this soil respond well to fertilization. Organic matter content is low. Permeability is moderately slow, and available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep, but root movement is somewhat restricted by the sandy clay lower layers.

Included with this soil in mapping are small areas of Chaney, Duffau, and Pedernales soils. Chaney soils are in low-lying areas where extra moisture has accumulated. Duffau soils are in a random pattern. Pedernales soils are in circular areas on low knolls and at higher elevations. Also included are areas of Windthorst fine sandy loam and available water capacity is high. The soil has fair tilth and can be worked throughout a wide range of moisture content. The root zone is deep, but root movement is restricted by the sandy clay lower layers.

Included with this soil in mapping are small areas of Chaney, Duffau, and Pedernales soils. Chaney soils are in slightly concave areas. Duffau soils are in a random pattern. Pedernales soils are in circular to oblong areas on low knolls or in areas that are adjacent to soils over limestone. Included soils make up less than 20 percent of any mapped area.

This soil is dominantly used as cropland. It has high potential for row crops and small grains. Soil blowing is a hazard. Minimum tillage and the use of cover crops, including grasses and legumes, help reduce runoff and control soil blowing. Terraces and contour cultivation also help control erosion. This soil has high potential as pastureland. Bermudagrass and lovegrass are well suited.

Potential for range is high. The climax plant community

limestone. Included soils make up less than 20 percent of any mapped area.

This soil is dominantly used as range. It has medium potential for range production. The climax plant community is a mixture of tall and mid grasses with scattered post oak and blackjack oak trees. Management concerns include proper grazing use, adequate rest periods, and brush management. This soil has medium potential as pastureland. Improved grasses, such as bermudagrass and lovegrass, are suited.

Potential as cropland is medium. Terraces and contour cultivation are needed to control erosion.

This soil has medium potential for most urban uses. Slow water intake is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption area or by modifying the filter field. Low strength is a limitation for local roads and streets, but this limitation can be overcome by good design and careful installation. Capability subclass IIIe; Sandy Loam range site.

57—Windthorst fine sandy loam, 1 to 5 percent slopes, eroded. This deep, well drained, gently sloping soil is on uplands. Areas are irregular in shape and range from 6 to 150 acres in size. Sheet erosion has removed about 75 percent of the original surface layer. There are a few shallow gullies about 6 to 10 inches deep, but they can be crossed with farm machinery.

Typically, the surface layer is brown, slightly acid fine sandy loam about 5 inches thick. The upper part of the subsoil is red, slightly acid sandy clay that extends to a depth of 18 inches. The middle part is yellowish red, slightly acid sandy clay that has yellow mottles and that extends to a depth of 28 inches. The lower part is yellowish red, medium acid sandy clay that has very pale brown, red, and pale brown mottles and that extends to a depth of 38 inches. The underlying material to a depth of 56 inches is mottled yellow, brownish yellow, and very pale brown, slightly acid fine sandy loam. To a depth of 62 inches it is white, neutral, weakly cemented sandstone that contains lenses of yellowish sandy clay loam.

Crops on this soil respond well to fertilization. Organic matter content is low. Permeability is moderately slow, and available water capacity is high. The soil has poor tilth and can be worked best under a narrow range of moisture content. The root zone is deep, but root movement is restricted by the sandy clay lower layers.

Included with this soil in mapping are small areas of Chaney and Pedernales soils. Chaney soils are in shallow depressions. Pedernales soils are on high knolls. Also included are areas in which the surface layer has been mixed with the sandy clay lower layers to form a surface layer of loam and sandy clay loam. Included soils make up less than 20 percent of any mapped area.

This soil is dominantly used as pastureland. It has medium potential for improved grasses such as bermudagrass, lovegrass, and Kleingrass. Management concerns include proper grazing to maintain adequate stubble height, fertilization to replace soil nutrients, and spraying or shredding to control weeds. This soil has low potential as cropland. Terraces and contour cultivation are needed to control erosion.

Potential as range is low. The climax plant community is a mixture of tall and mid grasses with scattered post oak and blackjack oak trees.

This soil has medium potential for most urban uses. Slow water intake is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption area or by modifying the filter field. Low strength is a limitation for local roads and streets, but this limitation can be overcome by good design and careful installation. Capability subclass IIIe; Sandy Loam range site.

58—Windthorst fine sandy loam, 5 to 8 percent slopes, eroded. This deep, well drained, sloping soil is on foot slopes and convex ridges of uplands. Areas are irregular in shape and range from 15 to 60 acres in size. Sheet erosion has removed about 75 percent of the original surface layer. There are shallow rills and a few very shallow gullies about 6 to 14 inches deep.

Typically, the surface layer is brown, slightly acid fine sandy loam about 5 inches thick. The upper part of the subsoil is red, slightly acid sandy clay that extends to a depth of 19 inches; the middle part is red, medium acid sandy clay that has strong brown mottles and that extends to a depth of 36 inches. The lower part is mottled yellowish red, pale brown, and yellowish brown, medium acid sandy clay loam that extends to a depth of 42 inches. The underlying material to a depth of 62 inches is very pale brown, neutral, weakly cemented sandstone that contains lenses of yellowish sandy clay loam.

Crops on this soil respond well to fertilization. Organic matter content is low. Permeability is moderately slow, and available water capacity is high. The root zone is deep, but some root movement is restricted by the sandy clay lower layers.

Included with this soil in mapping are small areas of Duffau, Pedernales, and Seawillow soils. Duffau soils are on the lower parts of slopes. Pedernales soils are on the upper parts of slopes and on convex knolls. Seawillow soils are on the upper parts of slopes near areas of shallow limestone soils. Some soils have a surface layer of loam or sandy clay loam caused by the mixing of the lower layers with the surface layer. Included soils make up less than 30 percent of any mapped area.

This soil is dominantly used as range. It has low potential for range production. The climax plant community is a mixture of tall and mid grasses with scattered post oak and blackjack oak trees. Management concerns include proper grazing use, adequate rest periods, and brush management.

Potential is low as pastureland and cropland. Erosion is a hazard if the native vegetation is disturbed or removed.

This soil has medium potential for most urban uses. Slow water intake, low strength, and slope are limitations. Capability subclass VIe; Sandy Loam range site.

59—Windthorst complex, gullied. This map unit consists of deep, well drained, undulating soils on erosional uplands. Areas are irregular in shape and range from 5 to 100 acres in size. Slopes range from 1 to 8 percent.

About 60 percent of this unit is Windthorst soils, 10 percent is gullies at intervals of about 30 to 180 feet, and about 30 percent is minor soils. The gullies are about 3 to 6 feet deep and 6 to 12 feet wide. Areas between gullies are Windthorst soils that have surface texture of fine sandy loam, sandy clay, clay loam, or sandy clay loam. These gullies and the Windthorst soils are so intricately mixed or in such small areas that they cannnot be shown separately at the scale mapped.

These soils are so intricately mixed that they cannot be shown separately at the scale mapped.

Typically, Yahola soils have a surface layer of brown, calcareous, stratified fine sandy loam about 18 inches thick. The upper part of the underlying material is light brown, calcareous loam that extends to a depth of 28 inches. The middle part is reddish yellow, calcareous, stratified fine sandy loam that extends to a depth of 48 inches. The lower part to a depth of 62 inches is pink, calcareous, stratified loamy fine sand.

Crops on this soil respond well to fertilization. Organic matter content is low. Permeability is moderately rapid, and available water capacity is medium. The soil is

environment. Also, it can help avoid soil-related failures in uses of the land.

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

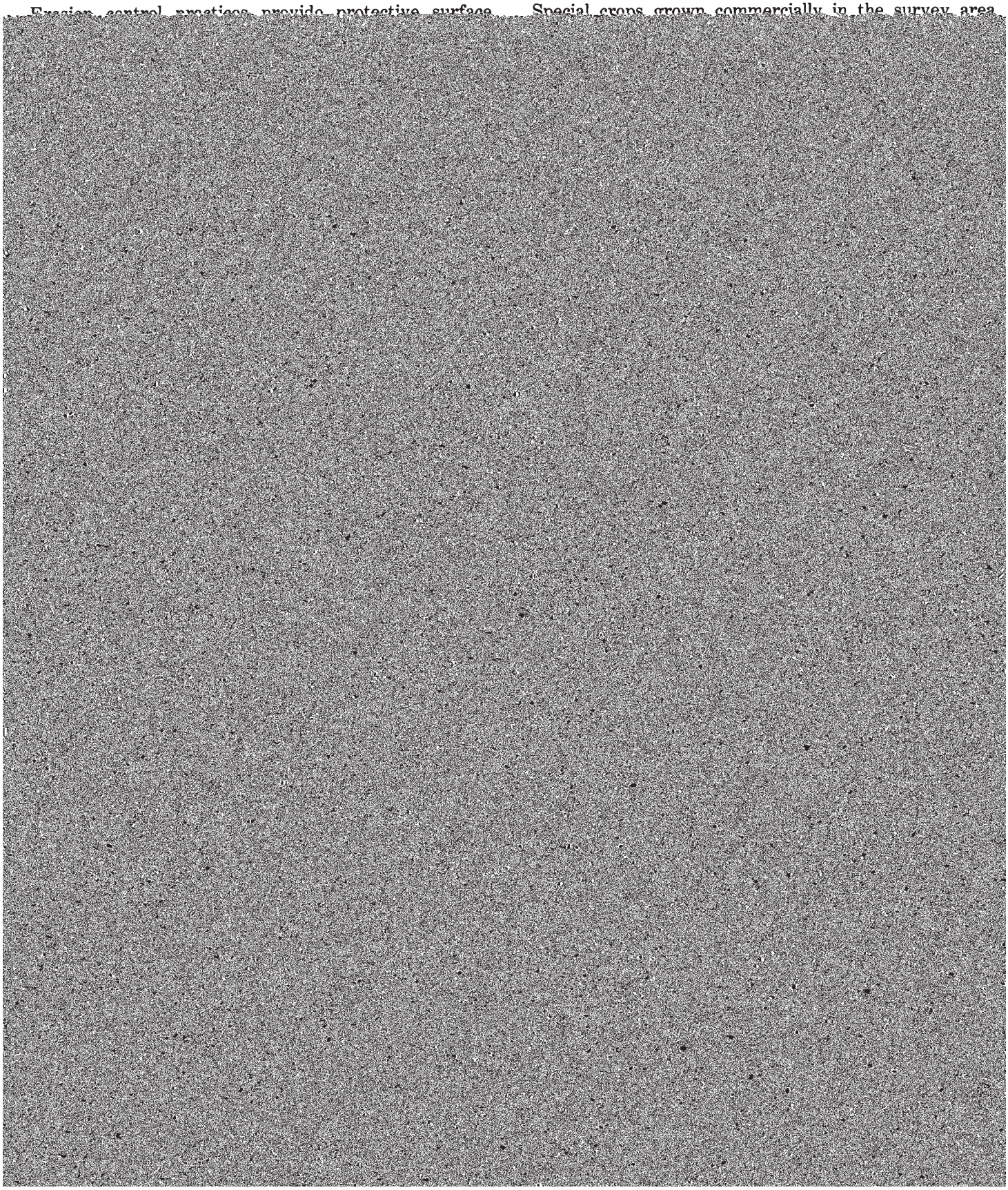
Information in this section is useful in planning use and management of soils for crops, pasture, and rangeland; as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recrea[illegible] useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms, should also consider the detailed information given in the description of each soil.

About 102,000 acres in the survey area is used for crops and pasture. Of this total about 11,000 acres is used for peanuts; 7,000 acres, for sorghums; 16,000 acres, for oats; and 68,000 acres is pasture or idle cropland.

The soils in Hood and Somervell County have high potential for increased production of food. Of the 211,000 acres of arable land in the survey area, only about 34,000 acres is farmed. In addition to the reserve productive [illegible]

Erosion control practices provide protective surface

Special crops grown commercially in the survey area



favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop;

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

Where climate and topography are about the same, differences in the kind and amount of vegetation that rangeland can produce are related closely to the kind of soil. Effective management is based on the relationships among soils, vegetation, and water.

Table 8 shows, for each kind of soil, the name of the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the expected percentage of each species in the composition of the potential natural plant community. Soils not listed cannot support a natural plant community of predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. The following are explanations of column headings in table 8.

A *range site* is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. Soils that produce a similar kind, amount, and proportion of range plants are grouped into range sites. For those areas where the relationship between soils and vegetation has been established, range sites can be interpreted directly from the soil map. Properties that determine the capacity of the soil to supply moisture and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

Potential production refers to the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the amount and distribution of precipitation and the temperatures are such that growing conditions are substantially better than average; in a normal year these conditions are about average for the area; in an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight refers to the total air-dry vegetation produced per acre each year by the potential natural plant community. Vegetation that is highly palatable to livestock and vegetation that is unpalatable are included. Some of the vegetation can also be grazed extensively by

particular range site. The more closely the existing community resembles the potential community, the better the range condition. The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the maximum production of vegetation, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

The soils in rangeland vary throughout the survey area from shallow, clayey soils over limestone to deep sands. Most of the rangeland in both counties consists of stony, shallow soils over limestone. The climax vegetation on these soils is an open tall and mid grass prairie. Potential productivity is only medium, but the vegetation produced is high in nutritive value. There are scattered areas in both counties of sandy loams and sands that support tall grass in an oak forest. Potential productivity is greater on the sandier soils, but the nutritive value of sandy soils is lower.

The major management concern on most of the rangeland is control of grazing so that the kinds and amounts of plants that make up the potential plant community are reestablished. This can be done by proper stocking and a deferred grazing system. Controlling brush is also important. This can be done mechanically, chemically, or biologically. Seeding adapted grasses, such as little bluestem, sideoats grama, indiangrass, and King Ranch bluestem, in areas of inadequate vegetation prevents excessive runoff and erosion and furnishes desirable forage. If sound range management based on soil survey information and range inventories is applied, potential is good for increasing the productivity of rangeland in the area.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, commu-

material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4)

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

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 9. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

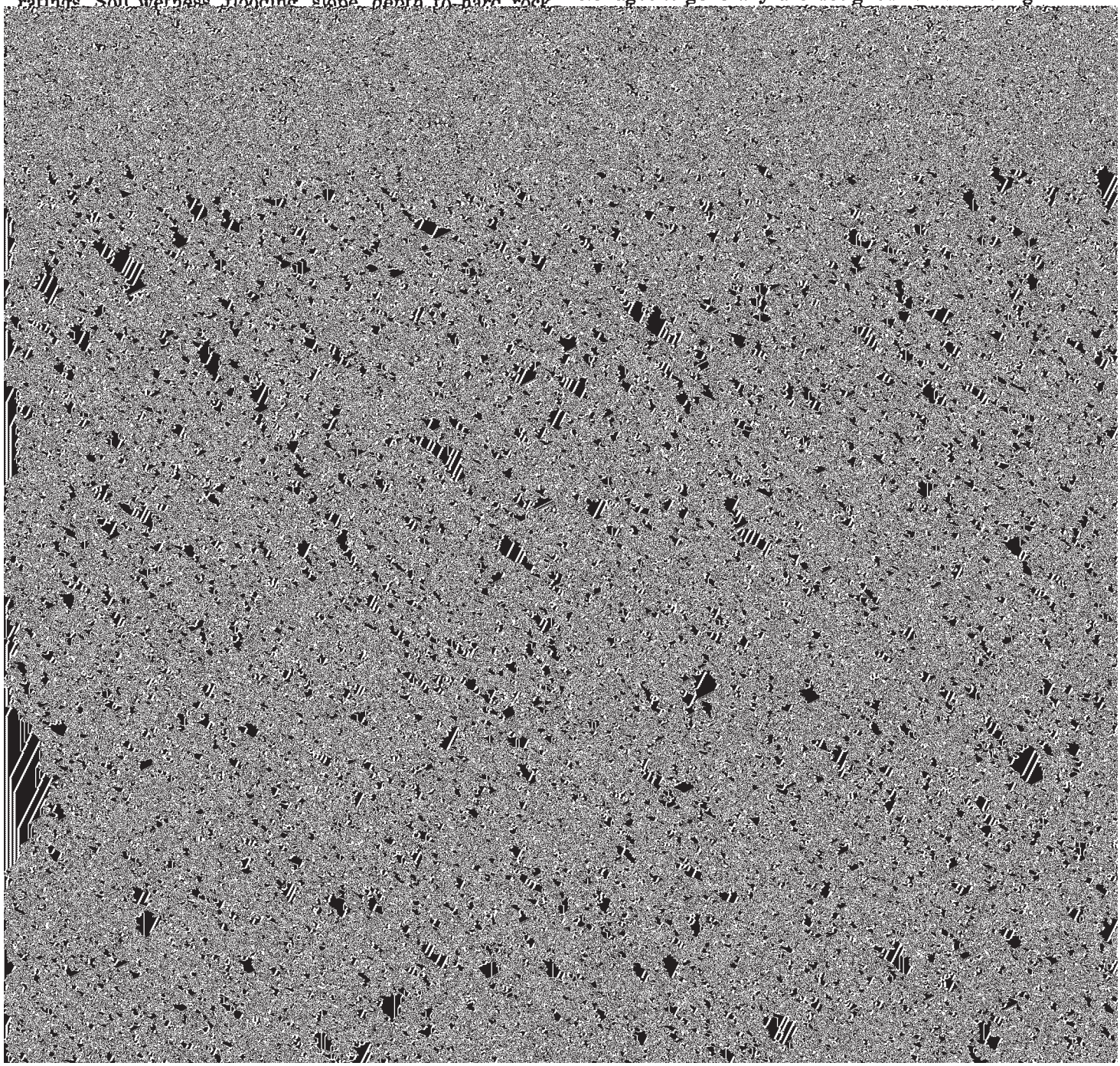
material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, and shrink-swell potential are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock

fluent, 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



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 [illegible]

stone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 16.

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 [illegible]

be overcome or modified by special planning and design. *Severe* means that the soil properties and site features are so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance is required.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

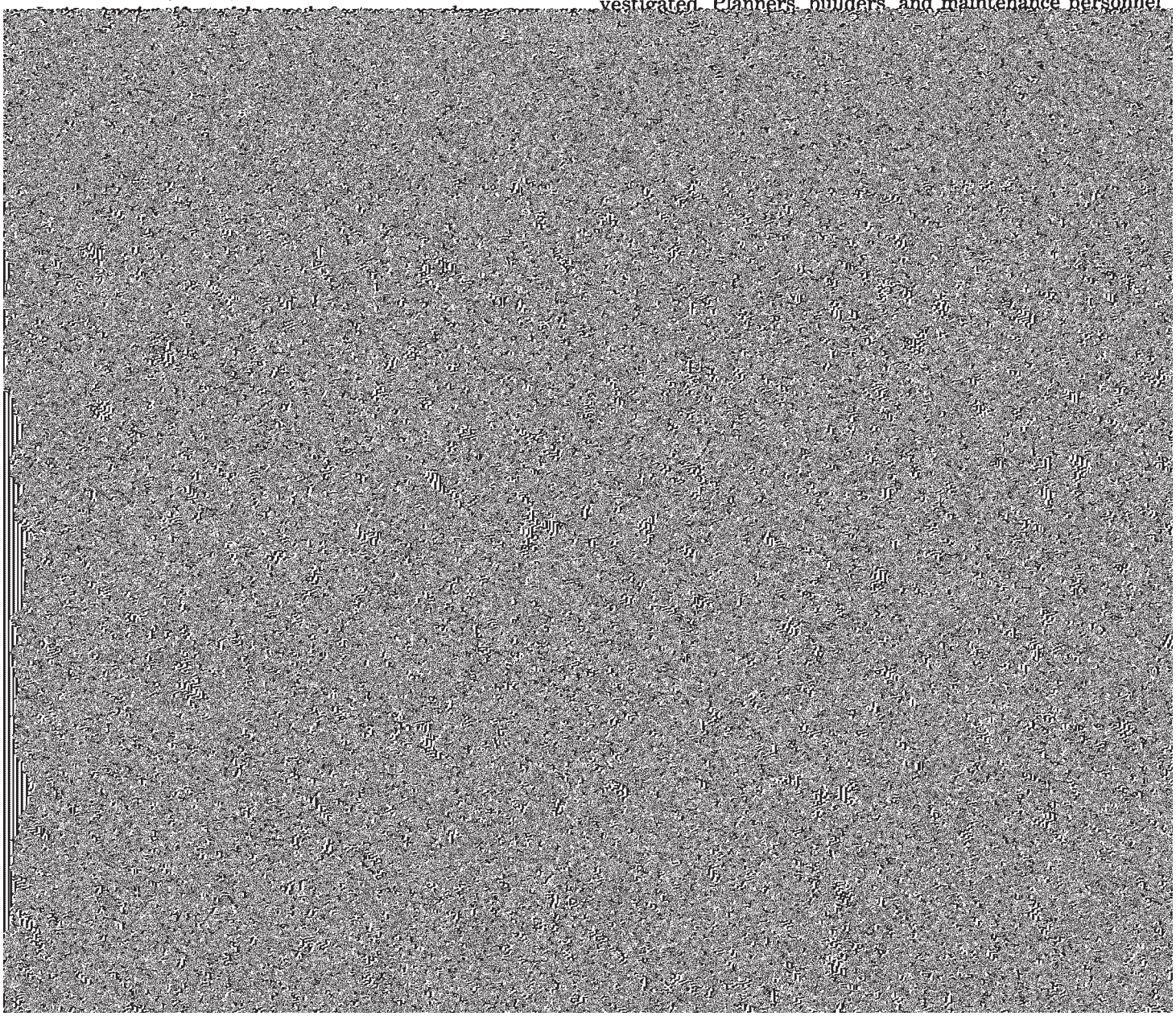
Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

properties that are important for town and country planning are also important for engineering. Information in the engineering sections of this soil survey, however, does not eliminate the need for more detailed onsite studies when soils are used intensively. Most soil map units contain areas of contrasting soils; these areas are too small to show separately on the soil map.

In this section site selection, foundation problems, sewage disposal systems, underground utility lines, and erosion and runoff are described in terms of their effect on urban and residential development.

Site selection

When a site is selected for the construction of urban works and structures, the soil needs to be carefully investigated. Planners, builders, and maintenance personnel



Denton and Krum soils are most likely to cause damage, and the lower layers of Hassee, Purves, Tarrant, and Thurber soils are also high in content of montmorillonite. Soils likely to swell and shrink enough to damage foundations are those that have a high liquid limit and high plasticity index, or the soils classified as CH in the Unified system of classification (see tables 16 and 19). Soils that are flooded, poorly drained, or have low strength or high corrosivity also merit special attention.

pipe. To prevent breakage, it may be necessary to cushion the pipes with sand.

Control of erosion and runoff

During urban construction the natural vegetation is generally removed and large areas are covered with pavement, concrete, and buildings. The amount of runoff from construction areas generally increases, and the pattern of runoff changes. Runoff after a heavy rain can be covered

factors can be partially overcome by increasing the strength of the structures. In Hood and Somervell Counties these soils often have additional factors, such as steep slopes, clay textures, surface stoniness, and high corrosivity to uncoated steel, that further lower their potential for urbanization.

Clay soils are difficult to excavate and move or manipulate. This adds additional cost to development and main-

activities are located adjacent to Lake Granbury and the Brazos and Paluxy Rivers. Existing water areas of one-fourth acre to 100 acres are abundant.

Dinosaur Valley State Park provides excellent recreatonal facilities. Tracks of several species of dinosaur are preserved in the limestone riverbed. Facilities include several picnic sites and a modern camping area.

About 50 historical markers and sites are located

areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

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

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

Wildlife habitat

EDWARD M. SCHWILLE, biologist, Soil Conservation Service, helped prepare this section.

Through management and manipulation of the habitat, wildlife in the survey area is increasing. Special emphasis is being given to the improvement of habitat for game species (fig. 11).

Major kinds of wildlife in the survey area are white-tailed deer, mourning dove, bobwhite quail, turkey, raccoon, opossum, striped skunk, ringtail cat, bobcat, coyote, red and grey fox, armadillo, fox and grey squirrel, and numerous songbirds. During the migration period, waterfowl such as northern mallard, pintail, teal, and canvasback ducks use existing water areas. Fishery resources abound in these water areas.

The golden-cheeked warbler, which is on the list of threatened and endangered species, lives in mature stands of Ashe juniper in the survey area. No other species on the list lives in this area.

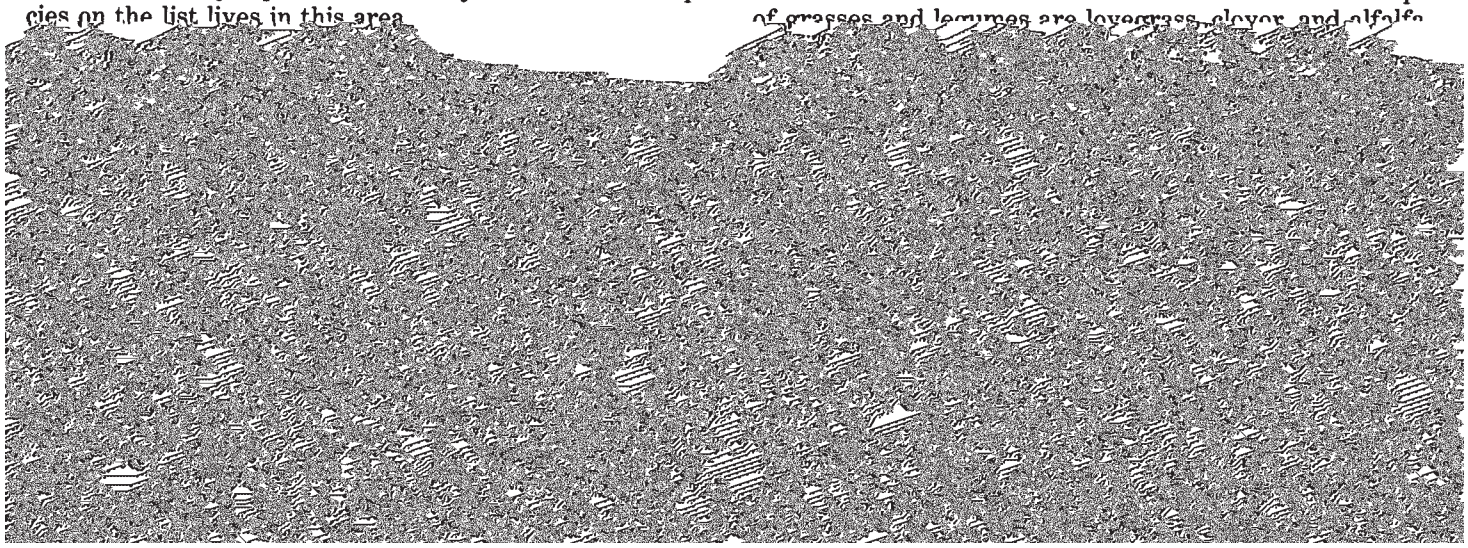
are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

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

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are lovegrass, clover, and alfalfa.



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. The kinds of wildlife attracted to these areas include bobwhite quail, meadowlark, cottontail rabbit, and red fox.

Rangeland habitat consists of areas of wild herbaceous

each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 16 in the standard terms used by the U.S. Department of Agriculture (*5*). These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Ranges in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 17 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment (*6*). The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can

4L. Calcareous loamy soils that are less than 35 percent. al. These soils have a very slow rate of water transmis-

Engineering test data

Table 19 contains the results of engineering tests performed by the Texas Highway Department on several important soils in Hood and Somervell Counties. The table shows the depth to which sampling was done and the results of tests to determine particle-size distribution and other properties significant in soil engineering.

The shrinkage limit is that point of moisture content of a drying soil at which shrinkage stops. As moisture leaves a soil, the soil shrinks. Volume decreases in direct proportion to the loss in moisture until a condition of equilibrium is reached where shrinkage stops although additional moisture is removed. The shrinkage limit is reported as the moisture content, as a percentage of the oven-dry weight of the soil, when shrinkage stops.

Linear shrinkage is the decrease in one dimention, expressed as a percentage of the original dimention, of the soil mass when the moisture content is reduced from the given value to the shrinkage limit. The data are used to give some indication of the amount of cracking that will take place in such soils and subgrades as a result of drying.

Shrinkage ratio is determined by taking the volume change of a soil from a wet stage to the shrinkage limit, and dividing this by the weight change of the soil during the same drying period. For this calculation, volume and weight changes are expressed as percentages of the volume and weight of the oven dry soil sample.

For explanations of the AASHTO and Unified classification systems, see the section "Engineering properties."

Mechanical analysis shows the percentages, by weight, of soil particles passing through sieves of specified sizes. Gravel ranges from 3 inches in diameter to just over 2 millimeters, the size of the No. 10 sieve. Sand ranges from 2 millimeters to just over 0.074 millimeter, the size of the No. 200 sieve. AASHTO standards define silt as soil particles between 0.074 millimeter and 0.005 millime-

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*5*). Unless otherwise noted, colors described are for dry soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or mapping units, of each soil series are described in the section "Soil maps for detailed planning."

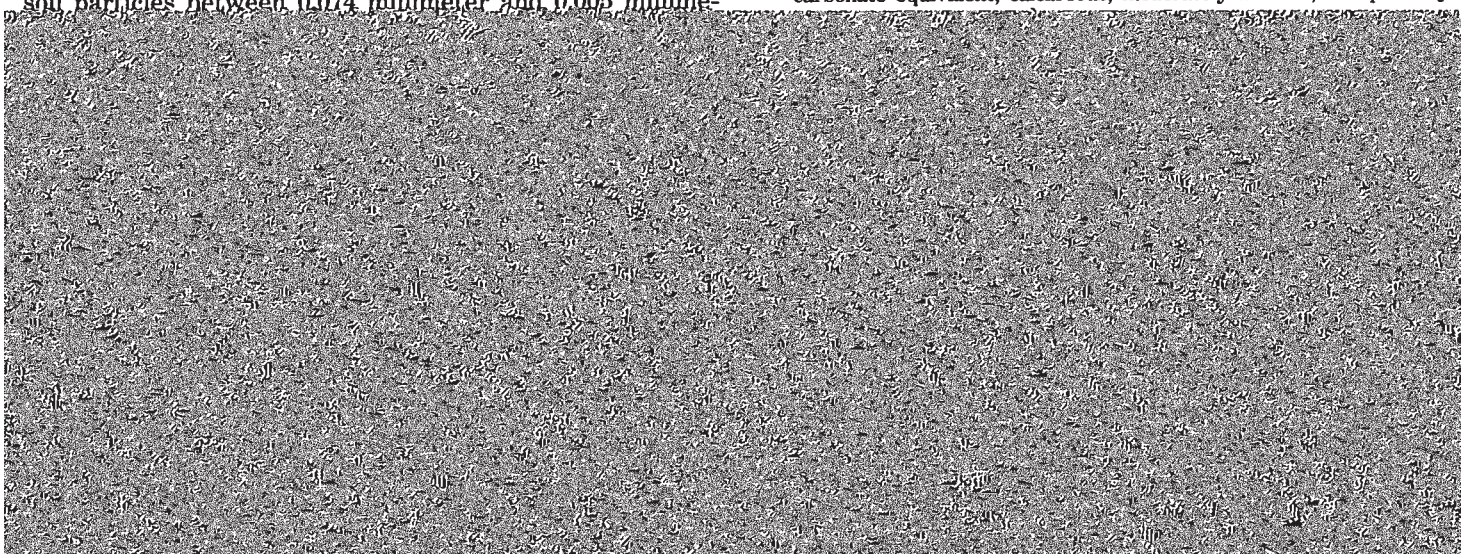
Aledo series

The Aledo series consists of very shallow to shallow, loamy soils that formed in interbedded limestone and marl on uplands. Slopes range from 1 to 8 percent.

Typical pedon of Aledo gravelly clay loam in an area of Aledo-Bolar association, undulating; from the intersection of Texas Highway 144 and U.S. Highway 377 in Granbury, about 7.6 miles east on U.S. Highway 377, and 600 feet south of highway in range:

A11—0 to 4 inches; dark grayish brown (10YR 4/2) gravelly clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; hard, friable; many fine roots; common fine pores; common wormcasts; about 20 percent by volume limestone fragments mostly about 1 to 3 inches across the long axis; fragments of limestone 1 to 8 inches across the long axis cover about 5 percent of the surface; about 48 percent calcium carbonate equivalent; calcareous; moderately alkaline; clear irregular boundary.

A12—4 to 14 inches; dark grayish brown (10YR 4/2) very gravelly clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; hard, friable; common fine roots; common fine pores; few wormcasts; about 75 percent by volume limestone fragments mostly 1 to 6 inches across the long axis; fragments have coatings of secondary calcium carbonate; about 54 percent calcium carbonate equivalent; calcareous; moderately alkaline; abrupt wavy



and U.S. Highway 67 in Glen Rose, about 4.2 miles east on U.S. Highway 67, and 350 feet south in a cultivated field:

B3ca—42 to 54 inches; brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; weak medium blocky structure; very hard, very firm; common films and threads of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary.

Cca—54 to 62 inches; grayish brown (10YR 5/2) clay, dark grayish

or exist as discontinuous remnant stone lines of limestone or petrocalcic horizons. Calcium carbonate content of the 10- to 40-inch control section is 40 to 75 percent.

The A horizon is grayish brown, dark grayish brown, very dark grayish brown, brown, or dark brown loam, clay loam, stony clay loam, or stony loam.

The B horizon is light brown, brown, pale brown, very pale brown, grayish brown, light brownish gray, light gray, yellowish brown, light yellowish brown, light olive brown, yellow, or pale yellow loam, silty clay loam, or clay loam. Some pedons have a B3ca horizon.

The R layer is indurated, fractured limestone that is interbedded with calcareous clayey marl or shale.

Bosque series

The Bosque series consists of deep, loamy soils that formed in calcareous alluvial sediments on bottom lands. Slopes range from 0 to 1 percent.

Typical pedon of Bosque loam, occasionally flooded; from the south end of the Paluxy River Bridge in Paluxy, about 1 mile south on Farm Road 204, and 150 feet west of road in pasture:

A11—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular and moderate fine subangular blocky structure; slightly hard, friable; many fine roots; calcareous; moderately alkaline; clear smooth boundary.

A12—6 to 20 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable; common fine roots; many very fine pores; many wormcasts; few films and threads of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary.

A13—20 to 30 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate fine subangular blocky structure; hard, firm; common fine roots; many fine pores; many films and threads of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary.

B2—30 to 46 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; hard, firm; many films and threads of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary.

C—46 to 62 inches; pale brown (10YR 6/3) clay loam, dark brown (10YR 4/3) moist; massive; hard, firm; many films and threads of calcium carbonate; calcareous; moderately alkaline.

The average texture of the 10- to 40-inch control section ranges from loam to clay loam, and clay content ranges from 20 to 35 percent. Some pedons contain a few fine siliceous or limestone pebbles.

The A horizon is brown, dark brown, grayish brown, dark grayish brown, or very dark grayish brown. It is mildly alkaline or moderately alkaline and is calcareous.

The B horizon is light brown, brown, pale brown, very pale brown, grayish brown, light brownish gray, or light yellowish brown loam or clay loam and has lenses of fine sandy loam in some pedons.

The C horizon ranges from fine sandy loam to clay. Some pedons include a buried horizon of dark grayish brown through very pale brown.

Brackett series

The Brackett series consists of shallow, loamy soils that formed in interbedded soft limestone and marly earth on uplands. Slopes range from 10 to 30 percent.

Typical pedon of Brackett loam, in an area of Brackett soils, hilly; from the intersection of U.S. Highway 67 and Farm Road 205 in Glen Rose, about 10 miles west on U.S. Highway 67, 0.6 mile north on Farm Road 204, and 150 feet south of road in range:

A1—0 to 4 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; moderate fine granular and subangular blocky structure; hard, friable; many fine roots and few medium roots; many wormcasts; many calcium carbonate concretions; about 30 percent fragments of limestone mostly less than 3 inches across occurring as a pavement on the surface; calcareous; moderately alkaline; clear wavy boundary.

B2—4 to 16 inches; very pale brown (10YR 8/4) clay loam, very pale brown (10YR 7/4) moist; moderate fine subangular blocky structure; hard, friable; few fine and medium roots; tongues of darker material from layer above in worm tunnels and root channels; many films and threads of calcium carbonate; common calcium carbonate concretions; calcareous; moderately alkaline; gradual smooth boundary.

Cr—16 to 40 inches; interbedded very pale brown (10YR 8/3) clay loam and weakly cemented, platy limestone fragments less than 3 inches across; massive; hard, friable; cleavage planes of rock structure evident in clay loam; few medium roots; calcareous; moderately alkaline.

Solum thickness ranges from 10 to 20 inches. Content of coarse fragments in the solum ranges from a few pieces of gravel-sized limestone to 35 percent, by volume, platy, weakly to strongly cemented fragments of limestone as much as 5 inches across the long axis. The soil, including the C horizon, has calcium carbonate content of 40 to more than 80 percent excluding fragments coarser than 20 millimeters.

The A horizon is brown, grayish brown, light yellowish brown, light brownish gray, pale brown, very pale brown, or light gray loam, gravelly loam, gravelly clay loam, or clay loam.

The B horizon is grayish brown, brown, yellowish brown, light brownish gray, pale brown, light yellowish brown, light gray, very pale brown, or pale yellow loam, gravelly loam, clay loam, or gravelly clay loam.

The C horizon is light brownish gray, olive yellow, very pale brown, pale yellow, or white. Content of fragments of limestone is 25 to 50 percent, by volume. The C horizon is limy earths intermingled with limestone, calcareous silty shales, or marl.

Bunyan series

The Bunyan series consists of deep, loamy soils that formed in stratified alluvial sediments on bottom lands. Slopes range from 0 to 1 percent.

Typical pedon of Bunyan fine sandy loam, occasionally flooded; from the intersection of U.S. Highway 67 and Texas Highway 144 in Glen Rose, about 2.6 miles east on U.S. Highway 67, 3.1 miles south on Farm Road 200, and 825 feet north in pasture:

A1—0 to 8 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; massive; hard, friable; many fine roots; many fine pores; few strata about 0.5 inch thick of dark brown clay loam material; slightly acid; abrupt smooth boundary.

C1—8 to 20 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; massive; hard, firm; many fine roots; thin strata of darker material with evident bedding planes; neutral; gradual smooth boundary.

C2—20 to 34 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; massive; hard, firm; few fine roots; mildly alkaline; abrupt smooth boundary.

C3—34 to 45 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; massive; hard, friable; few fine roots; calcareous; moderately alkaline; clear smooth boundary.

C4—45 to 58 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable; few soft bodies of calcium carbonate in lower part; calcareous; moderately alkaline; abrupt smooth boundary.

C5—58 to 62 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; few fine faint yellowish mottles; massive;

very hard, very firm; common soft bodies of calcium carbonate; few black concretions; calcareous; moderately alkaline.

The 10- to 40-inch control section is fine sandy loam, loam, sandy clay loam, or clay loam. Clay content is 18 to 35 percent, and content of material coarser than very fine sand is more than 15 percent. Stratification varies from scarcely evident to pronounced.

The A horizon is dark grayish brown, grayish brown, light brownish gray, brown, or pale brown. Below a depth of 10 inches, some pedons contain thin layers that are darker than the allowable range of the surrow. It has prominent grayish or brownish mottles, and in some pedons the Bt horizon has a mottled matrix of reds, yellows, browns, and grays. Texture is sandy clay or clay, and clay content is 35 to 50 percent. Reaction is slightly acid or medium acid. The B3 horizon is mottled with brownish yellow, yellowish brown, red, pale brown, light gray, or gray. It is sandy clay loam or sandy clay.

The C horizon ranges from sandy loam through shaly clay. Some pedons have thin, weakly cemented, discontinuous sandstone layers in the C horizon. Reaction is moderately alkaline through medium acid. Some pedons contain a few films, threads, or soft bodies of calcium car-

A2—4 to 34 inches; very pale brown (10YR 7/3) loamy fine sand, pale brown (10YR 6/3) moist; single grained; slightly hard, loose; common fine and medium roots; few siliceous pebbles; slightly acid; abrupt wavy boundary.

B21t—34 to 40 inches; brownish yellow (10YR 6/8) sandy clay, yellowish brown (10YR 5/8) moist; common medium distinct mottles of red (2.5YR 4/8), yellowish brown (10YR 5/4), brownish yellow (10YR 6/6), and light brownish gray (10YR 6/2); weak coarse blocky structure; very hard, very firm; medium acid; gradual smooth boundary.

B22t—40 to 48 inches; light gray (10YR 7/2) sandy clay, light brownish gray (10YR 6/2) moist; common coarse prominent mottles of yellowish brown (10YR 5/8) and red (2.5YR 4/8); weak coarse blocky structure; very hard, very firm; medium acid; gradual smooth boundary.

B3—48 to 56 inches; light gray (10YR 7/1) sandy clay loam, gray (10YR 6/1) moist; common coarse prominent mottles of red (2.5YR 4/8, 5/8), yellowish brown (10YR 5/6), and brownish yellow (10YR 6/6); weak coarse blocky structure; very hard, very firm; medium acid; gradual wavy boundary.

C—56 to 80 inches; white (10YR 8/1) sandy clay loam, light gray (10YR 7/1) moist; few medium prominent mottles of light red (2.5YR 6/8), red (2.5YR 5/8), yellowish brown (10YR 5/6), and brownish yellow (10YR 6/6); massive; very hard, firm; strongly acid.

Solum thickness ranges from 50 to 80 inches. A temporary water table is perched on the clayey subsoil following periods of heavy rainfall.

The A horizon ranges in thickness from 20 to 40 inches. It is light brown, brown, grayish brown, dark grayish brown, or very pale brown. Reaction is slightly acid to mildly alkaline. The A2 horizon is pale brown, very pale brown, light brown, or reddish yellow. Reaction is neutral to medium acid.

The B2t horizon is red, light gray, or brownish yellow and has red, yellow, brown, or gray mottles. The B2t horizon ranges in texture from sandy clay to clay and in structure from weak coarse blocky to moderate fine blocky. The B2t horizon is strongly acid to slightly acid. The B3 horizon is red, light gray, brownish yellow, or reddish yellow and has red, yellow, or gray mottles. It is sandy clay loam or sandy clay.

Texture of the C horizon is sandy clay loam or sandy clay.

The Demona soils in this survey area are taxadjuncts to the Demona series because they do not have low-chroma mottles within 75 cm of the surface; otherwise, they are similar in morphology, use, behavior, and management.

Denton series

The Denton series consists of moderately deep, clayey soils that formed over fractured indurated limestone and interbedded marls on uplands. Slopes range from 1 to 5 percent.

Typical pedon of Denton clay, 1 to 3 percent slopes; from the intersection of U.S. Highway 67 and Texas Highway 144 in Glen Rose, about 5.7 miles east on U.S. Highway 67, 1.6 miles south on Farm Road 199, 1.8 miles southeast on Farm Road 200, and 1,920 feet east of highway in range:

A11—0 to 10 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm; many fine roots; common calcium carbonate concretions; calcareous; moderately alkaline; clear smooth boundary.

A12—10 to 24 inches; brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; very hard, very firm; common fine roots; common calcium carbonate concretions; calcareous; moderately alkaline; gradual smooth boundary.

A13—24 to 32 inches; brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; moderate medium angular blocky structure; very hard, very firm; few fine roots; common calcium carbonate concretions; few shell fragments; calcareous; moderately alkaline; abrupt irregular boundary.

Cca—32 to 38 inches; brown (10YR 5/3) very gravelly clay, brown (10YR 4/3) moist; massive; very hard, firm; about 60 percent by volume limestone fragments 0.5 inch to 4 inches across the long axis; many calcium carbonate concretions; calcareous; moderately alkaline; abrupt irregular boundary.

R—38 to 40 inches; fractured limestone.

Solum thickness ranges from 22 to 40 inches over limestone bedrock or over limestone bedrock interbedded with marly clay. Fragments of limestone smaller than 3 inches across make up from 0 to 20 percent of the soil mass. Silicate clay content ranges from 35 to 55 percent.

The A horizon is dark brown, brown, very dark brown, dark grayish brown, or very dark grayish brown. Chromas of 2 are caused not by wetness but by lime. The mollic epipedon ranges from 16 to 35 inches in thickness. Structure of the A horizon ranges from moderate medium subangular blocky to moderate medium fine angular blocky.

Some pedons have a B horizon of brown, yellowish brown, light olive brown, dark yellowish brown, dark brown, pale brown, or light yellowish brown clay, silty clay, or silty clay loam. Some pedons have stone lines in the B horizon.

The R layer ranges from fractured limestone bedrock interbedded with calcareous clayey marl to beds of limestone rubble with clayey marl in the interstices.

Duffau series

The Duffau series consists of deep, loamy and sandy soils that formed in sands, sandy clay loams, fine sandy loams, and weakly cemented sandstone on uplands. Slopes range from 1 to 8 percent.

Typical pedon of Duffau fine sandy loam, 1 to 3 percent slopes; from the intersection of U.S. Highway 67 and Texas Highway 144 in Glen Rose, about 2.7 miles east on U.S. Highway 67, 1.8 miles south on Farm Road 200, 0.2 mile south on county road, and 330 feet east of road in a cultivated field:

Ap—0 to 12 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; hard, friable; common fine roots; slightly acid; clear smooth boundary.

B21t—12 to 32 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate fine subangular blocky structure; hard, firm; few fine roots; common fine tubular pores; patchy clay films on surface of peds; neutral; gradual smooth boundary.

B22t—32 to 40 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak coarse subangular blocky structure; hard, firm; few patchy clay films on surfaces of peds; few black concretions; neutral; gradual smooth boundary.

B23t—40 to 64 inches; reddish yellow (7.5YR 6/6) sandy clay loam, strong brown (7.5YR 5/6) moist; common coarse prominent mottles of brownish yellow (10YR 6/6) and red (2.5YR 4/8); weak coarse subangular blocky structure; hard, firm; neutral; gradual wavy boundary.

C—64 to 80 inches; mottled reddish yellow (7.5YR 6/6), very pale brown (10YR 7/3), and yellowish red (5YR 5/8) fine sandy loam; pockets of sandy clay loam and thin discontinuous bands of weakly cemented sandstone; massive; slightly hard, friable; neutral.

Solum thickness ranges from 60 to about 80 inches. Content of fine siliceous or ironstone pebbles ranges from none to few throughout the solum.

The A1 horizon is light yellowish brown, yellowish brown, pale brown, light brown, brown, dark grayish brown, or grayish brown. The A2 horizon, where present, is 1 to 3 units of color value lighter than the A1 horizon. The A horizon is fine sandy loam or loamy fine sand. It ranges from slightly acid through mildly alkaline.

The B2t horizon is reddish brown, yellowish red, reddish yellow, red, very pale brown, or strong brown. The B23t horizon contains none to common reddish brown, brownish yellow, red, yellowish red, or strong

brown mottles. The B2t horizon is sandy clay loam or clay loam and has

loam and loam; calcareous; moderately alkaline; clear smooth boun

The B2tg horizon is dark gray, very dark gray, very dark grayish brown, or dark grayish brown. Some pedons have few to common fine reddish or yellowish mottles. Clay content in the B2tg horizon ranges from about 45 to 60 percent. The B2tg horizon is slightly acid through moderately alkaline.

The B3g and Cca horizons are light gray, gray, light brownish gray, grayish brown, dark grayish brown, very dark grayish brown, brown, dark brown, pale brown, or yellowish brown clay or clay loam. Reaction ranges from neutral through moderately alkaline. Some pedons contain a few fine pebbles of quartz in the B3g and Cca horizons.

Hensley series

The Hensley series consists of shallow, loamy soils that formed over indurated, fractured limestone on uplands. Slopes range from 0 to 3 percent.

Typical pedon of Hensley stony clay loam, 0 to 3 percent slopes; from the intersection of U.S. Highway 67 and Farm Road 205 in Glen Rose, about 10 miles west on U.S. Highway 67, 330 feet south of highway along fence line, and 150 feet east in range:

A1—0 to 4 inches; brown (7.5YR 4/2) stony clay loam, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; very hard, firm; many fine roots; fragments of limestone 3 to 6 inches across make up about 1 percent of this horizon and fragments of limestone from 3 inches to 10 feet across cover 15 percent of the surface; neutral; clear smooth boundary.

B2t—4 to 18 inches; reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; moderate medium blocky structure; extremely hard, very firm; few fine roots; few thin continuous clay films on faces of peds; 2 percent by volume limestone fragments 4 to 8 inches across in lower part; neutral; abrupt smooth boundary.

R—18 to 20 inches; limestone bedrock with a few fractures.

Solum thickness to the lithic contact ranges from 10 to 20 inches. Content of limestone and ironstone fragments and gravel sized ferruginous pebbles in the A horizon ranges from 0 to about 25 percent, by volume. Limestone fragments of gravel to stone size cover from 0 to about 40 percent of the surface.

The A horizon is dark reddish gray, reddish brown, or brown. It is loam, clay loam, stony loam, or stony clay loam. It is slightly acid through mildly alkaline.

The Bt horizon is reddish brown, dark reddish brown, red, or dark red. Texture of the Bt horizon, exclusive of limestone or ferruginous pebbles, is clay loam or clay, and clay content is 35 to 55 percent. Content of coarse fragments of gravel to cobble size ranges from 0 to 15 percent, by volume. The Bt horizon is neutral through moderately alkaline.

Krum series

The Krum series consists of deep, clayey soils that formed in calcareous, clayey sediments on uplands. Slopes range from 0 to 3 percent.

Typical pedon of Krum clay, 1 to 3 percent slopes; from the intersection of U.S. Highway 67 and Texas Highway 144 in Glen Rose, about 1.0 mile east on U.S. Highway 67, 2.6 miles north on Texas Highway 144, and 150 feet east of highway in a cultivated field:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; very hard, very firm; common fine roots; few fine tubular

A1—7 to 29 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong medium angular blocky structure; very hard, very firm; few fine roots; shiny pressure faces on peds; common calcium carbonate concretions; calcareous; moderately alkaline; gradual smooth boundary.

B2—29 to 48 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; moderate medium angular blocky structure; very hard, very firm; streaks of darker material from horizon above in partially sealed cracks; few calcium carbonate concretions; calcareous; moderately alkaline; gradual smooth boundary.

C—48 to 62 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; massive; very hard, very firm; few calcium carbonate concretions; calcareous; moderately alkaline.

Solum thickness is 40 to 70 inches. The soils, when dry, have cracks 0.4 inch to 1.2 inches wide. These cracks extend from the surface to a depth of about 24 to 48 inches. The 10- to 40-inch control section is silty clay or clay, and clay content is 40 to 60 percent. Content of pebbles of limestone is 0 to 10 percent, and calcium carbonate equivalent is 5 to 25 percent.

The A horizon is very dark grayish brown, dark grayish brown, grayish brown, dark gray, brown, or dark brown. Thickness of an A horizon having moist color value and chroma of less than 3.5 is 14 to 36 inches. Texture is clay, silty clay, or silty clay loam, and the loamy textures are at a depth of less than 12 inches or in an Ap horizon. The A horizon is mildly alkaline or moderately alkaline, and the upper 10 inches is noncalcareous in some pedons.

The B horizon is brown, grayish brown, pale brown, yellowish brown, light yellowish brown, or light brown. Content of visible concretions and powdery bodies of calcium carbonate ranges from less than 1 percent to about 10 percent, by volume.

The C horizon is pale brown, light yellowish brown, brownish yellow, light brown, brown, reddish yellow, or light reddish brown silty clay loam, silty clay, or clay. Content of calcium carbonate concretions ranges from 2 to 20 percent, by volume.

Maloterre series

The Maloterre series consists of very shallow, loamy soils that formed over indurated limestone containing many imbedded fossil shells on uplands. Slopes range from 1 to 8 percent.

Typical pedon of Maloterre gravelly clay loam, 1 to 8 percent slopes; from the intersection of Texas Highway 144 and Farm Road 56 in Glen Rose, about 6 miles south on Texas Highway 144, about 1.9 miles west on county road, and 960 feet southwest in range:

A1—0 to 5 inches; light brownish gray (10YR 6/2) gravelly clay loam, grayish brown (10YR 5/2) moist; moderate fine subangular blocky and granular structure; hard, firm; few fine roots; about 20 percent by volume fossil shells and fragments of limestone 1 to 5 inches across; few fragments of limestone from 1 to 10 inches across are on the surface; calcareous; moderately alkaline; abrupt smooth boundary.

R—5 to 8 inches; limestone that contains many imbedded fossil shells.

Solum thickness ranges from 3 to 10 inches. Total clay content ranges from 30 to 45 percent, and the noncarbonate clay fraction is less than 35 percent. Content of fragments of limestone, commonly of gravel size, ranges from 5 to 35 percent, by volume. Calcium carbonate content in the fraction less than 20 millimeters ranges from 40 to 80 percent.

The A horizon is dark grayish brown, grayish brown, brown, light brownish gray, pale brown, or very pale brown. Where the A horizon has moist color value and chroma of less than 3.5, it is less than 4 inches thick. The A horizon is gravelly clay loam, gravelly clay, clay loam, or clay.

Nimrod series

The Nimrod series consists of deep, sandy soils that formed in sands, sandy loams, and sandy clay loams on uplands. In some places the materials have been reworked by wind. Slopes range from 1 to 5 percent.

Typical pedon of Nimrod fine sand, 1 to 5 percent slopes; from the intersection of U.S. Highway 377 and Farm Road 201 in Tolar, about 4.2 miles south on Farm Road 201, 1.2 miles west on paved county road, and 400 feet north in a cultivated field:

Ap—0 to 8 inches; pale brown (10YR 6/3) fine sand, brown (10YR 5/3) moist; single grained; loose; common fine roots; neutral; clear smooth boundary.

A2—8 to 26 inches; very pale brown (10YR 7/3) fine sand, pale brown (10YR 6/3) moist; single grained; loose; few fine roots; neutral; abrupt wavy boundary.

B21t—26 to 34 inches; brownish yellow (10YR 6/6) sandy clay loam, yellowish brown (10YR 5/6) moist; common coarse prominent mottles of light brownish gray (10YR 6/2) and red (2.5YR 4/8); weak fine blocky structure; extremely hard, firm; few fine roots; common fine tubular pores; few thin clay films on faces of peds; medium acid; gradual wavy boundary.

B22t—34 to 50 inches; brownish yellow (10YR 6/6) sandy clay loam, yellowish brown (10YR 5/6) moist; common coarse prominent mottles [illegible]

Ap—0 to 10 inches; brown (7.5YR 5/4) very fine sandy loam, dark brown (7.5YR 4/4) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable; few fine roots; slightly acid; clear smooth boundary.

B21—10 to 34 inches; reddish brown (5YR 5/4) very fine sandy loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few fine roots in upper part; few fine pores; few wormcasts; slightly acid; gradual smooth boundary.

B22—34 to 46 inches; yellowish red (5YR 5/6) very fine sandy loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure; slightly hard, friable; few insect burrows of darker color; neutral; gradual smooth boundary.

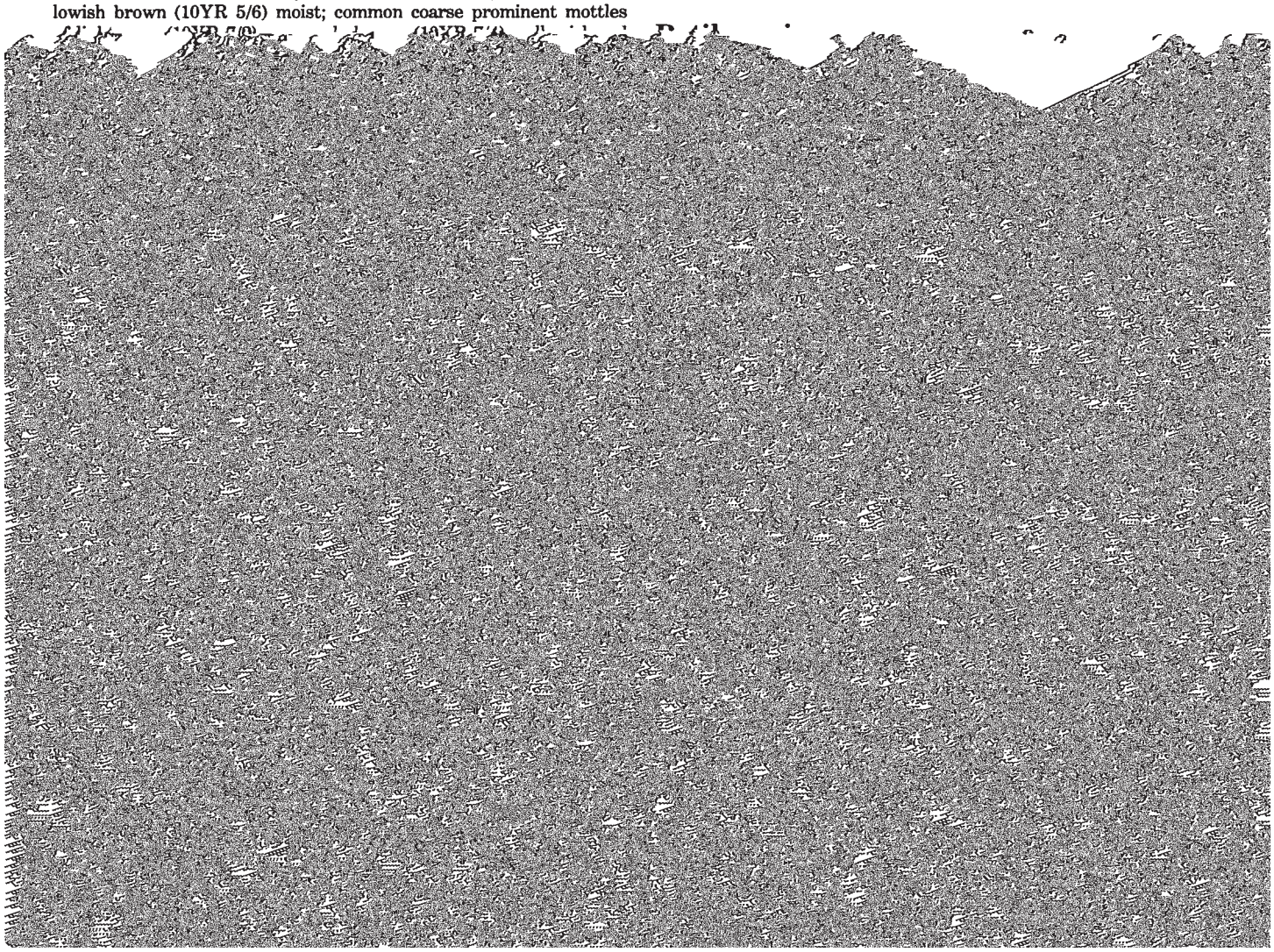
C—46 to 62 inches; reddish yellow (5YR 6/8) very fine sandy loam, yellowish red (5YR 5/8) moist; massive; slightly hard, friable; calcareous; moderately alkaline.

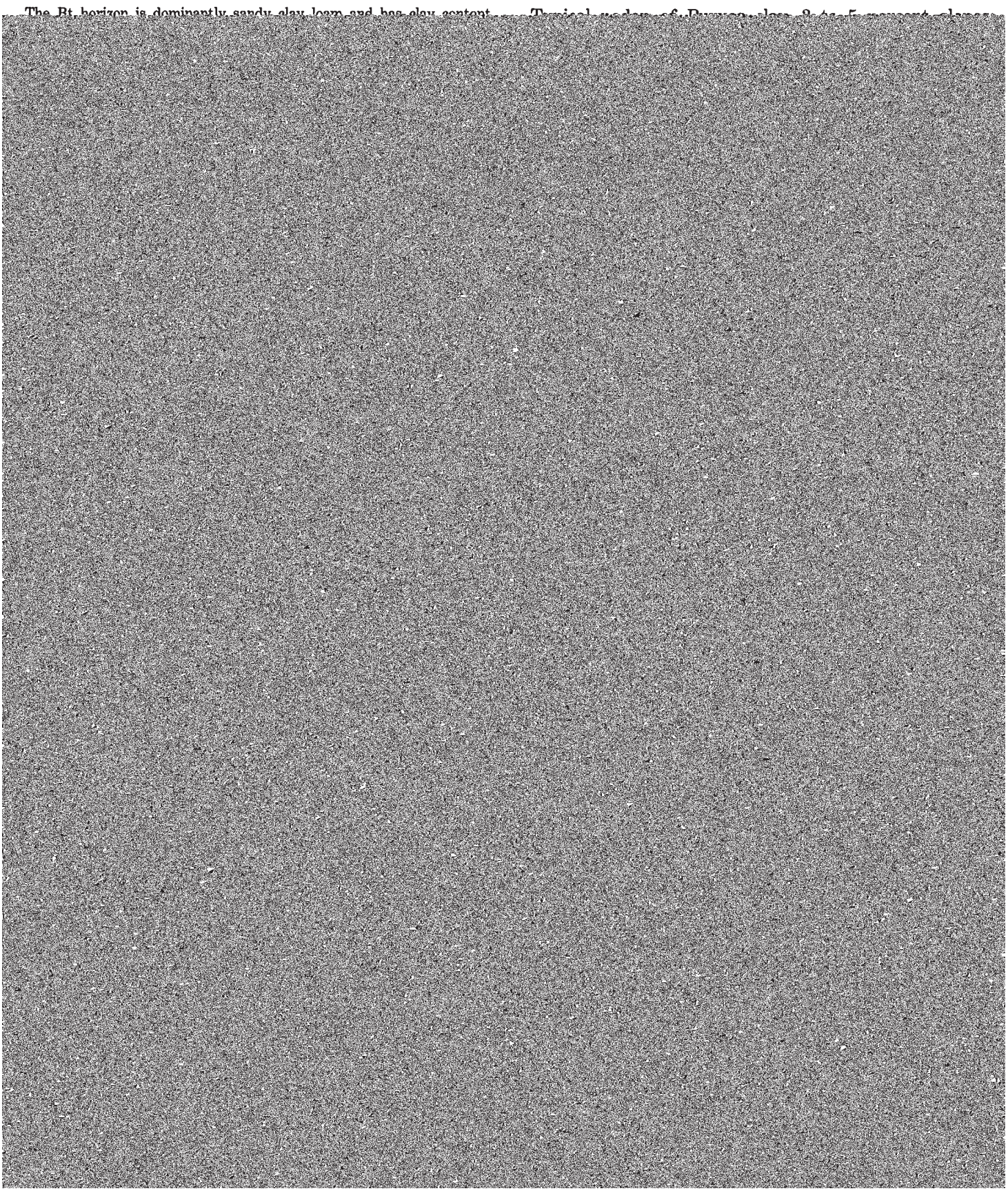
Depth to secondary calcium carbonate is 36 to 80 inches. Texture is very fine sandy loam or loam throughout, and the content of fine sand or coarser textured material ranges from 15 to 30 percent.

The A horizon is brown, yellowish brown, light brown, pale brown, or light yellowish brown. It is slightly acid or neutral.

The B horizon is reddish brown, yellowish red, or reddish yellow. It is slightly acid, neutral, or mildly alkaline.

The C horizon is reddish yellow, yellowish red, or strong brown. Visible calcium carbonate in the C horizon is in the form of films, threads, and soft bodies.





Sunev series

The Sunev series consists of deep, loamy soils that formed in ancient loamy alluvial sediments. Slopes range from 3 to 8 percent.

Typical pedon of Sunev clay loam, 3 to 5 percent slopes; from the intersection of Farm Road 51 and Farm Road 4 in Granbury, about 6.2 miles west on Farm Road 4, 0.7 mile north on ranch road, and 160 feet west in range:

A1—0 to 12 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate fine and medium granular structure; hard, friable; [illegible]

A12ca—6 to 14 inches; brown (10YR 4/3) very cobbly clay, dark brown (10YR 3/3) moist; moderate medium subangular blocky and granular structure; very hard, firm; few fine roots; about 75 percent by volume limestone fragments that are coated with calcium carbonate; calcareous; moderately alkaline; abrupt wavy boundary.

R—14 to 18 inches; fractured and platy limestone bedrock; about 1 percent by volume brown (10YR 4/3) clay, dark brown (10YR 3/3) moist, in vertical and horizontal cracks in limestone.

Thickness of solum ranges from 6 to 20 inches and corresponds with depth to indurated limestone. Content of coarse fragments in the solum is 35 to 85 percent; it ranges from 10 to 60 percent in the A11 horizon and from 70 to 90 percent in the A12 horizon. The content of coarse fragments greater than 3 inches across ranges from 25 to 70 percent.

B22t horizon. Structure ranges from moderate fine blocky to strong medium blocky.

The Cca and C horizons range from brownish calcareous clay loam to olive gray clay or shaly clay.

Truce series

The Truce series consists of deep, loamy soils that formed in materials weathered from shales and sandstones on uplands. Slopes range from 1 to 8 percent.

Typical pedon of Truce stony fine sandy loam, in an area of Truce stony soils, 1 to 8 percent slopes; from the intersection of Farm Road 4 and Farm Road 1189 in Lipan, about 1.5 miles north on paved county road, and 850 feet west in range:

A1—0 to 4 inches; brown (10YR 4/3) stony fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; very hard, friable; many fine roots; few siliceous pebbles; about 15 percent of the surface is covered with fragments of sandstone a few inches to 5 feet across the long axis; a few sandstone fragments throughout; neutral; abrupt smooth boundary.

A2—4 to 6 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; hard, friable; common fine roots; common siliceous pebbles; common fragments of sandstone; neutral; abrupt smooth boundary.

B21t—6 to 24 inches; yellowish red (5YR 5/6) clay, yellowish red (5YR 4/6) moist; moderate medium blocky structure; extremely hard, very firm; few fine roots; many clay films on faces of peds; few siliceous pebbles; slightly acid; gradual smooth boundary.

B22t—24 to 35 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; moderate medium blocky structure; extremely hard, very firm; common clay films on faces of peds; neutral; gradual wavy boundary.

B3—35 to 42 inches; yellowish brown (10YR 5/8) clay, yellowish brown (10YR 5/8) moist; weak coarse blocky structure; extremely hard,

Venus series

The Venus series consists of deep, loamy soils that formed in thick beds of unconsolidated, calcareous, loamy sediments on uplands. Slopes range from 1 to 3 percent.

Typical pedon of Venus loam, 1 to 3 percent slopes; from the intersection of Texas Highway 144 and Barnard Street in Glen Rose, about 0.8 mile southwest on Barnard Street, and 40 feet north in a cultivated field:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular and subangular blocky structure; hard, friable; common fine roots; few wormcasts; few siliceous pebbles; calcareous; moderately alkaline; abrupt smooth boundary.

A1—6 to 13 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, friable; few fine roots; few films and threads of calcium carbonate; calcareous; moderately alkaline; gradual smooth boundary.

B21ca—13 to 34 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; moderate fine granular structure; hard, friable; few fine roots; few wormcasts; common films and threads of calcium carbonate; few calcium carbonate concretions; few shell fragments; 20 percent calcium carbonate equivalent; calcareous; moderately alkaline; gradual smooth boundary.

B22ca—34 to 42 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate fine granular structure; hard, friable; common films and threads of calcium carbonate; many concretions and soft bodies of calcium carbonate; few fragments of limestone 1 to 8 inches across; 26 percent calcium carbonate equivalent; calcareous; moderately alkaline; gradual smooth boundary.

Cca—42 to 60 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; slightly hard, friable; many concretions and soft bodies of calcium carbonate; many pebbles and fragments of limestone 1 to 10 inches across; 38 percent calcium carbonate equivalent; calcareous; moderately alkaline.

The solum ranges from 40 to 70 inches in thickness. Some pedons are

B21t—5 to 18 inches; red (2.5YR 5/6) sandy clay, red (2.5YR 4/6) moist; strong medium blocky structure; extremely hard, very firm; few fine roots; nearly continuous clay films on faces of peds; slightly acid; gradual smooth boundary.

B22t—18 to 28 inches; yellowish red (5YR 5/8) sandy clay, yellowish red (5YR 4/8) moist; few fine faint yellowish mottles; moderate medium blocky structure; extremely hard, very firm; common discontinuous clay films on faces of peds; slightly acid; gradual smooth boundary.

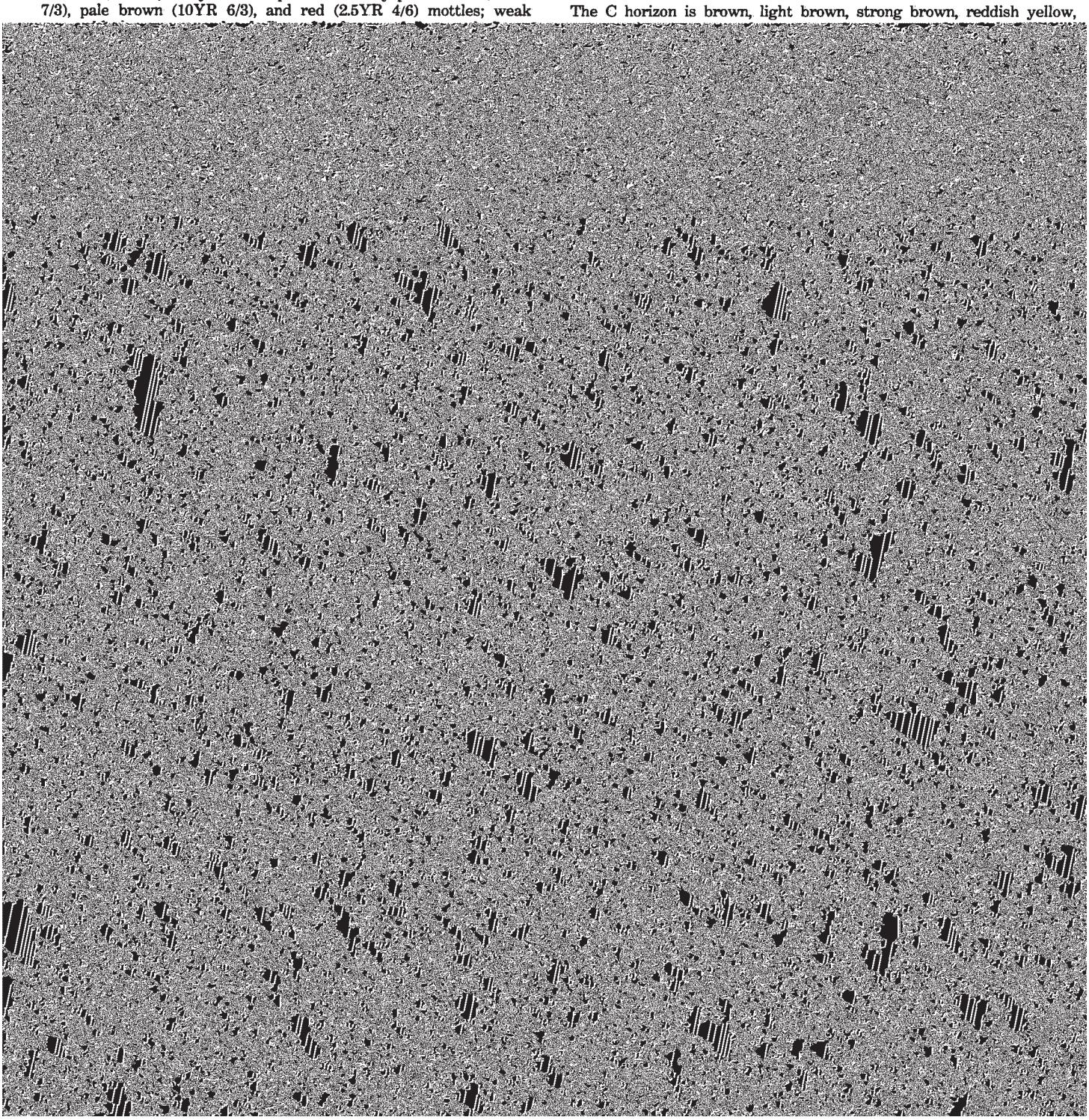
B3—28 to 38 inches; yellowish red (5YR 5/8) sandy clay, yellowish red (5YR 4/8) moist; many medium prominent very pale brown (10YR 7/3), pale brown (10YR 6/3), and red (2.5YR 4/6) mottles; weak

C3—48 to 62 inches; pink (7.5YR 7/4) loamy fine sand, light brown (7.5YR 6/4) moist; massive; loose, very friable; thin strata of fine sandy loam, loam, and silt loam; calcareous; moderately alkaline.

Buried soils occur below a depth of 30 inches in some areas.

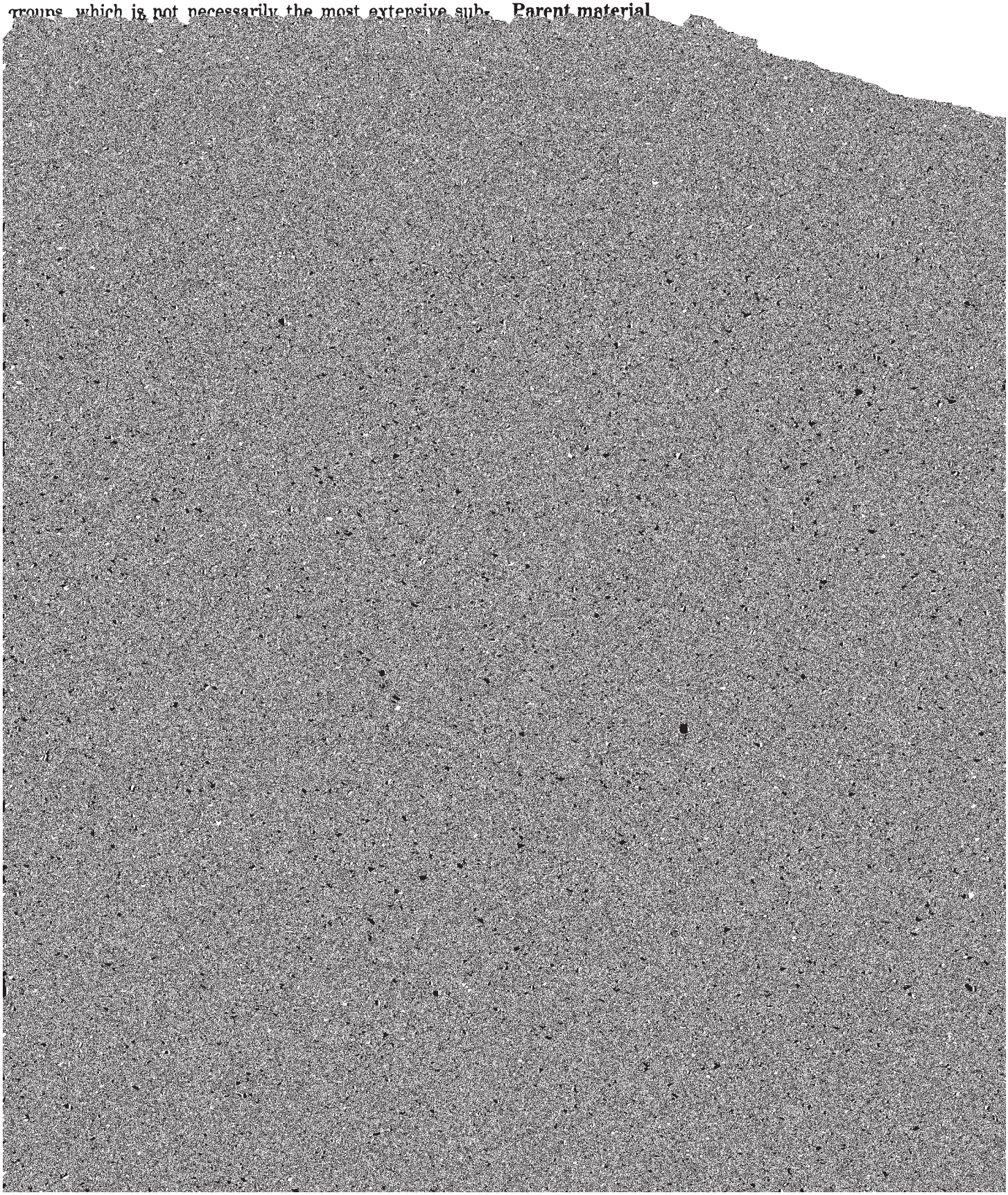
The A horizon is brown, pinkish gray, light brown, pink, strong brown, reddish yellow, dark reddish gray, reddish gray, reddish brown, light reddish brown, or yellowish red. It is mildly alkaline or moderately alkaline in the upper 10 inches and moderately alkaline and calcareous below.

The C horizon is brown, light brown, strong brown, reddish yellow,



groups, which is not necessarily the most extensive sub-

Parent material



and eventually the lower layers become clayey. Wind also affects the formation of soils in the survey area. Soil material that developed into Decordova, Nimrod, and Patilo soils has been reworked by wind.

Plant and animal life

Plants, animals, insects, micro-organisms, earthworms, and other forms of life that live on and in the soil contribute to its development. Gains in organic matter and nitrogen, gains or losses in plant nutrients, and changes in structure and porosity are among the changes caused by

Time

Time, usually a long time, is required for formation of soils that have distinct horizons. The differences in length of time that parent materials have been in place are generally reflected in the degree of development of the soil profile.

The soils in Hood and Somervell Counties range from young to old. The young soils have very little horizon development, and the older soils have well expressed soil horizons.

Runyan soils are examples of young soils that show lit-

	Inches
Very low	0 to 3
Low	3 to 6
Medium	6 to 9
High	More than 9

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common

Deferred grazing. A delay in grazing until range plants have reached a specified stage of growth. Grazing is deferred in order to increase the vigor of forage and to allow desirable plants to produce seed. Contrasts with continuous grazing and rotation grazing.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of

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.

Excess lime. Excess carbonates. Excessive carbonates, or lime, restrict the growth of some plants.

Fast intake. The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of

separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Invaders. On range, plants that encroach into an area and grow after

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0

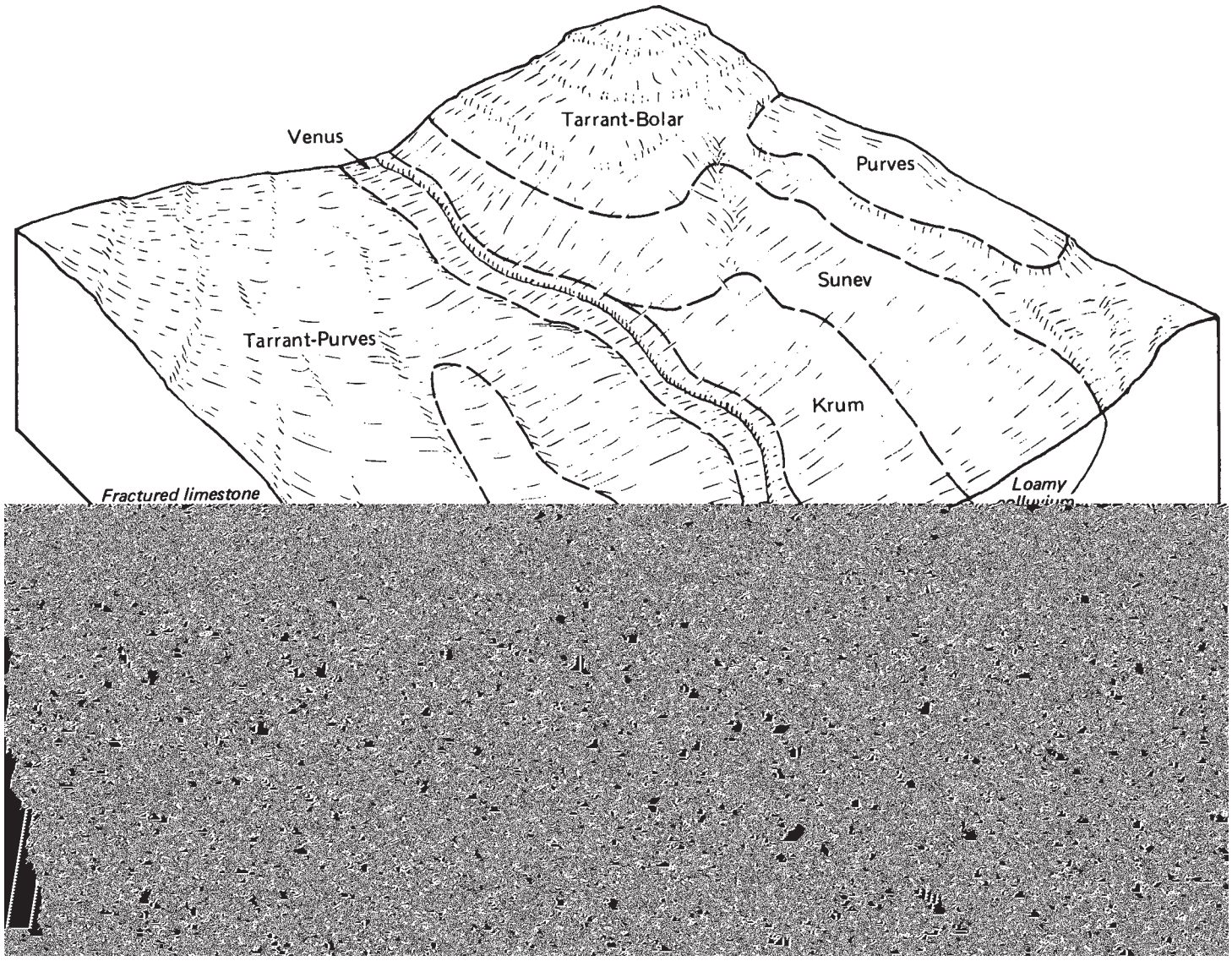
Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Illustrations


Tarrant-Bolar
Venus
Purves
Sunev
Tarrant-Purves
Krum
Fractured limestone
Loamy

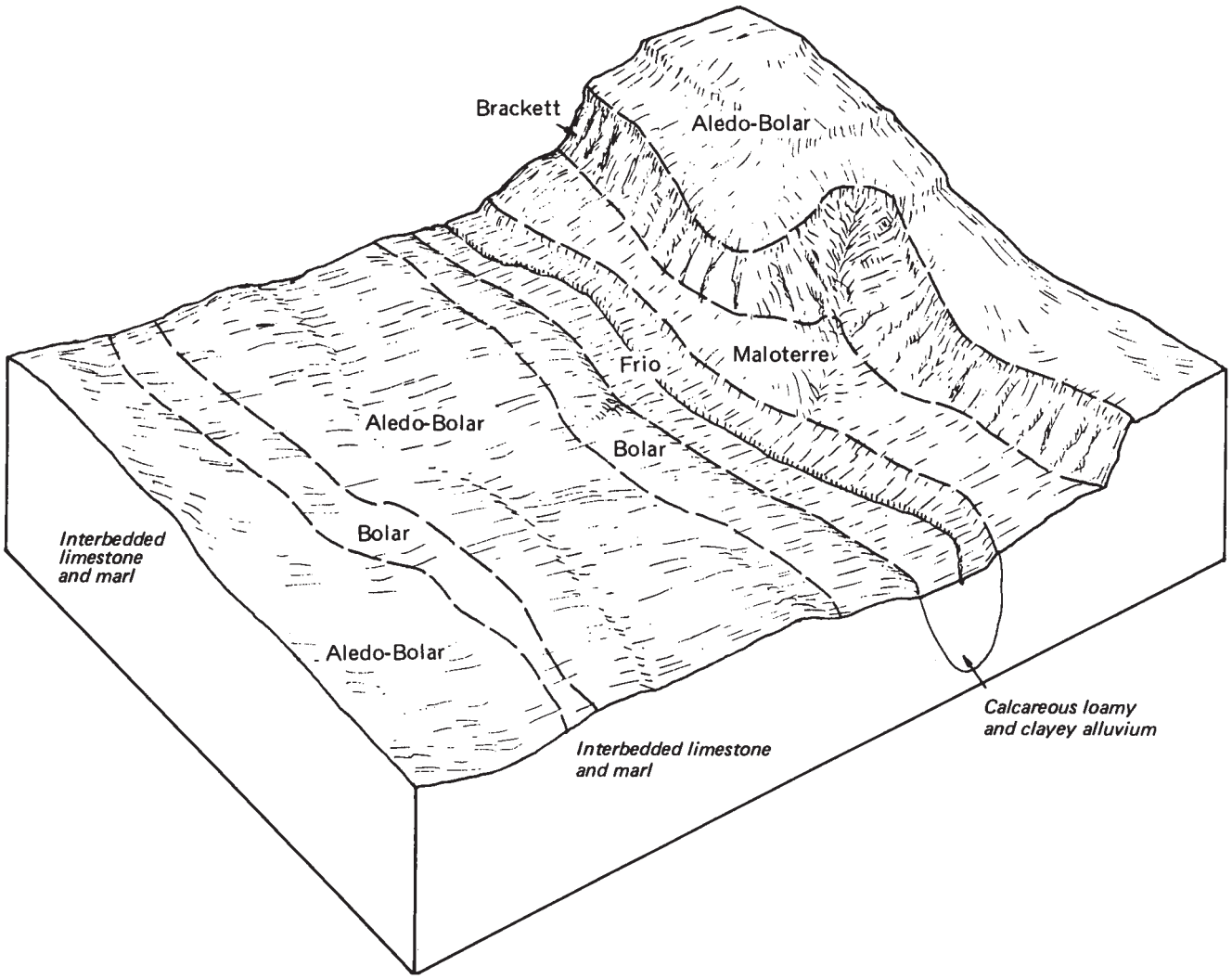
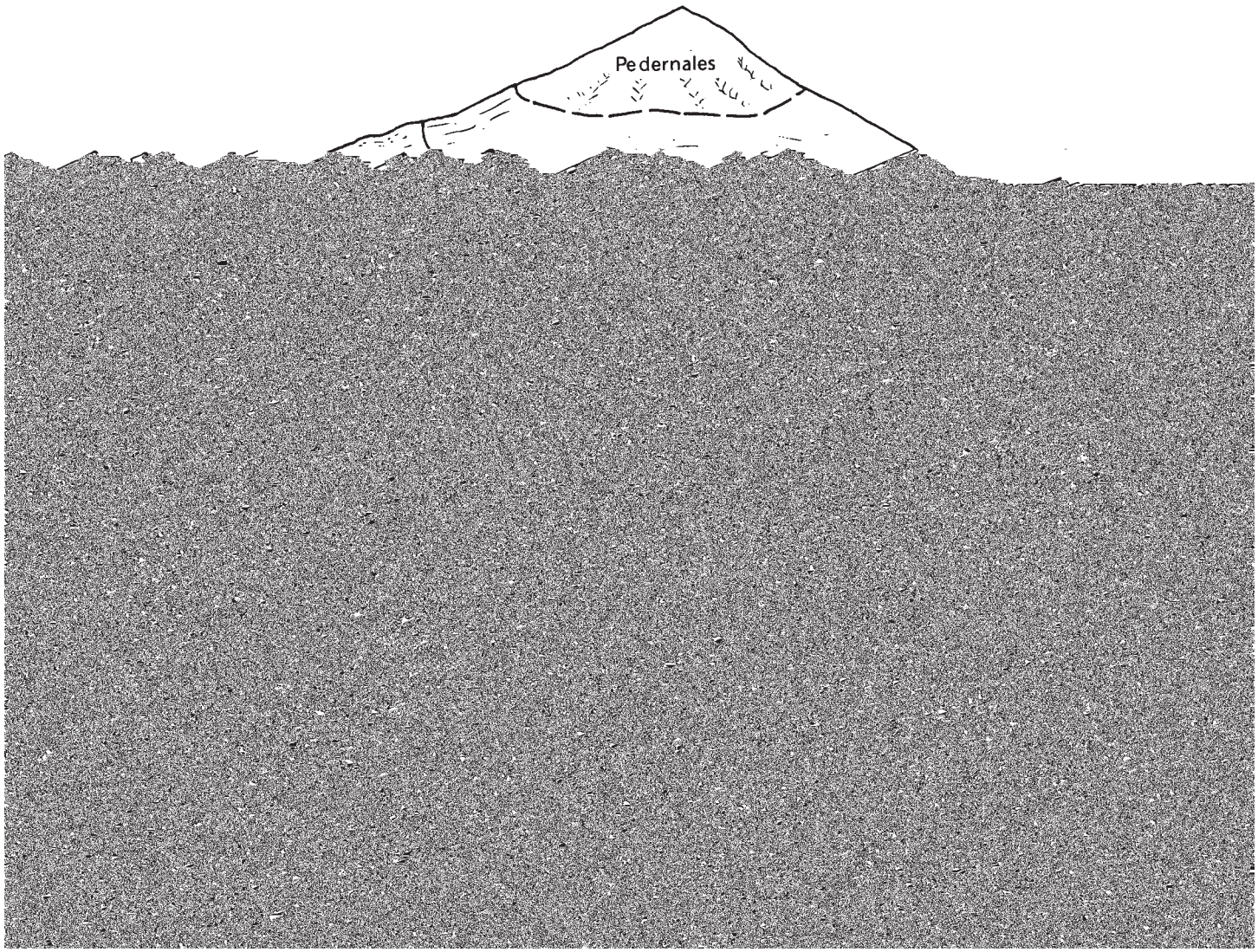


Figure 2.—Pattern of soils in the Aledo-Bolar unit on the general soil map.


Pedernales

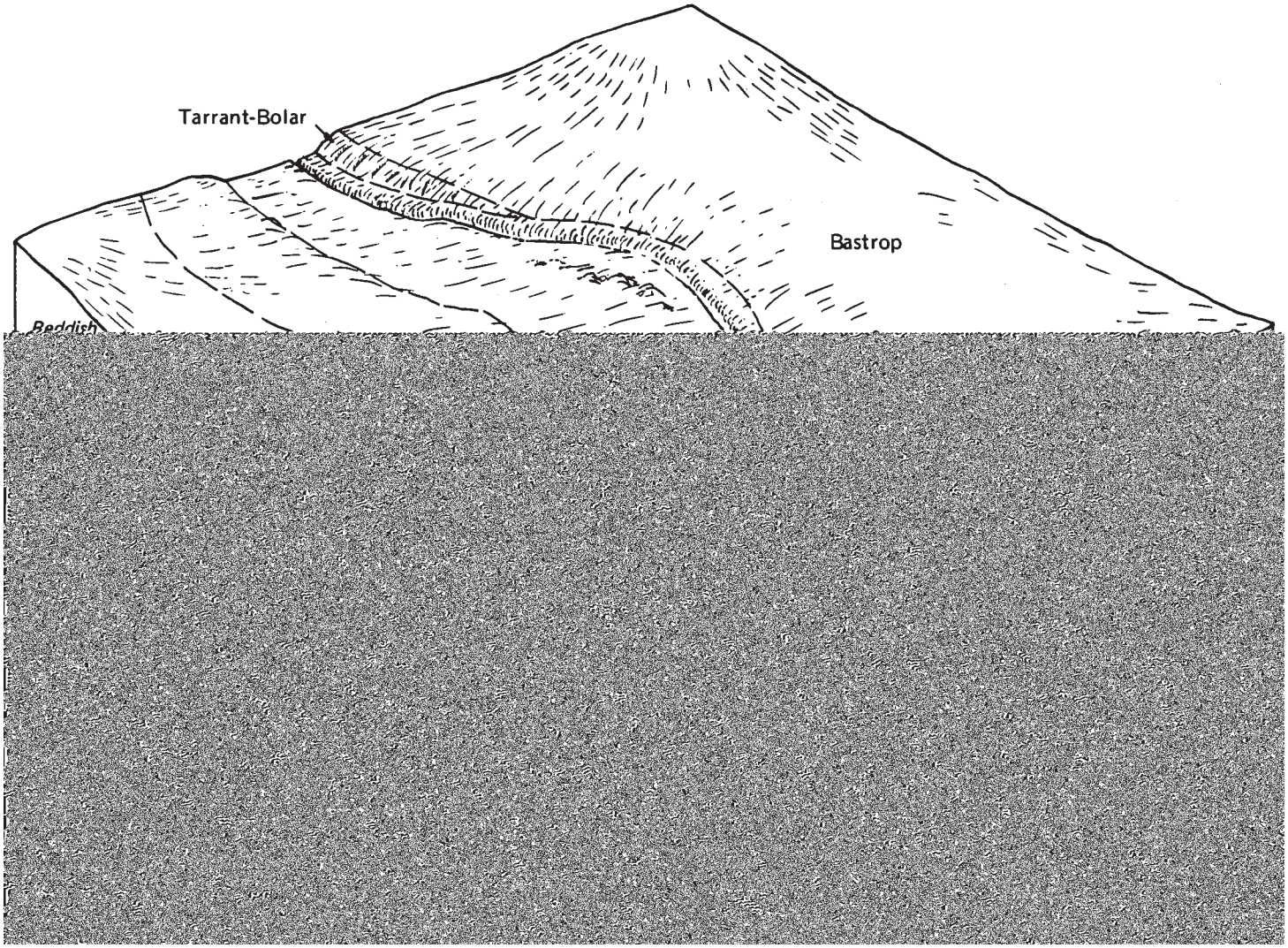

Tarrant-Bolar
Bastrop
Beddish

Figure 5.—Landscape of Aledo-Bolar association, undulating. The Aledo part is in the Shallow range site, and the Bolar part is in the Clay loam range site.

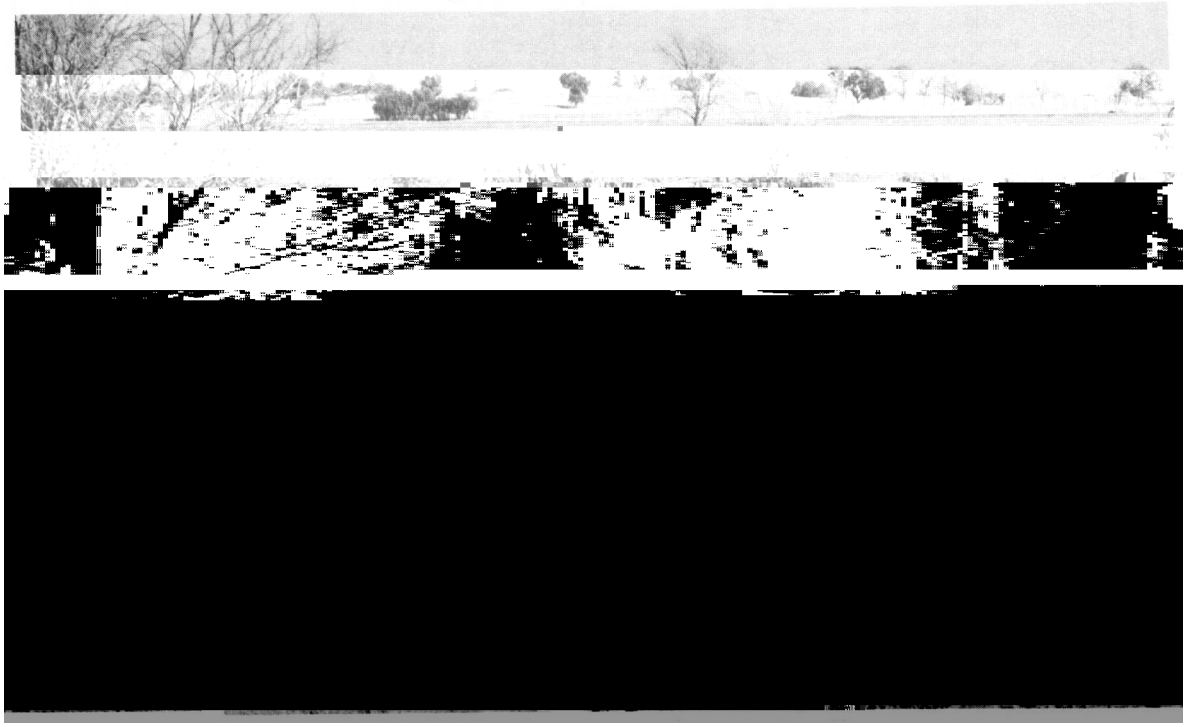


Figure 6.—Typical gully in Bastrop complex, gullied.

Figure 7.—Stripcropping peanuts with grain sorghum to control soil blowing. The soil is Chaney loamy fine sand, 1 to 5 percent slopes.

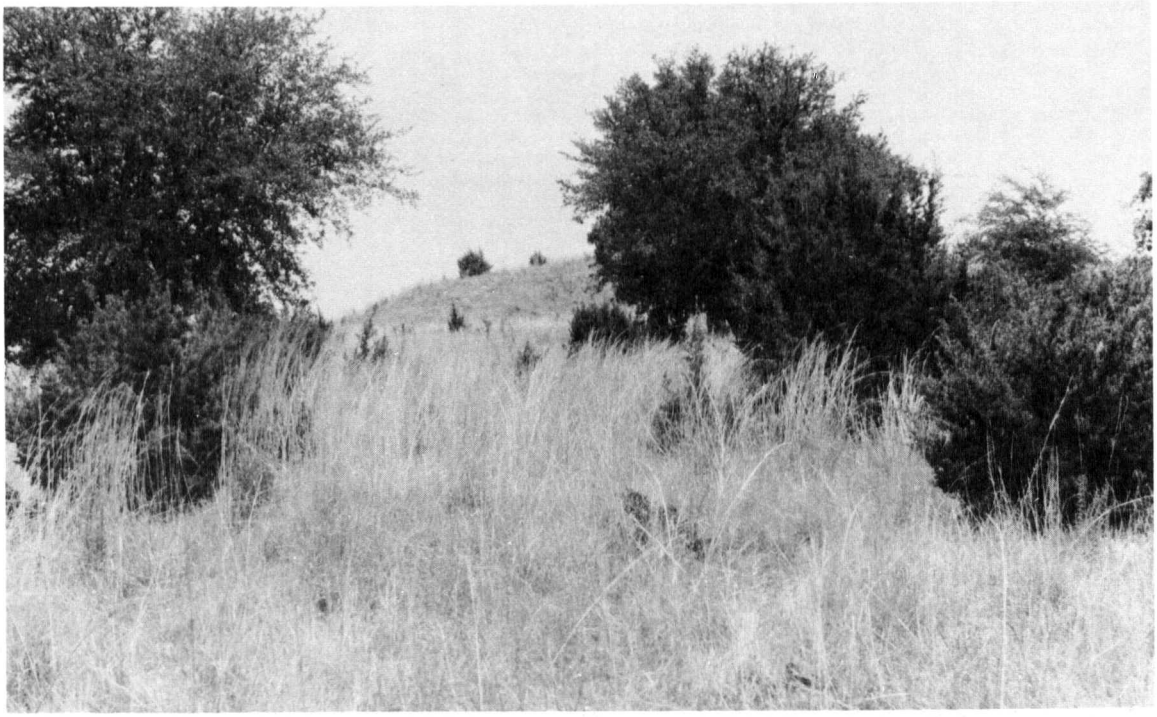


Figure 8.—Area of Tarrant-Bolar association, hilly, with a good cover of little bluestem.

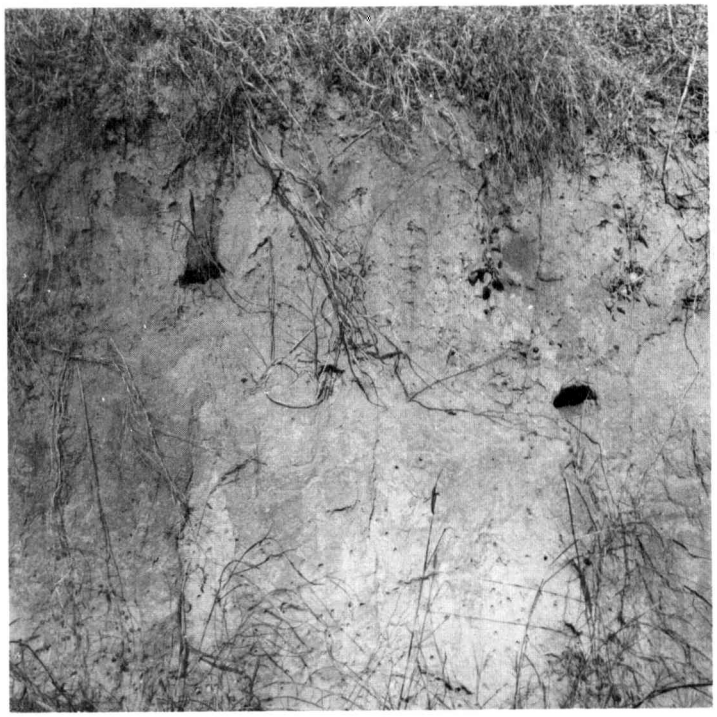


Figure 9.—Profile of Venus loam. This soil is used mainly as cropland and has high potential for row crops and small grains.

Figure 10.—Pastureland of improved bermudagrass on Yahola-Gaddy complex, occasionally flooded.

Figure 11.—Brush piles left unburned as a place for cover for quail and other small animals. The soil is Windthorst fine sandy loam, 1 to 3 percent slopes.

Tables

TABLE 1.—TEMPERATURE AND PRECIPITATION DATA

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have— Maximum temperature higher than—	2 years in 10 will have— Minimum temperature lower than—	Average number of growing degree days[1]	Average	2 years in 10 will have— Less than—	2 years in 10 will have— More than—	Average number of days with 0.10 inch or more	Average snowfall
	F	F	F	F	F	Units	In	In	In		In
January	58.1	33.0	45.6	83	8	43	1.60	.41	2.54	3	.7
February	62.9	36.8	49.9	88	15	97	1.74	.60	2.64	4	.6
March	70.3	43.9	57.1	94	22	284	1.93	.38	3.12	4	.1
April	79.5	54.7	67.1	95	29	513	3.84	1.88	5.44	6	.0
May	85.6	61.9	73.7	99	44	735	4.31	1.95	6.28	5	.0
June	93.0	69.4	81.2	103	54	936	2.83	.84	4.44	4	.0
July	97.7	72.8	85.3	107	62	1,094	1.73	.47	2.73	3	.0
August	97.1	71.7	84.4	106	58	1,066	2.12	.70	3.26	3	.0
September	90.1	65.8	78.0	102	47	840	3.13	1.30	4.60	5	.0
October	80.8	54.9	67.9	96	34	555	3.52	1.06	5.49	4	.0
November	68.8	43.4	56.1	86	22	214	2.20	.89	3.25	4	.0
December	61.4	36.1	48.7	82	14	96	1.61	.44	2.53	3	.2
Year	78.8	53.7	66.3	108	8	6,473	30.56	24.87	36.47	48	1.6

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 F).

TABLE 2.—FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-75 at Granbury, Texas]

Probability	Temperature		
	24° F.	28° F.	32° F.

TABLE 4.—POTENTIALS AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR SPECIFIED USES

Map unit	Extent of area	Cultivated farm crops	Pasture grasses	Range grasses	Urban uses	Recreation areas
	Pct					
1. Tarrant-Purves	39	Low:	Low:	Medium:	Low:	Low:

TABLE 5.—ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Hood County	Somervell County	Total— Area	Total— Extent
		Acres	Acres	Acres	Pct
1	Aledo-Bolar association, undulating	64,320	10	64,330	16.1
2	Bastrop loamy fine sand, 1 to 5 percent slopes	1,450	2,290	3,740	0.9
3	Bastrop fine sandy loam, 0 to 1 percent slopes	670	130	800	0.2
4	Bastrop fine sandy loam, 1 to 3 percent slopes	5,600	2,040	7,640	1.9
5	Bastrop fine sandy loam, 3 to 5 percent slopes	1,018	600	1,610	0.4

TABLE 6.—YIELDS PER ACRE OF CROPS AND PASTURE

[All yields were estimated for a high level of management in 1975. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Grain sorghum	Oats	Peanuts	Improved bermudagrass
	Bu	Bu	Lb	AUM[1]
Aledo:				
1:				
Aledo part	—	—	—	—
Bolar part	—	—	—	—
Bastrop:				
2	55	—	1,400	6.0
3	70	40	1,250	7.0
4	55	40	1,200	7.0
5	45	—	800	5.5
6	40	30	800	5.0
7	40	—	—	5.5
[2]8	—	—	—	4.0
Blanket:				
9	60	65	—	6.0
Bolar:				
10	40	40	—	5.0
11	35	35	—	5.0
Bosque:				
12	65	60	—	6.5
Brackett:				
[2]13	—	—	—	—
Bunyan:				
14	70	50	1,200	8.0
Chaney:				

TABLE 6.—YIELDS PER ACRE OF CROPS AND PASTURE—Continued

Soil name and map symbol	Grain sorghum	Oats	Peanuts	Improved bermudagrass
	Bu	Bu	Lb	AUM[1]
Hassee:				
27	45	30	—	5.0
28	35	30	—	4.5
Hensley:				
29	—	—	—	—
Krum:				
30	75	70	—	7.5
31	70	70	—	7.5
Maloterre:				
32	—	—	—	—
Nimrod:				
33	40	30	1,200	5.5
Paluxy:				
34	60	45	1,200	7.0
35	50	45	1,100	6.5
36	35	—	—	5.5
Patilo:				
37	—	—	1,000	4.5
Pedernales:				
38	35	60	1,000	4.5
39	35	45	800	4.0
40	20	35	700	3.5
41	—	—	—	3.0
Purves:				
42	35	45	—	4.0
43	25	40	—	3.5
Seawillow:				
44	40	40	—	5.0
45	35	30	—	4.5
Sunev:				
46	35	50	—	5.5
47	30	45	—	5.5
Tarrant:				
[2]48:				
Tarrant part	—	—	—	—
Bolar part	—	—	—	—
[2]49:				
Tarrant part	—	—	—	—
Purves part	—	—	—	—
Thurber:				
50	30	35	—	3.5
Truce:				
51	25	15	—	3.0

See footnotes at end of table.

TABLE 6.—YIELDS PER ACRE OF CROPS AND PASTURE—Continued

Soil name and map symbol	Grain sorghum	Oats	Peanuts	Improved bermudagrass
	Bu	Bu	Lb	AUM[1]
Truce:				
[2]52	—	—	—	—
Venus:				
53	70	60	—	7.0
Windthorst:				
54	35	30	1,200	6.0
55	45	40	1,100	6.0
56	35	35	1,000	5.0
57	35	30	800	4.5
58	—	—	—	3.5
[2]59	—	—	—	3.0
Yahola:				
[2]60:				
Yahola part	45	—	1,600	7.5
Gaddy part	30	—	1,300	6.0

[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 a period of 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.

TABLE 7.—CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas excluded. Absence of an entry means no acreage]

Class	Total acreage	Major management concerns (subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	1,470	—	—	—
II	64,422	43,410	20,282	730
III	124,318	121,670	620	2,028
IV	17,840	17,840	—	—
V	—	—	—	—
VI	103,638	9,970	—	93,668
VII	78,532	—	—	78,532
VIII	—	—	—	—

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
Aledo:					
[1]1:					
Aledo part	Shallow	Favorable	3,000	Little bluestem	30
		Normal	2,000	Yellow 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
				Other perennial forbs	5
				Other trees	5
Bolar part	Clay Loam	Favorable	6,000	Little bluestem	20
		Normal	5,000	Yellow indiangrass	15
		Unfavorable	3,000	Big bluestem	10
				Sideoats grama	10
				Silver bluestem	5
				Tall dropseed	5
				Texas wintergrass	5
				Canada wildrye	5
				Other perennial forbs	15
				Other perennial grasses	5
				Other trees	5
Bastrop:					
2	Loamy Sand	Favorable	5,500	Little bluestem	50
		Normal	4,200	Yellow indiangrass	10
		Unfavorable	3,000	Switchgrass	5
				Purpletop	5
				Fall witchgrass	5
				Post oak	5
				Blackjack oak	5
				American beautyberry	5
				Other perennial forbs	5
				Other annual forbs	5
3, 4, 5, 6, 7, [1]8	Sandy Loam	Favorable	5,500	Little bluestem	50
		Normal	4,500	Yellow indiangrass	10
		Unfavorable	3,000	Switchgrass	5
				Purpletop	5
				Sideoats grama	5
				Fall witchgrass	5
				Post oak	5
				Blackjack oak	5
				Hackberry	5
				Other perennial forbs	3
				Other annual forbs	2
Blanket:					
9	Clay Loam	Favorable	6,500	Little bluestem	20
		Normal	5,000	Yellow indiangrass	15
		Unfavorable	3,000	Big bluestem	10
				Sideoats grama	10
				Silver bluestem	5
				Tall dropseed	5
				Texas wintergrass	5
				Canada wildrye	5
				Other perennial forbs	15
				Other perennial grasses	5
				Other trees	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:					
10, 11	Clay Loam	Favorable	6,000	Little bluestem	20
		Normal	5,000	Yellow indiangrass	15
		Unfavorable	3,000	Big bluestem	10
				Sideoats grama	10
				Silver bluestem	5
				Tall dropseed	5
				Texas wintergrass	5
				Canada wildrye	5
				Other perennial forbs	15
				Other perennial grasses	5
				Other trees	5
Bosque:					
12	Loamy Bottomland	Favorable	6,500	Yellow indiangrass	20
		Normal	5,000	Little bluestem	15
		Unfavorable	3,500	Switchgrass	15
				Big bluestem	10
				Sideoats grama	5
				Canada wildrye	5
				Vine-mesquite	5
				Texas wintergrass	5
				Tall dropseed	5
				Other trees	10
				Other perennial forbs	5
Brackett:					
[1]13	Steep Adobe	Favorable	3,000	Little bluestem	30
		Normal	2,200	Sideoats grama	10
		Unfavorable	1,500	Tall grama	10
				Yellow indiangrass	10
				Tall dropseed	5
				Silver bluestem	5
				Slim tridens	5
				Hairy grama	5
				Other trees	15
				Other perennial forbs	5
Bunyan:					
14	Loamy Bottomland	Favorable	6,500	Indiangrass	20
		Normal	5,000	Switchgrass	15
		Unfavorable	1,500	Big bluestem	10
				Little bluestem	10
				Tall dropseed	5
				Texas wintergrass	5
				Sideoats grama	5
				Vine-mesquite	5
				Other perennial grasses	10

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
Decordova:					
17	Loamy sand	Favorable	5,000	Little bluestem	50
		Normal	4,000	Yellow indiangrass	10
		Unfavorable	2,500	Switchgrass	5
				Purpletop	5
				Fall witchgrass	5
				Post oak	5
				Blackjack oak	5
				Other perennial grasses	5
				Other perennial forbs	5
				Other annual forbs	5
Demona:					
18	Sandy	Favorable	4,500	Little bluestem	25
		Normal	3,500	Big bluestem	10
		Unfavorable	2,000	Yellow indiangrass	10
				Post oak	8
				Blackjack oak	7
				Sand lovegrass	5
				Purpletop	5
				Tall dropseed	5
				Silver bluestem	5
				Scribner panicum	5
				Other perennial grasses	5
				Other trees	5
				Other perennial forbs	5
Denton:					
19, 20	Clay Loam	Favorable	6,500	Little bluestem	20
		Normal	5,000	Yellow indiangrass	15
		Unfavorable	3,000	Sideoats grama	10
				Big bluestem	10
				Switchgrass	5
				Silver bluestem	5
				Texas wintergrass	5
				Tall dropseed	5
				Other perennial forbs	15
				Other perennial grasses	5
				Other trees	5
Duffau:					
21	Loamy Sand	Favorable	5,000	Little bluestem	25
		Normal	4,000	Big bluestem	10
		Unfavorable	3,000	Yellow indiangrass	10
				Post oak	10
				Silver bluestem	5
				Scribner panicum	5
				Sand lovegrass	5
				Tall dropseed	5
				Purpletop	5
				Other perennial grasses	10
				Other trees	5
				Other perennial forbs	5
22, 23, 24, 25	Sandy Loam	Favorable	5,500	Little bluestem	30
		Normal	4,500	Big bluestem	10
		Unfavorable	3,000	Yellow indiangrass	10
				Sideoats grama	5
				Silver bluestem	5
				Scribner panicum	5
				Texas wintergrass	5
				Arizona cottontop	5
				Post oak	4
				Other perennial forbs	10
				Other trees	6
				Other perennial grasses	5

See footnote at end of table.

TABLE 6.—RANGE PRODUCTIVITY AND COMPOSITION—Continued

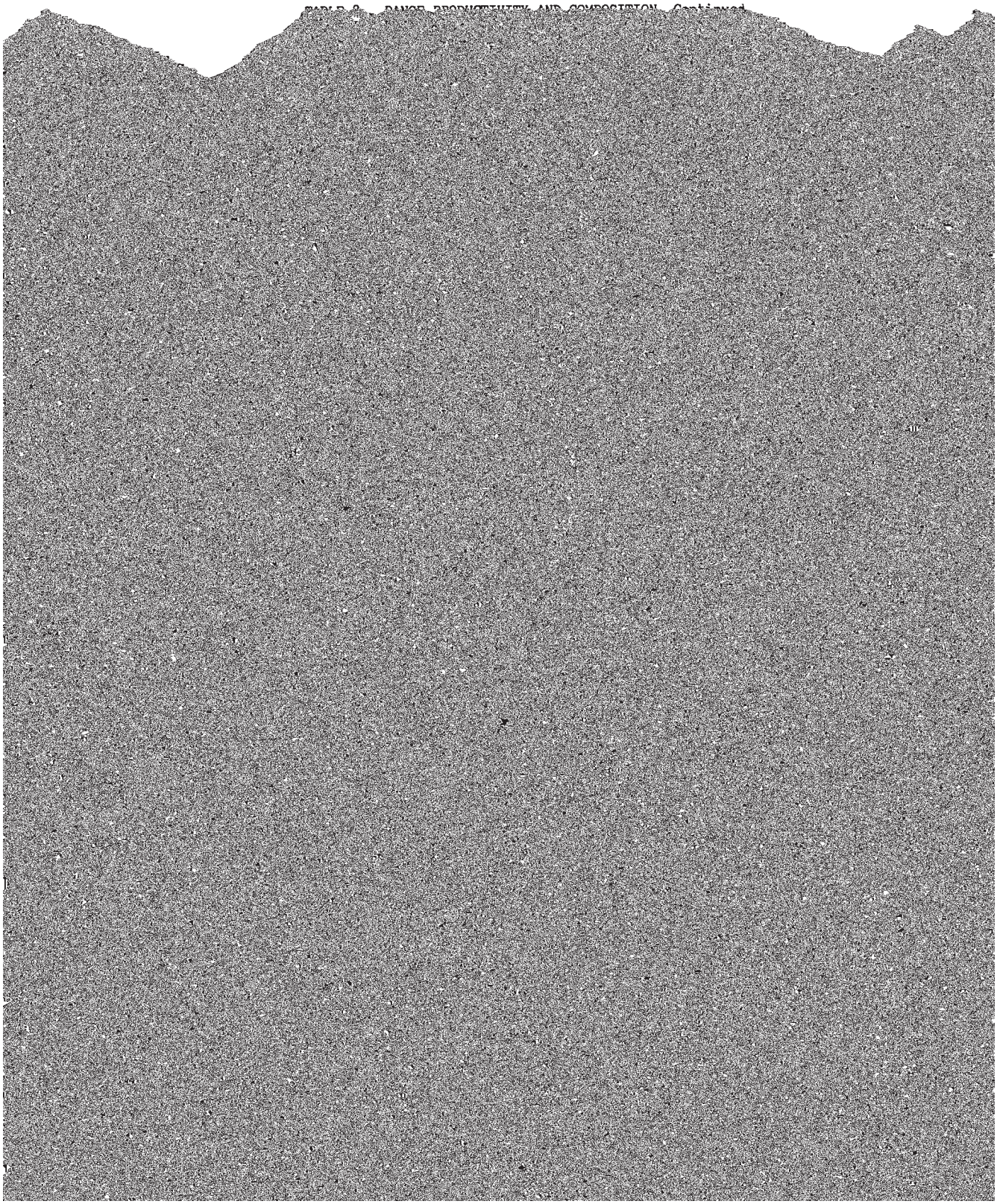


TABLE 8.—RANGE PRODUCTIVITY AND COMPOSITION—Continued

	Potential production		

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
Sunev:					
46, 47	Clay Loam	Favorable	6,500	Little bluestem	50
		Normal	5,500	Yellow indiangrass	15
		Unfavorable	3,500	Big bluestem	10
				Live oak	3
				Eastern gamagrass	2
				Switchgrass	2
				Sideoats grama	2
				Vine-mesquite	2
				Buffalograss	2
				Other perennial forbs	5
				Other annual forbs	5
				Other trees	2
Tarrant:					
48:					
Tarrant part	Steep Rocky	Favorable	1,800	Sideoats grama	20
		Normal	1,400	Silver bluestem	15
		Unfavorable	800	Little bluestem	10

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
Thurber:					
50	Claypan Prairie	Favorable	3,500	Vine-mesquite	20
		Normal	3,000	Sideoats grama	10
		Unfavorable	2,000	Arizona cottontop	10
				Buffalograss	5
				Blue grama	5
				Texas wintergrass	5
				Tall dropseed	5
				Sand dropseed	5
				Purple threeawn	5
				Silver bluestem	5
				Other peennial grasses	15
				Other perennial forbs	5
				Other annual grasses	5
Truce:					
51	Tight Sandy Loam	Favorable	4,000	Sideoats grama	30
		Normal	3,000	Arizona cottontop	15
		Unfavorable	2,000	Vine-mesquite	15
				Little bluestem	5
				Silver bluestem	5
				Buffalograss	5
				Texas wintergrass	5
				Other perennial grasses	10
				Other trees	5
				Other perennial forbs	5
52	Tight Sandy Loam	Favorable	4,000	Sideoats grama	30
		Normal	3,000	Arizona cottontop	15
		Unfavorable	2,000	Vine-mesquite	15
				Little bluestem	5
				Silver bluestem	5
				Buffalograss	5
				Texas wintergrass	5
				Other perennial grasses	10
				Other perennial forbs	5
				Other trees	5
Venus:					
53	Clay Loam	Favorable	6,500	Little bluestem	20
		Normal	5,000	Yellow indiangrass	15
		Unfavorable	3,000	Big bluestem	10
				Sideoats grama	10
				Silver bluestem	5
				Tall dropseed	5
				Texas wintergrass	5
				Canada wildrye	5
				Other perennial forbs	15
				Other perennial grasses	5
				Other trees	5

TABLE 8.—RANGE PRODUCTIVITY AND COMPOSITION—Continued

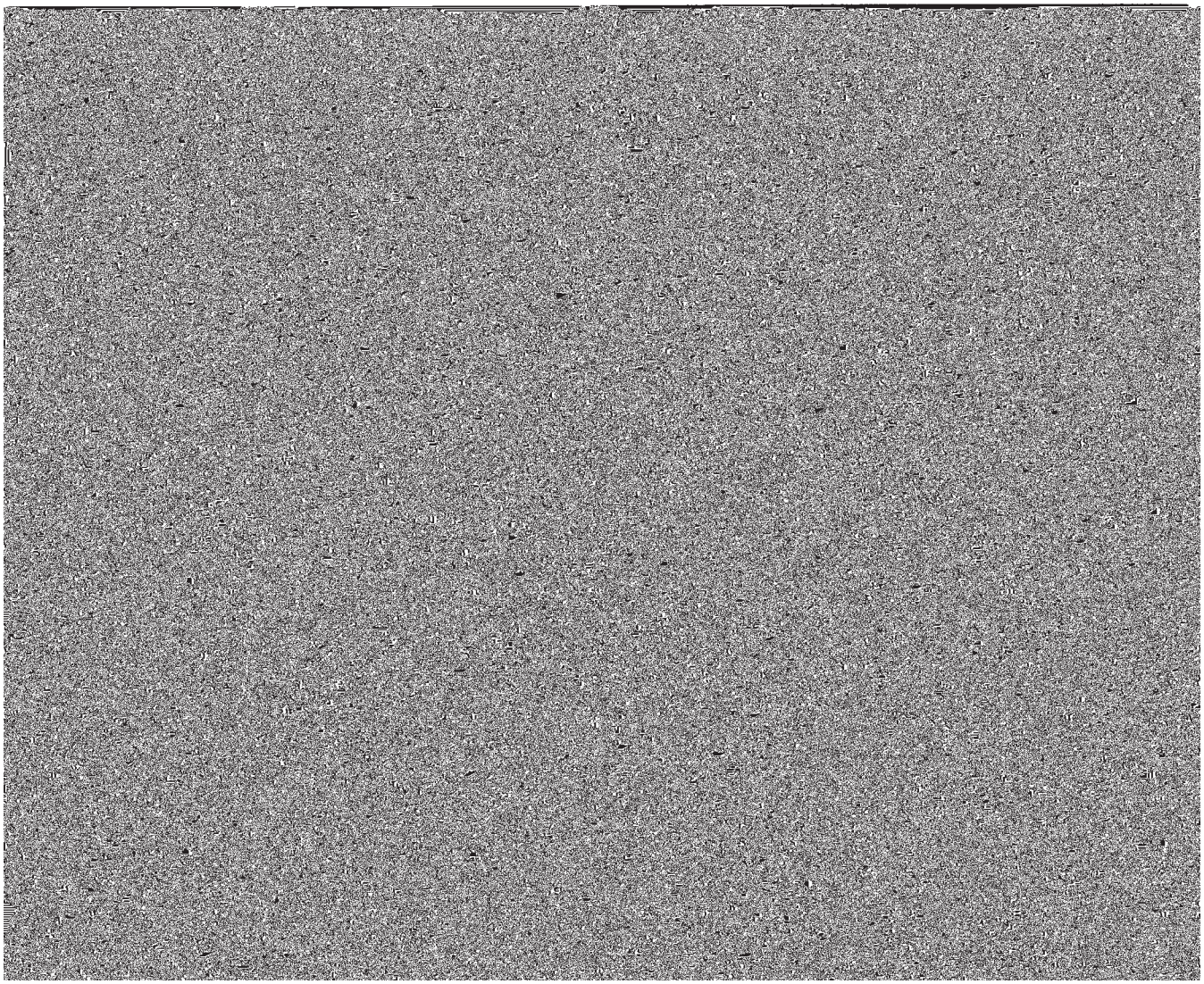


TABLE 9.—BUILDING SITE DEVELOPMENT

["Shrink-swell" 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
Aledo:					
[1]1:					
Aledo part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Bolar part	Moderate: depth to rock.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength, slope.	Severe: low strength.
Bastrop:					
2, 3, 4, 5, 6	Slight	Slight	Slight	Slight	Moderate: low strength.
7, [1]8	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
Blanket:					
9	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
Bolar:					
10	Moderate: depth to rock.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Severe: low strength.
11	Moderate: depth to rock.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength, slope.	Severe: low strength.
Bosque:					
12	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Brackett:					
[1]13	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bunyan:					
14	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Chaney:					
15, 16	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Decordova:					
17	Slight	Slight	Slight	Slight	Slight.
Demona:					
18	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: shrink-swell.
Denton:					
19, 20	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: low strength, shrink-swell.
Duffau:					
21, 23, 24, 25	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.
22	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.

See footnote at end of table.

TABLE 9.—BUILDING SITE DEVELOPMENT—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Frio: 26	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods, low strength.
Hassee: 27, 28	Severe: too clayey, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell.
Hensley: 29	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Krum: 30, 31	Severe: cutbanks cave, too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
Maloterre:					

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
Tarrant:					
Purves part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Thurber:					
50	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.
Truce:					
51	Severe: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
[1]52	Severe: too clayey, large stones.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
Venus:					
53	Slight	Slight	Slight	Slight	Moderate: low strength.
Windthorst:					
54, 55, 57	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
56, 58, [1]59	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Yahola:					
[1]60:					
Yahola part	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, low strength.
Gaddy part	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 10.—SANITARY FACILITIES

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the

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
Hassee:					
27	Severe: percs slowly.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: thin layer.
28	Severe:	Moderate:	Severe:	Severe:	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
Tarrant:					
Purves part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, too clayey.
Thurber:					
50	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Truce:					
51	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: thin layer.
[1]52	Severe: percs slowly.	Moderate: large stones, slope.	Severe: too clayey, large stones.	Slight	Poor: thin layer, large stones.
Venus:					
53	Slight	Moderate: seepage.	Slight	Slight	Good.
Windthorst:					
54, 55, 56, 57, 58, [1]59	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Yahola:					
[1]60:					
Yahola part	Severe: floods.	Severe: seepage, floods.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
Gaddy part	Severe: floods.	Severe: seepage, floods.	Severe: seepage, too sandy, floods.	Severe: floods, seepage.	Fair: too sandy.

[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
Aledo:				
[1]1:				
Aledo part	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, small stones.
Bolar part	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Bastrop:				
2	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too sandy.
3, 4, 5, 6, 7, [1]8	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Blanket:				
9	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Bolar:				
10, 11	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: excess lime.

TABLE 11.—CONSTRUCTION MATERIALS—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Hassee: 27, 28	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Hensley: 29	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Krum: 30, 31	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
Maloterre: 32	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, excess lime.
Nimrod: 33	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Paluxy: 34, 35, 36	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Patilo: 37	Good	Fair: excess fines.	Unsuited: excess fines.	Poor: too sandy.
Pedernales: 38, 39, 40, 41	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Purves: 42, 43	Poor: shrink-swell, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, thin layer.
Seawillow: 44, 45	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: excess lime.
Sunev: 46, 47	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: excess lime.
Tarrant:				
148:				
Tarrant part	Poor: thin layer, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, large stones.
Bolar part	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
149:				
Tarrant part	Poor: thin layer, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, large stones.
Purves part	Poor: shrink-swell, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, thin layer.
Thurber: 50	Poor: shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.

See footnote at end of table.

TABLE 11.—CONSTRUCTION MATERIALS—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Truce:				
51	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
[1]52	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Venus:				
53	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Windthorst:				
54	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too sandy.
55, 56, 57, 58, [1]59	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Yahola:				
[1]60:				
Yahola part	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.
Gaddy part	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 12.—WATER MANAGEMENT

["Seepage" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not evaluated]

Soil name and map symbol	Limitations for— Pond reservoir areas	Embankments, dikes and levees	Features affecting— Irrigation	Terraces and diversions	Grassed waterways
Aledo:					
[1]1:					
Aledo part	Severe: depth to rock.	Severe: thin layer.	Rooting depth, droughty.	Depth to rock, rooting depth.	Droughty, rooting depth.
Bolar part	Severe: seepage.	Moderate: thin layer.	Excess lime	Large stones	Large stones.
Bastrop: 2, 3, 4, 5, 6, 7, 8	Moderate: seepage.	Moderate: piping.	Favorable	Favorable	Favorable.
Blanket: 9	Moderate: seepage.	Moderate: piping, compressible.	Favorable	Favorable	Favorable.
Bolar: 10, 11	Severe: seepage.	Moderate: thin layer.	Excess lime	Favorable	Favorable.
Bosque: 12	Moderate: seepage.	Moderate: compressible.	Favorable	Floods	Floods.
Brackett: [1]13	Severe: seepage.	Severe: thin layer.	Droughty, excess lime, rooting depth.	Depth to rock, rooting depth.	Droughty, rooting depth.
Bunyan: 14	Moderate: seepage.	Moderate: piping.	Floods	Not needed	Favorable.
Chaney: 15, 16	Slight	Moderate: erodes easily.	Percs slowly, soil blowing.	Piping, erodes easily.	Erodes easily.
Decordova: 17	Severe: seepage.	Severe: piping, seepage.	Fast intake, erodes easily.	Too sandy, erodes easily, piping.	Erodes easily.
Demona: 18	Moderate: seepage.	Moderate: erodes easily.	Fast intake, soil blowing.	Piping, erodes easily.	Erodes easily.
Denton: 19, 20	Severe: depth to rock.	Moderate: compressible, shrink-swell.	Percs slowly	Favorable	Favorable.
Duffau: 21	Moderate: seepage.	Moderate: erodes easily, piping.	Soil blowing, erodes easily.	Soil blowing, erodes easily.	Erodes easily.
22, 23, 24, 25	Moderate: seepage.	Moderate: erodes easily, piping.	Erodes easily	Erodes easily	Erodes easily.
Frio: 26	Moderate: seepage.	Moderate: compressible.	Floods	Favorable	Favorable.

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
Hassee:					
27, 28	Slight	Moderate: unstable fill.	Slow intake	Percs slowly	Droughty, percs slowly.
Hensley:					
29	Severe: depth to rock.	Severe: thin layer.	Rooting depth, slow intake.	Depth to rock	Percs slowly, rooting depth.
Krum:					
30, 31	Moderate:	Moderate:	Slow intake	Percs slowly,	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
Truce:					
51	Slight	Moderate: low strength.	Percs slowly	Favorable	Favorable.
[1]52	Slight	Moderate: large stones.	Slow intake, complex slope.	Large stones	Large stones.
Venus:					
53	Severe: seepage.	Moderate: piping.	Favorable	Favorable	Favorable.
Windthorst:					
54, 55, 56, 57, 58, [1]59	Moderate: seepage.	Moderate: compressible.	Percs slowly, erodes easily.	Percs slowly, erodes easily.	Percs slowly, erodes easily.
Yahola:					
[1]60:					
Yahola part	Severe: seepage.	Moderate: unstable fill, seepage, piping.	Floods	Not needed	Not needed.
Gaddy part	Severe: seepage.	Moderate: unstable fill, piping.	Seepage	Erodes easily	Erodes easily.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 13.—POTENTIAL FOR URBANIZATION

Soil name and map symbol	Elements of urbanization: Shallow excavations	Dwellings	Streets	Uncoated steel pipe	Major concerns	Potential for urbanization
Aledo: [1]11	Low	Low	Low	Medium	Shallow depth to rock.	Low.
Bastrop: 2, 3, 4, 5, 6, 7, [1]8	Very high	Very high	High	High	Low strength.	High.
Blanket: 9	Medium	Medium	Low	Low	Shrink-swell, low strength.	Medium.
Bolar: 10, 11	Medium	Medium	Low	Low	Low strength, corrosivity.	Medium.
Bosque: 12	Very low	Very low	Very low	Low	Flooding.	Very low.
Brackett: [1]13	Low	Low	Low	Low	Slope, depth to rock.	Low.
Bunyan: 14	Very low	Very low	Very low	Medium	Flooding.	Very low.
Chaney: 15, 16	Medium	Medium	Low	Medium	Shrink-swell, low strength.	Medium.
Decordova: 17	Very high	Very high	Very high	High	Cutbanks cave.	Very high.
Demona: 18	Low	Medium	Medium	Very high	Cutbanks cave, wetness.	Medium.
Denton: 19, 20	Low	Low	Low	Low	Shrink-swell, low strength.	Low.
Duffau: 21, 22, 23, 24, 25	Very high	High	High	High	Low strength.	Very high.
Frio: 26	Very low	Very low	Very low	Low	Flooding.	Very low.
Hassee: 27, 28	Low	Low	Low	Low	Shrink-swell, too clayey.	Low.
Hensley: 29	Low	Low	Low	Low	Depth to rock, corrosivity.	Low.
Krum: 30, 31	Low	Low	Low	Low	Low strength, shrink-swell.	Low.
Maloterre: 32	Low	Low	Low	Low	Depth to rock, corrosivity.	Low.
Nimrod: 33	Low	Medium	High	High	Wetness, cutbanks cave.	Medium.

See footnote at end of table.

TABLE 13.—POTENTIAL FOR URBANIZATION—Continued

Soil name and map symbol	Elements of urbanization				Major concerns	Potential for urbanization
	Shallow excavations	Dwellings	Streets	Uncoated steel pipe		
Paluxy: 34, 35, 36	Very high	Very high	Medium	High	Low strength.	High.
Patilo: 37	Low	High	High	High	Cutbanks cave.	High.
Pedernales: 38, 39, 40, 41	Medium	Medium	Medium	Low	Shrink-swell, low strength.	Medium.
Purves: 42, 43	Low	Low	Low	Low	Depth to rock, corrosivity.	Low.
Seawillow: 44, 45	Medium	Medium	Low	Medium	Low strength, shrink-swell.	Medium.
Sunev: 46, 47	High	High	Medium	Medium	Low strength, corrosivity.	High.
Tarrant: 48, 49	Low	Low	Low	Low	Depth to rock, large stones.	Low.
Thurber:						

TABLE 14.—RECREATIONAL DEVELOPMENT

["Shrink-swell" 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"]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Aledo:				
[1]1:				
Aledo part	Moderate: too clayey.	Moderate: too clayey.	Severe: depth to rock, small stones.	Moderate: too clayey.
Bolar part	Moderate: too clayey, large stones.	Moderate: too clayey, large stones.	Severe: large stones.	Moderate: too clayey, large stones.
Bastrop:				
2	Moderate:	Moderate:	Moderate:	Moderate:

TABLE 14.—RECREATIONAL DEVELOPMENT—Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Duffau:				
23, 24	Slight	Slight	Moderate: slope.	Slight.
25	Slight	Slight	Severe: slope.	Slight.
Frio:				
26	Severe:	Severe:	Severe:	Severe:

TABLE 14.—RECREATIONAL DEVELOPMENT—Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Sunev:				
46	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey, slope.	Moderate: too clayey.
47	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 15.—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
Aledo:						
[1]1:						
Aledo part	Poor	Poor	Poor	Fair	Poor	Poor.
Bolar part	Poor	Poor	Fair	Fair	Poor	Fair.
Bastrop:						
2	Fair	Fair	Good	Good	Fair	Good.
3, 4	Good	Fair	Good	Good	Good	Good.
5, 6, 7, [1]8	Fair	Fair	Good	Good	Fair	Good.
Blanket:						
9	Good	Good	Fair	Good	Good	Fair.
Bolar:						
10	Good	Good	Fair	Fair	Good	Fair.
11	Fair	Good	Fair	Fair	Fair	Fair.
Bosque:						
12	Good	Good	Good	Good	Good	Good.
Brackett:						
[1]13	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair
Bunyan:						
14	Good	Good	Good	Good	Good	Good.
Chaney:						
15, 16	Fair	Good	Good	Good	Good	Good.
Decordova:						
17	Fair	Fair	Good	Good	Fair	Good.
Demona:						
18	Fair	Good	Good	Good	Good	Good.
Denton:						
19	Good	Good	Fair	Fair	Good	Fair
20	Fair	Good	Fair	Fair	Fair	Fair
Duffau:						
21	Fair	Good	Good	Good	Good	Good.
22	Good	Good	Good	Good	Good	Good.
23, 24, 25	Fair	Good	Good	Good	Good	Good.
Frio:						
26	Good	Good	Fair	Good	Good	Fair.
Hassee:						
27, 28	Fair	Fair	Fair	Fair	Fair	Fair.
Hensley:						
29	Poor	Poor	Fair	Fair	Poor	Fair.

See footnote at end of table.

TABLE 15.—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
Windthorst:						
55	Good	Good	Good	Good	Good	Good.
57	Fair	Good	Good	Good	Good	Good.
58	Poor	Fair	Good	Good	Fair	Good.
[1]59	Poor	Fair	Good	Good	Fair	Good.
Yahola:						
[1]60:						
Yahola part	Good	Good	Good	Good	Good	Good.
Gaddy part	Fair	Fair	Fair	Fair	Fair	Fair.

[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.—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: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Aledo:											
[1]1:											
Aledo part	0–4	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
	4–14	Very gravelly clay loam, very gravelly loam.	GC, GM, SC	A–2–4, A–2–6	5–30	35–55	30–50	25–50	15–35	30–40	10–20
	14–18	Weathered bedrock.	—	—	—	—	—	—	—	—	—
Bolar part	0–6	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
	6–28	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
	28–32	Weathered bedrock.	—	—	—	—	—	—	—	—	—
Bastrop:											
2	0–10	Loamy fine sand	SM, SM–SC	A–2–4, A–4	0	95–100	80–100	75–95	20–50	<20	NP–4
	10–80	Sandy clay loam, clay loam, loam.	CL, SC	A–6	0	95–100	80–100	80–100	40–70	26–40	11–22
3, 4, 5, 6, 7, [1]8	0–13	Fine sandy loam	ML, SM, CL–ML, SM–SC	A–4	0	95–100	80–100	80–100	36–70	18–25	2–7
	13–80	Sandy clay loam, clay loam, loam.	CL, SC	A–6	0	95–100	80–100	80–100	40–70	26–40	11–22
Blanket:											
9	0–12	Clay loam	CL	A–6	0	95–100	95–100	90–100	60–80	28–40	12–24
	12–42	Clay loam, clay, silty clay.	CL, CH	A–7	0	95–100	95–100	85–100	70–90	41–55	20–35
	42–62	Clay loam, clay, silty clay loam.	CL	A–6, A–7	0	85–100	80–100	70–90	51–85	30–45	15–30
Bolar:											
10, 11	0–13	Clay loam	CL, SC	A–6, A–7, A–4	0–5	75–100	75–100	70–98	40–80	25–42	9–25
	13–28	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
	28–32	Weathered bedrock.	—	—	—	—	—	—	—	—	—
Bosque:											
12	0–20	Loam	CL, CL–ML	A–4, A–6	0	100	95–100	80–100	55–95	24–40	7–22
	20–46	Loam, clay loam	CL	A–4, A–6, A–7–6	0	100	95–100	95–100	55–80	26–45	10–25
	46–62	Loam, clay loam, clay.	CL, CL–ML	A–4, A–6, A–7–6	0	98–100	95–100	80–100	55–95	24–45	7–25
Brackett:											
[1]13	0–16	Loam	CL, SC	A–6, A–4	0–20	70–100	60–100	55–95	40–85	28–40	10–20
	16–40	Weathered bedrock.	—	—	—	—	—	—	—	—	—

See footnote at end of table.

TABLE 16.—ENGINEERING PROPERTIES AND CLASSIFICATIONS—Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Bunyan:											
14	0–8	Fine sandy loam	SM-SC, SC, CL, CL-ML	A-4, A-6	0	100	95–100	70–95	40–75	20–35	3–16
	8–58	Stratified clay loam to fine sandy loam.	SC, CL, ML	A-4, A-6	0	100	95–100	80–100	40–95	20–40	8–25
	58–62	Stratified clay loam to fine sandy loam.	SC, CL, ML	A-6, A-7	0	100	95–100	80–95	45–95	30–45	11–25
Chaney:											
15, 16	0–12	Loamy fine sand	SM, SM-SC, SP-SM	A-2-4, A-4, A-3	0	80–100	80–100	65–98	7–45	<25	NP-4
	12–44	Clay, sandy clay	CL, CH, SC	A-7-6	0	90–100	90–100	90–100	45–85	42–60	24–42
	44–56	Sandy clay, clay, sandy clay loam.	CL, CH, SC	A-6, A-7-6, A-2-6	0	90–100	90–100	80–100	30–70	25–55	11–40
	56–72	Clay, sandy clay loam, shaly clay.	CL, CH, SC, SM-SC	A-6, A-7-6, A-2	0	90–100	90–100	80–100	25–85	25–60	6–40
Decordova:											
17	0–14	Loamy fine sand	SM, SP-SM	A-2-4	0	85–100	85–100	80–95	10–25	<20	NP-3
	14–80	Fine sandy loam, loam.	SM, SM-SC	A-2-4, A-4	0	90–100	90–100	80–95	15–40	<25	NP-7
Demona:											
18	0–34	Loamy fine sand	SM, SP-SM, SM-SC	A-2-4, A-4, A-3	0	80–100	75–100	60–98	7–45	<25	NP-5
	34–48	Sandy clay, clay	CH, CL	A-7-6	0	80–100	80–100	80–100	50–85	42–60	24–40
	48–80	Sandy clay, clay, sandy clay loam.	CL, CH, SC	A-2-6, A-7-6, A-6	0	80–100	80–100	80–100	25–85	25–60	11–40
Denton:											
19, 20	0–32	Clay	CH, MH	A-7	0–10	80–100	80–100	80–100	75–95	51–70	26–45
	32–40	Weathered bedrock.	—	—	—	—	—	—	—	—	—
Duffau:											
21	0–12	Loamy fine sand	SM, SM-SC	A-2-4, A-4	0	95–100	95–100	75–98	15–40	<22	NP-4
	12–80	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0	95–100	95–100	80–100	36–65	30–40	15–24
22, 23, 24, 25	0–12	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
	12–64	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0	95–100	95–100	80–100	36–65	30–40	15–24
	64–80	Sandy clay loam, loam, fine sandy loam.	SC, CL, CL-ML, SM	A-4, A-6	0	95–100	95–100	80–100	40–65	20–36	2–18
Frio:											
26	0–38	Silty clay	CL, CH	A-6, A-7	0–2	80–100	80–100	70–100	60–95	35–52	20–34
	38–62	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

See footnote at end of table.

TABLE 16.—ENGINEERING PROPERTIES AND CLASSIFICATIONS—Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Hassee:											
27, 28	0–14	Fine sandy loam	CL	A–4, A–6	0	95–100	95–100	80–100	50–80	20–35	8–16
	14–30	Clay	CH, CL	A–7–6	0	95–100	95–100	95–100	75–95	41–60	24–40
	30–62	Clay, clay loam	CH, CL	A–7–6, A–6	0	95–100	95–100	90–100	70–95	35–52	20–35
Hensley:											
29	0–4	Stony clay loam	CL, SC, GC, GM–GC	A–6, A–4	8–25	65–95	60–95	55–95	36–80	20–40	5–20
	4–18	Clay, clay loam	CL, CH	A–6, A–7	0–10	80–100	75–100	70–100	60–95	35–55	18–35
	18–20	Unweathered bedrock.	—	—	—	—	—	—	—	—	—
Krum:											
30, 31	0–7	Clay	CH	A–7–6	0	95–100	85–100	85–100	85–95	51–65	25–45
	7–48	Silty clay, clay	CH	A–7–6	0	95–100	85–100	80–100	65–95	51–74	28–50
	48–62	Silty clay loam, silty clay, clay.	CH, CL	A–7–6	0	85–100	75–100	70–95	65–95	48–60	28–38
Maloterre:											
32	0–5	Gravelly clay loam.	SC, CL, GC	A–6	0–10	60–95	50–95	45–90	36–80	30–40	11–20
	5–8	Weathered bedrock.	—	—	—	—	—	—	—	—	—
Nimrod:											
33	0–26	Fine sand	SP–SM, SM, SM–SC	A–2–4, A–3	0	95–100	95–100	90–100	8–28	<25	NP–4
	26–72	Sandy clay loam	SC, CL	A–6, A–2–6	0	95–100	95–100	90–100	25–55	20–35	11–20
	72–80	Sandy loam, sandy clay loam, loamy fine sand.	SC, CL, SM–SC, CL–ML	A–4, A–6, A–2–4, A–2–6	0	95–100	95–100	90–100	15–55	20–30	4–16
Paluxy:											
34, 35, 36	0–46	Very fine sandy loam.	SM, SM–SC, CL–ML, ML	A–4, A–2–4	0	100	98–100	70–100	30–60	<25	NP–7
	46–62	Very fine sandy loam, loam.	SM, SM–SC, CL–ML, ML	A–4, A–2–4	0	100	98–100	70–100	30–60	<25	NP–7
Patilo:											
37	0–48	Fine sand	SM, SP–SM, SM–SC	A–2–4, A–3	0	100	95–100	85–100	8–28	<25	NP–5
	48–80	Sandy clay loam, fine sandy loam.	SC	A–2, A–4, A–6	0	90–100	90–100	90–100	25–50	22–36	8–20
Pedernales:											
38, 39, 40, 41	0–12	Fine sandy loam	SM, ML, CL–ML, SM–SC	A–4, A–2–4	0	95–100	90–100	75–100	33–55	<25	NP–7
	12–42	Sandy clay, clay	CH, CL,	A–7, A–6	0	90–100	90–100	85–100	45–75	38–60	20–36

TABLE 16.—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	
Purves:											
42, 43	0-12	Clay	CH	A-7-6	0-5	90-100	80-100	80-95	70-95	51-65	30-40
	12-17	Gravelly clay, very gravelly clay, gravelly clay loam.	CH, SC	A-7-6	0-35	60-100	60-100	55-95	45-90	51-65	30-40
	17-19	Unweathered bedrock.	—	—	—	—	—	—	—	—	—
Seawillow:											
44, 45	0-38	Loam, clay loam	CL	A-7-6, A-6	0-5	80-100	75-100	75-100	51-90	29-46	14-30
	38-62	Clay loam, loam, silty clay loam.	CL, ML	A-4, A-6	0-5	75-100	65-100	60-100	51-75	27-41	10-25
Sunev:											
46, 47	0-12	Clay loam	CL, SC	A-4, A-6	0	90-100	80-100	80-100	45-60	25-40	8-18
	12-26	Loam, clay loam, silty clay loam.	CL	A-4, A-6	0	90-100	80-100	80-100	51-65	28-40	8-18
	26-62	Loam, clay loam, silty clay	CL	A-4, A-6	0	90-100	75-100	75-100	51-61	25-40	8-18

TABLE 16.—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	
Truce:											

TABLE 17.—PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[Dashes indicate data were not available. 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 estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility
						Uncoated steel	Concrete	K	T	

TABLE 17.—PHYSICAL AND CHEMICAL PROPERTIES OF SOILS—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH						
Duffau:										
22, 23, 24, 25	0-12	2.0-6.0	0.11-0.15	6.1-7.8	Low	Low	Low	0.43	5	3
	12-64	0.6-2.0	0.12-0.19	6.1-7.8	Low	Moderate	Low	0.32		
	64-80	0.6-2.0	0.10-0.15	6.1-7.8	Low	Moderate	Low	0.32		
Frio:										
26	0-38	0.2-0.6	0.15-0.22	7.9-8.4	Moderate	High	Low	0.32	5	4
	38-62	0.2-0.6	0.11-0.22	7.9-8.4	Moderate	High	Low	0.32		
Hassee:										
27, 28	0-14	0.6-2.0	0.11-0.20	6.1-7.3	Low	High	Low	0.43	5	3
	14-30	<0.06	0.12-0.18	6.1-8.4	High	High	Low	0.32		
	30-62	<0.06	0.12-0.20	6.6-8.4	High	High	Low	0.32		
Hensley:										
29	0-4	0.2-0.6	0.10-0.18	6.1-7.8	Low	High	Low	0.37	1	8
	4-18	0.06-0.2	0.10-0.20	6.6-8.4	Moderate	High	Low	0.32		
	18-20	—	—	—	—	—	—	—		
Krum:										
30, 31	0-7	0.2-0.6	0.15-0.20	7.4-8.4	High	High	Low	0.32	5	4
	7-48	0.2-0.6	0.14-0.20	7.9-8.4	High	High	Low	0.32		
	48-62	0.2-0.6	0.14-0.20	7.9-8.4	High	High	Low	0.32		
Maloterre:										
32	0-5	0.2-0.6	0.13-0.16	7.9-8.4	Low	High	Low	0.15	1	8
	5-8	—	—	—	—	—	—	—		
Nimrod:										
33	0-26	6.0-20	0.05-0.10	5.6-7.3	Very low	Low	Low	0.20	5	1
	26-72	0.2-0.6	0.12-0.17	5.1-6.0	Low	High	Moderate	0.32		
	72-80	0.2-0.6	0.06-0.17	5.1-6.5	Low	High	Moderate	0.32		
Paluxy:										
34, 35, 36	0-46	2.0-6.0	0.14-0.20	6.1-7.8	Very low	Low	Low	0.28	5	3
	46-62	2.0-6.0	0.14-0.20	7.9-8.4	Very low	Low	Low	0.28		
Patilo:										
37	0-48	6.0-20	0.05-0.08	5.6-7.3	Very low	Low	Low	0.17	5	1
	48-80	0.2-0.6	0.14-0.18	5.1-6.5	Low	High	Moderate	—		
Pedernales:										
38, 39, 40, 41	0-12	0.6-2.0	0.12-0.17	6.1-7.8	Low	Low	Low	0.37	5	3
	12-42	0.2-0.6	0.15-0.20	6.1-7.8	Moderate	High	Low	0.24		
	42-62	0.2-0.6	0.15-0.20	7.9-8.4	Moderate	Moderate	Low	0.15		
Purves:										
42, 43	0-12	0.2-0.6	0.12-0.18	7.9-8.4	High	High	Low	0.32	1	4
	12-17	0.2-0.6	0.08-0.18	7.9-8.4	High	High	Low	0.32		
	17-19	—	—	—	—	—	—	—		
Seawillow:										
44, 45	0-38	0.6-2.0	0.12-0.20	7.9-8.4	Moderate	Moderate	Low	0.32	5	4L
	38-62	0.6-2.0	0.12-0.18	7.9-8.4	Low	Moderate	Low	0.32		

TABLE 17.—PHYSICAL AND CHEMICAL PROPERTIES OF SOILS—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T	Wind erodibility group
	In	In/hr	In/in	pH						
Tarrant:										
[1]49:										
Tarrant part	0-14	0.2-0.6	0.10-0.17	7.9-8.4	Low	High	Low	0.32	1	8
	14-18	—	—	—	—	—	—	—		
Purves part	0-12	0.2-0.6	0.08-0.15	7.9-8.4	High	High	Low	0.24	1	8
	12-17	0.2-0.6	0.08-0.15	7.9-8.4	High	High	Low	0.24		
	17-19	—	—	—	—	—	—	—		
Thurber:										
50	0-10	0.2-0.6	0.15-0.22	6.1-7.8	Moderate	High	Low	0.43	5	6
	10-35	<0.06	0.12-0.18	6.6-8.4	High	High	Low	0.32		
	35-62	<0.06	0.12-0.18	7.4-8.4	High	High	Low	0.32		
Truce:										
51	0-6	0.6-2.0	0.11-0.15	5.6-7.3	Low	Low	Low	0.32	3	3
	6-42	0.06-0.2	0.12-0.18	6.1-8.4	Moderate	High	Low	0.32		
	42-62	—	—	—	—	—	—	—		
[1]52	0-6	0.6-2.0	0.08-0.12	5.6-7.3	Low	Low	Low	0.24	3	8
	6-42	0.06-0.2	0.12-0.18	6.1-8.4	Moderate	High	Low	0.32		
	42-62	—	—	—	—	—	—	—		
Venus:										
53	0-13	0.6-2.0	0.15-0.20	7.9-8.4	Low	High	Low	0.28	5	4L
	13-42	0.6-2.0	0.15-0.20	7.9-8.4	Low	High	Low	0.28		
	42-60	0.6-2.0	0.13-0.18	7.9-8.4	Low	High	Low	0.28		
Windthorst:										
54	0-10	2.0-6.0	0.07-0.11	5.6-7.3	Very low	Low	Low	0.24	5	2
	10-34	0.2-0.6	0.15-0.20	5.6-7.3	Moderate	High	Low	0.37		
	34-46	0.2-0.6	0.12-0.20	5.6-8.4	Moderate	Moderate	Low	0.37		
	46-62	—	—	—	—	—	—	—		
55, 56, 57, 58, [1]59	0-5	0.6-2.0	0.12-0.17	5.6-7.3	Low	Low	Low	0.49	5	3
	5-38	0.2-0.6	0.15-0.20	5.6-7.3	Moderate	High	Low	0.37		
	38-56	0.2-0.6	0.12-0.20	5.6-8.4	Moderate	Moderate	Low	0.37		
	56-62	—	—	—	—	—	—	—		
Yahola:										
[1]60:										
Yahola part	0-18	2.0-6.0	0.12-0.16	7.4-8.4	Low	Low	Low	0.24	5	3
	18-48	2.0-6.0	0.12-0.16	7.9-8.4	Low	Low	Low	0.24		
	48-62	2.0-6.0	0.07-0.16	7.9-8.4	Low	Low	Low	0.24		
Gaddy part	0-14	6.0-20	0.07-0.11	7.4-8.4	Low	Low	Low	0.17	5	2
	14-62	6.0-20	0.06-0.10	7.9-8.4	Low	Low	Low	0.17		

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 18.—SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. See text for descriptions of symbols and such terms as "rare," "brief," and "perched." The symbol < means less than; > 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	
Aledo:									
[1]1:									
Aledo part	C	None	—	—	>6.0	—	—	8-20	Hard
Bolar part	C	None	—	—	>6.0	—	—	20-40	Rippable
Bastrop: 2, 3, 4, 5, 6, 7, [1]8	B	None	—	—	>6.0	—	—	>60	—
Blanket: 9	C	None	—	—	>6.0	—	—	>60	—
Bolar: 10, 11	C	None	—	—	>6.0	—	—	20-40	Rippable
Bosque: 12	B	Rare to common.	Brief	May-Oct	>6.0	—	—	>60	—
Brackett: [1]13	C	None	—	—	>6.0	—	—	10-20	Rippable
Bunyan: 14	B	Rare to common.	Brief	May-Oct	>6.0	—	—	>60	—
Chaney: 15, 16	C	None	—	—	>6.0	—	—	>60	—
Decordova: 17	B	None	—	—	>6.0	—	—	>60	—
Demona: 18	C	None	—	—	1.5-3.5	Perched	May-Oct	>60	—
Denton: 19, 20	D	None	—	—	>6.0	—	—	22-40	Rippable
Duffau: 21, 22, 23, 24, 25	B	None	—	—	>6.0	—	—	>60	—
Frio: 26	B	Rare to common.	Brief	May-Oct	>6.0	—	—	>60	—
Hassee: 27,28	D	None	—	—	1.0-2.0	Perched	May-Oct	>60	—
Hensley: 29	D	None	—	—	>6.0	—	—	10-20	Hard
Krum: 30, 31	D	None	—	—	>6.0	—	—	>60	—
Maloterre: 32	D	None	—	—	>6.0	—	—	3-10	Hard
Nimrod: 33	C	None	—	—	1.5-3.5	Perched	May-Oct	>60	—
Paluxy: 34, 35, 36	B	None	—	—	>6.0	—	—	>60	—

See footnote at end of table.

TABLE 18.—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	
Patilo: 37	B	None	—	—	3.0–6.0	Perched	May–Oct	>60	—
Pedernales: 38, 39, 40, 41	C	None	—	—	>6.0	—	—	>60	—
Purves: 42, 43	D	None	—	—	>6.0	—	—	8–20	Hard
Seawillow: 44, 45	B	None	—	—	>6.0	—	—	>60	—
Sunev: 46, 47	B	None	—	—	>6.0	—	—	>60	—
Tarrant: 48:									

TABLE 19.—ENGINEERING TEST DATA

[Tests were performed by the Texas Highway Department]

Soil name and sample number	Depth	Shrinkage			Classification[1]		Mechanical analysis[4]							Liquid limit	Plasticity index
							Percentage passing sieve				Percentage smaller than				
		Limit	Linear	Ratio	AASHTO[2]	Unified[3]	No. 4	No. 10	No. 40	No. 200	0.05 mm	0.005 mm	0.002 mm		
	In														
Aledo clay loam:															
73-197-R	0-4	18	9.6	1.73	A-6(7)	CL	84	79	66	53	47	20	14	38	17
Bosque loam:															
73-198-R	6-20	18	4.7	1.80	A-4(5)	CL	100	100	99	62	50	22	16	26	9
73-199-R	30-46	16	6.1	1.84	A-6(5)	CL	100	100	99	57	50	25	19	27	12
Chaney loamy fine sand:															
73-200-R	0-12	14	0.5	1.85	A-2-4(0)	SM	99	98	91	12	12	5	4	18	2
73-201-R	17-34	13	15.8	1.94	A-7-6(10)	SC	100	100	97	49	48	43	43	48	31
73-202-R	56-72	9	18.6	2.10	A-7-6(15)	CL	100	99	97	64	59	44	40	50	36
Decordova loamy fine sand:															
73-209-R	0-14	16	0.5	1.77	A-2-4(0)	SP-SM	100	100	90	11	7	3	3	19	3
73-210-R	14-58	16	1.6	1.83	A-2-4(0)	SM	100	100	94	21	16	7	7	18	2
Frio silty clay:															
73-204-R	8-26	13	14.1	1.97	A-7-6(15)	CL	100	100	99	87	82	46	37	42	27
Paluxy very fine sandy loam:															
73-203-R	10-34	19	1.4	1.76	A-4(2)	SM	100	100	100	44	30	10	8	21	2
Windthorst fine sandy loam:															
73-206-R	0-5	20	2.3	1.70	A-4(1)	SM-SC	100	100	100	38	26	12	11	23	4
73-207-R	5-18	14	14.0	1.89	A-7-6(15)	CL	100	100	100	71	62	44	43	44	27
73-208-R	38-56	19	4.4	1.71	A-4(6)	CL	100	100	100	67	45	16	15	27	8

[1]Unified and AASHTO classification made by Soil Conservation Service Personnel.

[2]Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (Pt. 1, Ed. 8)[1]. The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, AASHTO Designation M 145-49.

[3]Based on the Unified Soil Classification System.

[4]Mechanical analyses according to the AASHTO Designation T88. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analysed by the hydrometer method and the various grain-sized fractions are calculated on the bases of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analysed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-sized fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

TABLE 20.—CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics of this taxadjunct that are outside the range of the series]

Soil name	Family or higher taxonomic class
Aledo	Loamy-skeletal, carbonatic, thermic Lithic Haplustolls
Bastrop	Fine-loamy, mixed, thermic Udic Paleustalfs
Blanket	Fine, mixed, thermic Pachic Argiustolls
Bolar	Fine-loamy, carbonatic, thermic Typic Calciustolls
Bosque	Fine-loamy, mixed, thermic Cumulic Haplustolls
Brackett	Loamy, carbonatic, thermic, shallow Typic Ustochrepts
Bunyan	Fine-loamy, mixed, nonacid, thermic Typic Ustifluvents
Chaney	Fine, mixed, thermic Aquic Paleustalfs
Decordova	Coarse-loamy, siliceous, thermic Udic Paleustalfs
*Demona	Clayey, mixed, thermic Aquic Arenic Paleustalfs
Denton	Fine, montmorillonitic, thermic Vertic Calciustolls
Duffau	Fine-loamy, siliceous, thermic Udic Paleustalfs
Frio	Fine, mixed, thermic Cumulic Haplustolls
Gadin	Sandy, mixed, thermic Typic Ustifluvents

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