SOIL SURVEY OF

Baylor County, Texas

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

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.

Major fieldwork for this soil survey was completed in the period 1966–70. Soil names and descriptions were approved in 1971. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1971. 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 Miller-Brazos Soil and Water Conservation District and the Wilbarger Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and ranches; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Baylor County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the capability unit and range site in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units and range sites.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife."

Ranchers and others can find, under "Range Management," groupings of the soils according to their suitability for range, and also the names of many of the plants that grow on each range site.

Community planners and others can read about soil properties that affect the choice of sites for nonindustrial buildings and for recreational areas in the sections "Use of the Soils for Recreational Areas" and "Engineering Uses of the Soils."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in Baylor County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given at the beginning of the publication and in the information given in the section "Additional Facts About the County" at the end of this publication.

Cover: Wheat and newly planted cotton on Rotan clay loam.

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SOIL SURVEY OF BAYLOR COUNTY, TEXAS

BY COLLETUS A. ROGERS, GILES D. PASSMORE, AND WILLIAM M. RISINGER, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE TEXAS AGRICULTURAL EXPERIMENT STATION

BAYLOR COUNTY is in the north-central part of Texas (fig. 1). The total area is 583,040 acres, or 911 square miles. Seymour is the county seat.

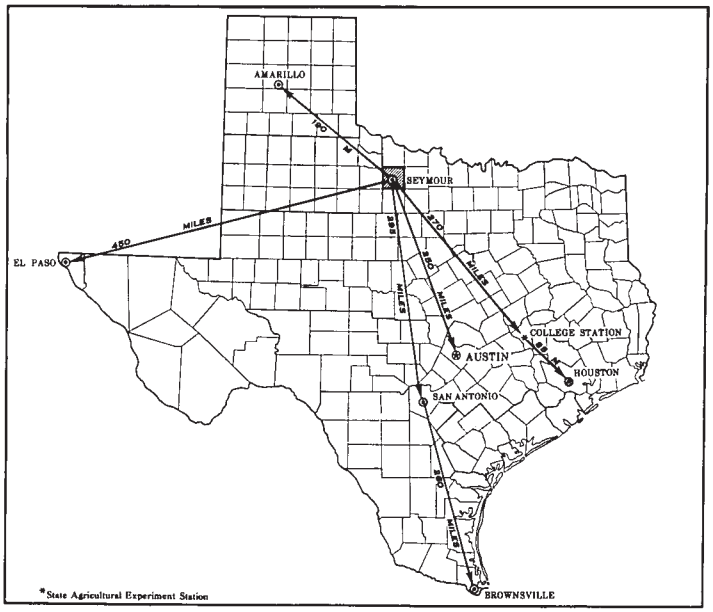

Figure 1.—**Location of Baylor County in Texas.**

Most of the county is in the eastern part of the Rolling Red Plains. About 10,000 acres in the southern section of the county are in the Rolling Red Prairies. The soils of the county are mostly gently sloping to rolling. They are used as cropland and rangeland.

Farming and ranching are of major importance. About 155,000 acres of nearly level to gently sloping areas of the county are cultivated. About 6,500 acres are used for irrigated farming. Wheat, grain sorghum, and cotton are the main cash crops. The county has periods of drought. During these periods satisfactory yields are obtained only from the more productive dryland and irrigated soils. Soil blowing or water erosion is a hazard in most areas.

Most of the county is drained by the Wichita and Brazos Rivers. The Wichita River drains the northern part of the county and the Brazos River drains the central and southern parts of the county. An area in the eastern part of the county is drained by the Little Wichita River.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Baylor County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes; the size and speed of streams; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.[1]

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Rotan and Vernon, for example, are the names of two soil series. All the soils in the United States that have the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Miles fine

[1] United States Department of Agriculture. 1951. *Soil Survey Manual.* U.S. Dept. Agr. Handbook No. 18, 503 pp., illus.

sandy loam, 1 to 3 percent slopes, is one of the phases in the Miles series.

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

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series or of different phases within one series. Three such kinds of mapping units are shown on the soil map of Baylor County: soil complexes, soil associations, and undifferentiated groups.

A soil complex consists of areas of two or more soils so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Lueders-Throck complex, 1 to 8 percent slopes, is an example.

A soil association is made up of adjacent soils that occur as areas large enough to be shown individually on the soil map, but are shown as one unit because the time and effort required to delineate them separately cannot be justified. A considerable degree of uniformity exists in pattern and relative extent of the dominant soils, but the soils may differ greatly one from another. The name of an association consists of the names of the dominant soils, joined by a hyphen. Owens-Vernon association, rolling, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Lincoln and Yahola soils, frequently flooded, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Badland is a land type in Baylor County.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kind of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kind of soil. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants, and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or a high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil, and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Baylor County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

The map that shows soil associations is useful to people who want a general idea of the soils in the county, who want to compare different parts of the county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is not suitable for planning the management of a farm or field, or choosing the site for a building or other structures, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The seven soil associations in Baylor County are described on the following pages.

1. Vernon-Tillman Association

Nearly level to sloping, moderately deep and deep, clayey and loamy soils

This association consists of nearly level to sloping soils on uplands.

This association makes up 39 percent of the county.

It is about 35 percent Vernon soils, 27 percent Tillman soils, and 38 percent minor soils and areas of water. The minor soils are Clairemont, Hollister, Mangum, Owens, Sagerton, and Aspermont soils.

The Vernon soils are gently sloping to sloping. They have a surface layer of reddish-brown, calcareous clay about 7 inches thick. The surface layer is underlain by reddish-brown, calcareous clay about 11 inches thick. The next layer is weak-red, calcareous clay about 8 inches thick. The underlying material is red shaly clay.

The Tillman soils are nearly level to gently sloping (fig. 2). They have a surface layer of reddish-brown clay loam about 7 inches thick. The surface layer is underlain by reddish-brown clay about 11 inches thick. The next layer is yellowish-red, calcareous clay about 24 inches thick. The next layer is red, calcareous clay about 20 inches thick. The underlying material is red shaly clay.

The Clairemont and Mangum soils are on flood plains of local streams. The Hollister and Sagerton soils are nearly level to gently sloping. The Owens and Aspermont soils are gently sloping to sloping.

Most of this association is used for range on large ranches, but a few areas are cultivated. The soils are droughty. The hazard of water erosion is slight to moderate.

2. Owens-Vernon Association

Gently sloping to steep, shallow and moderately deep, clayey soils

This association consists of gently sloping to steep soils on uplands.

This association makes up 27 percent of the county. It is about 35 percent Owens soils, 29 percent Vernon soils, and 36 percent minor soils, areas of Badland, and water. The minor soils are Clairemont, Mangum, Tillman, and Aspermont soils.

The Owens soils are sloping to steep. They have a surface layer of red calcareous clay about 6 inches thick. The surface layer is underlain by red, calcareous clay about 12 inches thick. The underlying material is red shaly clay.

The Vernon soils are gently sloping. They have a surface layer of reddish-brown, calcareous clay about 7 inches thick. The surface layer is underlain by reddish-brown, calcareous clay about 11 inches thick. The next layer is weak-red, calcareous clay about 8 inches thick. The underlying material is red shaly clay.

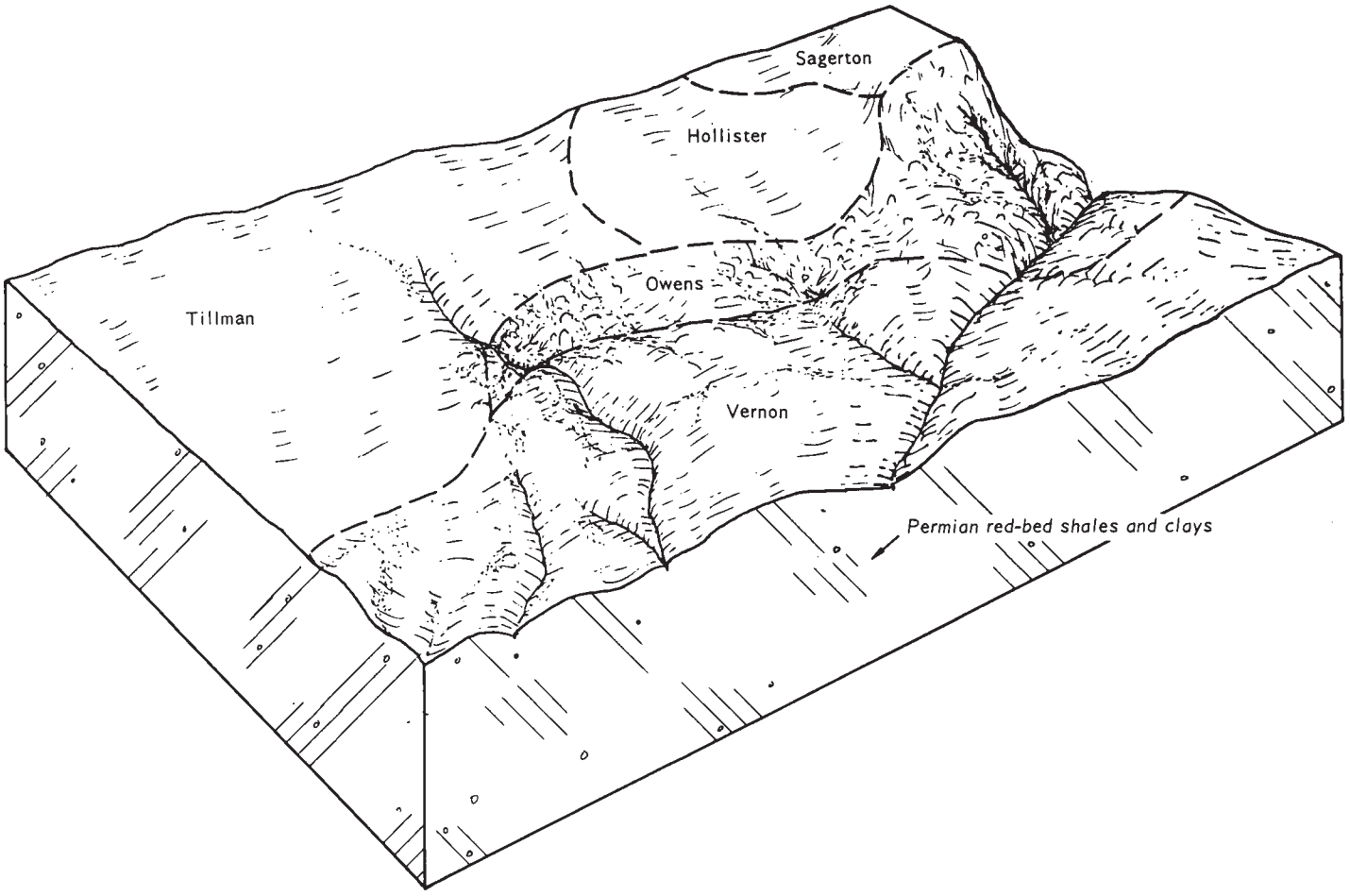

***Figure 2.*—Typical pattern of the soils in association 1.**

The Clairemont and Mangum soils are in areas along drains. The Tillman soils are on narrow divides. The Aspermont soils are on upland areas. The areas of Badland occupy escarpments and areas where erosion is severe.

This association is used for range. It is too droughty and too steep to be cultivated. The hazard of water erosion is moderate to severe.

3. Owens-Mereta Association

Gently sloping to steep, shallow, clayey and loamy soils

This association consists of gently sloping to steep soils on uplands.

This association makes up 12 percent of the county (fig. 3). It is about 36 percent Owens soils, 13 percent Mereta soils, and 51 percent minor soils. The minor soils are Frio, Hensley, Lindy, Lueders, Tobosa, Throck, and Aspermont.

The Owens soils are sloping to steep. Stones 1 foot to 5 feet in diameter are on 35 to 70 percent of the area. These soils have a surface layer of light yellowish-brown, calcareous clay about 6 inches thick. This layer is underlain by pale-olive, calcareous clay about 12 inches thick. The underlying material is pale-yellow shaly clay.

The Mereta soils are gently sloping. They have a surface layer of brown, calcareous clay loam about 8 inches thick. This layer is underlain by brown, calcareous clay loam about 8 inches thick. The next layer is very pale brown, cemented caliche about 6 inches thick. The underlying material is light-gray to very pale brown clay loam.

The Frio soils are in drains. The Hensley and Lindy soils are on ridgetops. The Tobosa soils are adjacent to drains. The Lueders, Throck, and Aspermont soils are on sides of hills.

Most of this association is used for range. It is too steep, too stony, or too shallow to be cultivated. The hazard of water erosion is moderate to severe, and the hazard of soil blowing is slight.

4. Miles-Enterprise-Hardeman Association

Nearly level to strongly sloping, deep, loamy soils

This association consists of nearly level to strongly sloping soils on uplands. These areas are in close proximity to the Brazos River.

This association makes up 9 percent of the county

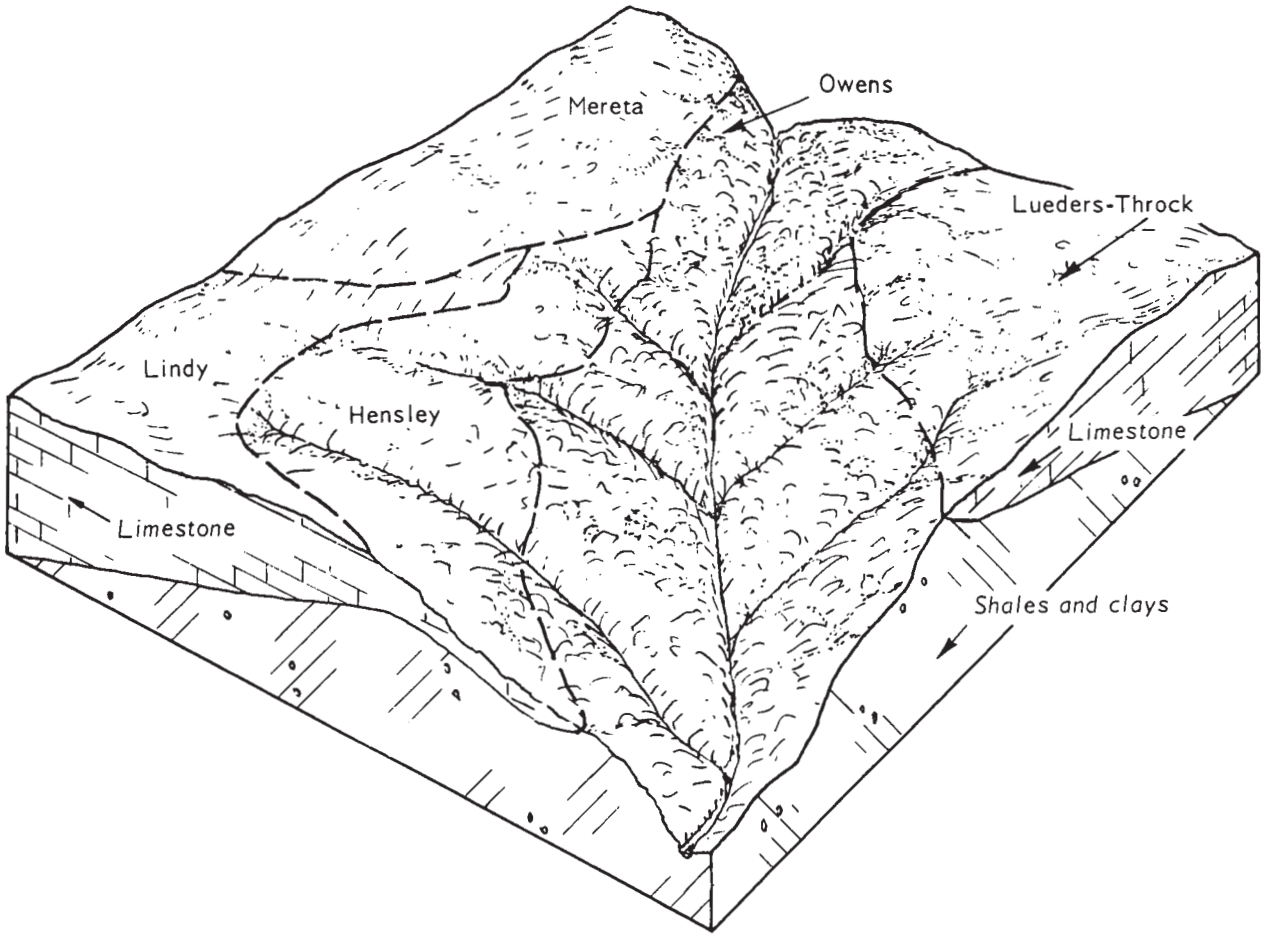

***Figure 3.*—Typical pattern of the soils in association 3.**

(fig. 4). It is about 37 percent Miles soils, 24 percent Enterprise soils, 16 percent Hardeman soils, and 23 percent minor soils. The minor soils are Chaney, Clairemont, Eufaula, and Grandfield soils.

The Miles soils have a surface layer of brown fine sandy loam about 14 inches thick. The surface layer is underlain by reddish-brown, very friable sandy clay loam about 6 inches thick. The next layer is yellowish-red, very friable sandy clay loam about 40 inches thick. The underlying material is red, very friable, calcareous sandy clay loam that extends to a depth of 60 to 80 inches or more.

The Enterprise soils have a surface layer of reddish-brown, calcareous very fine sandy loam about 18 inches thick. The surface layer is underlain by yellowish-red, very friable, calcareous very fine sandy loam about 62 inches thick.

The Hardeman soils have a surface layer of reddish-brown, very friable, calcareous fine sandy loam about 9 inches thick. This layer is underlain by reddish-yellow, very friable, calcareous fine sandy loam that extends to a depth of 90 inches or more.

The Clairemont soils are along drains. The Grandfield and Eufaula soils occupy a higher position than the major soils of this association.

Most of this association is cultivated. The hazard of water erosion is slight to severe, and the hazard of soil blowing is moderate to severe.

5. Clairemont-Yahola-Lincoln Association

Nearly level, deep, loamy soils

This association consists of nearly level soils on bottom lands. They are on the flood plains of the Brazos and Wichita Rivers.

This association makes up 5 percent of the county. It is about 57 percent Clairmont soils, 23 percent Yahola soils, 19 percent Lincoln soils, and 1 percent Mangum clay.

The Clairemont soils have a surface layer of reddish-brown, calcareous silt loam about 6 inches thick. This layer is underlain by reddish-brown, calcareous silty clay loam that extends to a depth of 80 inches.

The Yahola soils have a surface layer of reddish-brown, calcareous fine sandy loam about 10 inches thick. This layer is underlain by light reddish-brown, calcareous fine sandy loam about 30 inches thick. The underlying material is reddish-yellow fine sandy loam about 30 inches thick.

The Lincoln soils have a surface layer of reddish-brown, calcareous silt loam about 4 inches thick. This layer is underlain by pink, calcareous fine sand about 48 inches thick. The next layer is reddish-yellow, calcareous loamy fine sandy about 10 inches thick. The underlying material is pink fine sand.

Mangum clay occurs at a slightly lower position than the major soils of this association.

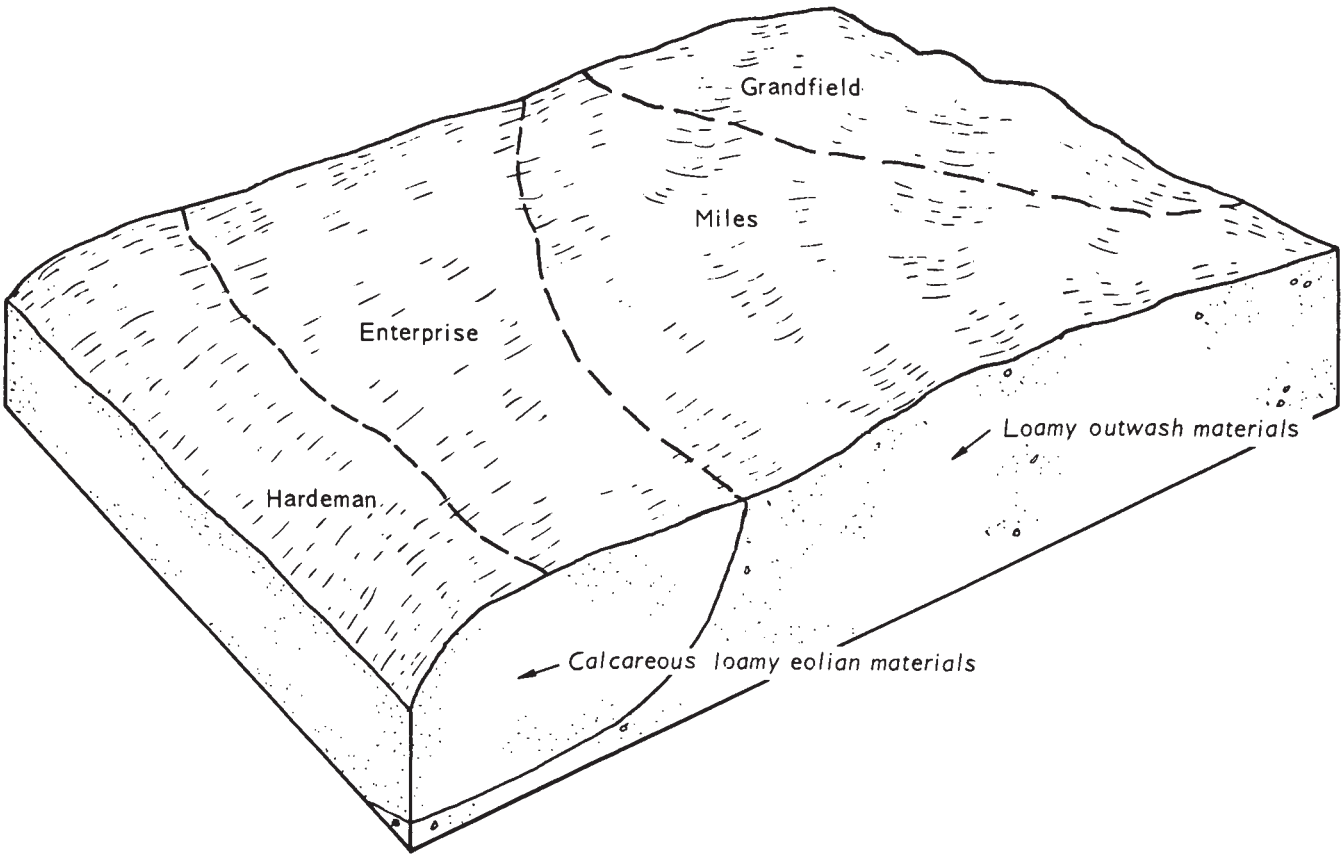

***Figure 4.*—Typical pattern of the soils in association 4.**

Most of this association is used for range. The hazard of water erosion is slight, and the hazard of soil blowing is moderate.

6. Sagerton-Rotan-Winters Association

Nearly level to gently sloping, deep, loamy soils

This association consists of nearly level to gently sloping soils on uplands.

This association makes up 4 percent of the county (fig. 5). It is about 50 percent Sagerton soils, 21 percent Rotan soils, 21 percent Winters soils, and 8 percent minor soils. The minor soils are Miles and Rowena.

The Sagerton soils are nearly level to gently sloping. They have a surface layer of dark-brown clay loam about 8 inches thick. This layer is underlain by dark-brown clay loam about 8 inches thick. The next layer is dark-brown, calcareous clay about 26 inches thick. The layer below it is reddish-yellow, calcareous clay loam about 24 inches thick. The underlying material is reddish-yellow, calcareous clay that extends to a depth of 80 inches.

The Rotan soils are nearly level. They have a surface layer of dark-brown, friable clay loam about 8 inches thick. This layer is underlain by dark-brown, firm clay loam about 9 inches thick. The next layer is dark-brown, very firm, calcareous clay loam about 5 inches thick. The layer below it is dark-brown, very firm, calcareous clay about 16 inches thick. The underlying material, to a depth of 80 inches, is calcareous clay loam. It is reddish yellow in the upper part and yellowish red in the lower part.

The Winters soils are nearly level to gently sloping. They have a surface layer of reddish-brown loam about 9 inches thick. This layer is underlain by reddish-brown sandy clay about 33 inches thick. The layer below it is yellowish-red sandy clay loam about 10 inches thick. The underlying material is yellowish-red sandy clay loam about 28 inches thick.

The Miles and Rowena soils occupy a similar position to the major soils of this association.

Most of this association is cultivated. The hazard of water erosion is slight to moderate, and the hazard of soil blowing is slight.

7. Tobosa-Rowena Association

Nearly level to gently sloping, deep, clayey and loamy soils

This association consists of nearly level to gently sloping soils on uplands.

This association makes up 4 percent of the county. It is about 62 percent Tobosa soils, 29 percent Rowena soils, and 9 percent minor soils. The minor soils are Frio, Lindy, Rotan, and Aspermont soils.

The Tobosa soils are nearly level to gently sloping. They have a surface layer of dark grayish-brown, cal-

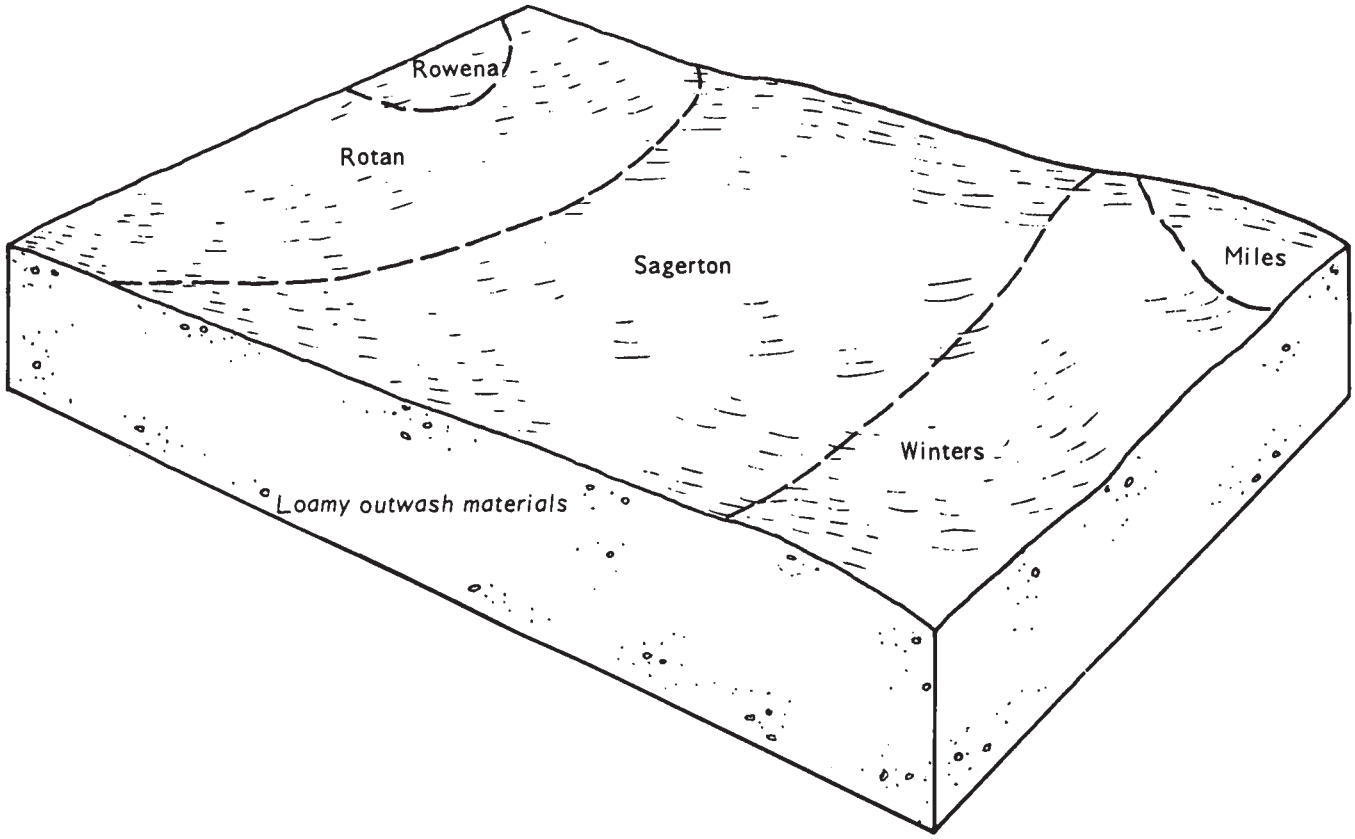

***Figure 5.*—Typical pattern of the soils in association 6.**

careous clay about 10 inches thick. This layer is underlain by dark-brown, calcareous clay about 8 inches thick. The next layer is brown, calcareous clay about 30 inches thick. The layer below it is light-brown, calcareous clay about 10 inches thick. The underlying material is reddish-yellow, calcareous clay loam.

The Rowena soils are nearly level to gently sloping. They have a surface layer of dark-brown, calcareous clay loam about 8 inches thick. This layer is underlain by dark-brown, calcareous clay about 29 inches thick. The next lower layer is reddish-yellow, calcareous clay loam about 26 inches thick. The underlying material is red, calcareous clay loam that extends to a depth of 80 inches.

The Frio soils are along drains. The Frio and Rotan soils are nearly level. The Lindy soils are nearly level to gently sloping. The Aspermont soils are more sloping than the Tobosa and Rowena soils.

Most of this association is cultivated. The hazard of water erosion is slight to moderate, and the hazard of soil blowing is slight.

Descriptions of the Soils

This section describes the soil series and mapping units in Baylor County. Each soil series is described in considerable detail, and then, briefly, each mapping unit in that series. Unless specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second, detailed and in technical terms, is for scientists, engineers, and others who need to make thorough and precise studies of soils. Unless it is otherwise stated, the colors given in the descriptions are those of a dry soil.

As mentioned in the section "How This Survey Was Made," not all mapping units are of a soil series. Badland, for example, does not belong to a soil series, but nevertheless, is listed in alphabetical order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit and range site in which the mapping unit has been placed. The page for the description of each capability unit and range site can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The approximate acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary at the back of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey manual.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent	Soil	Acres	Percent
Aspermont silty clay loam, 1 to 3 percent slopes	16,932	2.9	Lindy clay loam, 1 to 3 percent slopes	7,445	1.3
Aspermont silty clay loam, 3 to 5 percent slopes	4,402	.7	Lueders-Throck complex, 1 to 8 percent slopes	8,275	1.4
Badland and Owens soils, undulating	12,570	2.2	Mangum clay	13,524	2.3
Chaney loamy fine sand, 0 to 1 percent slopes	2,557	.4	Mereta clay loam, 1 to 3 percent slopes	7,157	1.2
Clairemont silt loam	41,430	7.1	Mereta clay loam, 3 to 5 percent slopes	2,039	.3
Cobb fine sandy loam, 1 to 3 percent slopes	1,203	.2	Miles fine sandy loam, 0 to 1 percent slopes	9,344	1.6
Cosh fine sandy loam, 1 to 3 percent slopes	2,305	.4	Miles fine sandy loam, 1 to 3 percent slopes	14,379	2.5
Enterprise very fine sandy loam, 0 to 1 percent slopes	4,365	.7	Owens stony clay, 5 to 30 percent slopes	25,933	4.4
Enterprise very fine sandy loam, 1 to 3 percent slopes	9,123	1.6	Owens-Vernon association, rolling	90,101	15.5
Eufaula fine sand, 3 to 8 percent slopes	1,506	.3	Randall clay	392	.1
Frio silty clay loam	1,931	.3	Rotan clay loam, 0 to 1 percent slopes	8,198	1.4
Frio silty clay loam, channeled	7,793	1.3	Rowena clay loam, 0 to 1 percent slopes	6,137	1.1
Grandfield loamy fine sand, 0 to 3 percent slopes	5,294	.9	Rowena clay loam, 1 to 3 percent slopes	3,860	.7
Grandfield fine sandy loam, 3 to 5 percent slopes	1,505	.3	Sagerton clay loam, 0 to 1 percent slopes	13,892	2.4
Hardeman fine sandy loam, 3 to 5 percent slopes	3,013	.5	Sagerton clay loam, 1 to 3 percent slopes	11,424	2.0
Hardeman fine sandy loam, 5 to 12 percent slopes	7,626	1.3	Tillman clay loam, 0 to 1 percent slopes	7,721	1.3
Hensley clay loam, 1 to 3 percent slopes	2,898	.5	Tillman clay loam, 1 to 3 percent slopes	57,171	9.8
Hollister clay loam, 0 to 1 percent slopes	2,634	.5	Tobosa clay, 0 to 1 percent slopes	9,061	1.6
Kamay silt loam, 0 to 1 percent slopes	5,677	1.0	Tobosa clay, 1 to 3 percent slopes	14,917	2.6
Kamay silt loam, 1 to 3 percent slopes	3,192	.5	Vernon clay, 1 to 3 percent slopes	21,772	3.7
Lincoln and Yahola soils, frequently flooded	10,972	1.9	Vernon clay, 3 to 8 percent slopes	67,100	11.5
Lindy clay loam, 0 to 1 percent slopes	2,289	.4	Winters loam, 0 to 1 percent slopes	4,363	.7
			Winters loam, 1 to 3 percent slopes	2,845	.5
			Yahola fine sandy loam	1,925	.3
			Water and riverbeds	22,848	3.9
			Total	583,040	100.0

Aspermont Series

The Aspermont series consists of moderately deep to deep, gently sloping soils on uplands. These soils formed in loamy sediment.

In a representative profile the surface layer is reddish-brown, calcareous silty clay loam about 8 inches thick. It is underlain, to a depth of about 40 inches, by a subsoil of friable, calcareous silty clay loam. The upper part of the subsoil is light reddish brown and contains a few soft masses and hard concretions of calcium carbonate. The lower part is reddish yellow and is about 30 percent, by volume, calcium carbonate. The underlying material, which begins at a depth of about 40 inches, is red, calcareous shaly clay.

Aspermont soils are well drained. Runoff is medium, and permeability is moderate. Available water capacity is high.

Representative profile of Aspermont silty clay loam, 1 to 3 percent slopes, in a cultivated field about 6.3 miles southwest of the courthouse in Seymour; 5.6 miles southwest from the courthouse on U.S. Highway 277; 1.3 miles west on Farm Road 2070; 30 feet south of road:

Ap—0 to 8 inches, reddish-brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; strong, fine, subangular blocky structure and granular structure; hard, friable, sticky; many roots; many pores; few very fine calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

B2—8 to 16 inches, light reddish-brown (5YR 6/4) silty clay loam, reddish brown (5YR 5/4) moist; weak, coarse, prismatic structure parting to moderate, fine, subangular blocky; hard, friable, sticky; few roots; few pores; few soft masses and fine calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

B2ca—16 to 40 inches, reddish-yellow (5YR 6/6) silty clay loam, yellowish red (5YR 5/6) moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; hard, friable, sticky; 30 percent, by volume, soft masses of calcium carbonate; calcareous; moderately alkaline; abrupt, smooth boundary.

C—40 to 60 inches, red (10R 5/6) shaly clay, red (10R 4/6) moist; massive; very hard, very firm; calcareous; moderately alkaline.

The solum ranges from 24 to 50 inches in thickness. The A horizon ranges from 5 to 10 inches in thickness. It is brown or reddish brown. The B2 horizon ranges from 7 to 18 inches in thickness. It is brown or light reddish brown. The B2ca horizon ranges from 12 to 24 inches in thickness and is yellowish red or reddish yellow. Content of calcium carbonate in the B2ca horizon ranges from 15 to 30 percent, by volume. The C horizon ranges from shaly clay to silty clay.

Aspermont silty clay loam, 1 to 3 percent slopes (AsB).—This soil is on uplands. Areas range from 15 to 300 acres in size. Slopes are convex and average 2 percent. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Tillman, Sagerton, and Rotan soils. These included soils are on the lower parts of the landscape and are less sloping than Aspermont soils. Also included are areas of more sloping Vernon soils on higher parts of the landscape.

About half the acreage of this soil is cultivated, and the other half is used for range. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit IIIe–5, dryland; Deep Hardland range site.

Aspermont silty clay loam, 3 to 5 percent slopes (AsC).—This soil is on ridges. Slopes are convex and average 4 percent. Areas of this soil range from 10 to 50 acres in size.

The surface layer is reddish-brown silty clay loam about 6 inches thick. It is underlain by light reddish-brown silty clay loam about 8 inches thick. The next layer is reddish-yellow silty clay loam about 20 inches thick. It is about 20 percent calcium carbonate. The underlying material is red shaly clay.

Included with this soil in mapping are areas of the more sloping Vernon and Owens soils.

Most of this acreage is used for range. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit IVe–1, dryland; Deep Hardland range site.

Badland

Badland consists of barren red-bed shaly clay (fig. 6). It is on escarpments and in areas where erosion is severe.

This land type has little value for farming. The vegetation is too sparse to have much value for grazing.

Badland and Owens soils, undulating (BoC).—This association is on uplands. Slopes are dominantly 1 to 3 percent but range from 1 to 8 percent. Areas are irregular in shape and range from 20 acres to several thousand acres in size. Escarpments occur on the outer edges of some of them. Badland makes up about 70 percent of this association, and Owens soils make up about 25 percent. The rest is Vernon soils and areas of alluvium that occur along drainageways.

Badland consists of red-bed shaly clay that has rocklike structure. Owens soils have a reddish-brown clayey surface layer about 6 inches thick. This layer is underlain by red clay about 8 inches thick. The underlying material is red shaly clay.

The hazard of water erosion is severe. Capability unit VIIs–1, dryland; range site unassigned.

Chaney Series

The Chaney series consists of deep, nearly level soils on uplands. These soils formed in sandy and loamy materials.

In a representative profile the surface layer is brown, loose loamy fine sand about 12 inches thick. The next layer is about 50 inches thick. In sequence from the top, the upper 6 inches is reddish-brown, friable sandy clay loam; the next 8 inches is mottled, reddish-brown, extremely firm sandy clay; the next 22 inches is mottled, reddish-yellow, extremely firm sandy clay; and the next 14 inches is mottled, red, very firm sandy clay. Below this, to a depth of 80 inches, is yellowish-red, friable sandy clay loam. The underlying material is reddish-yellow fine sandy loam.

Chaney soils are moderately well drained. Runoff and permeability are slow. Available water capacity is high.

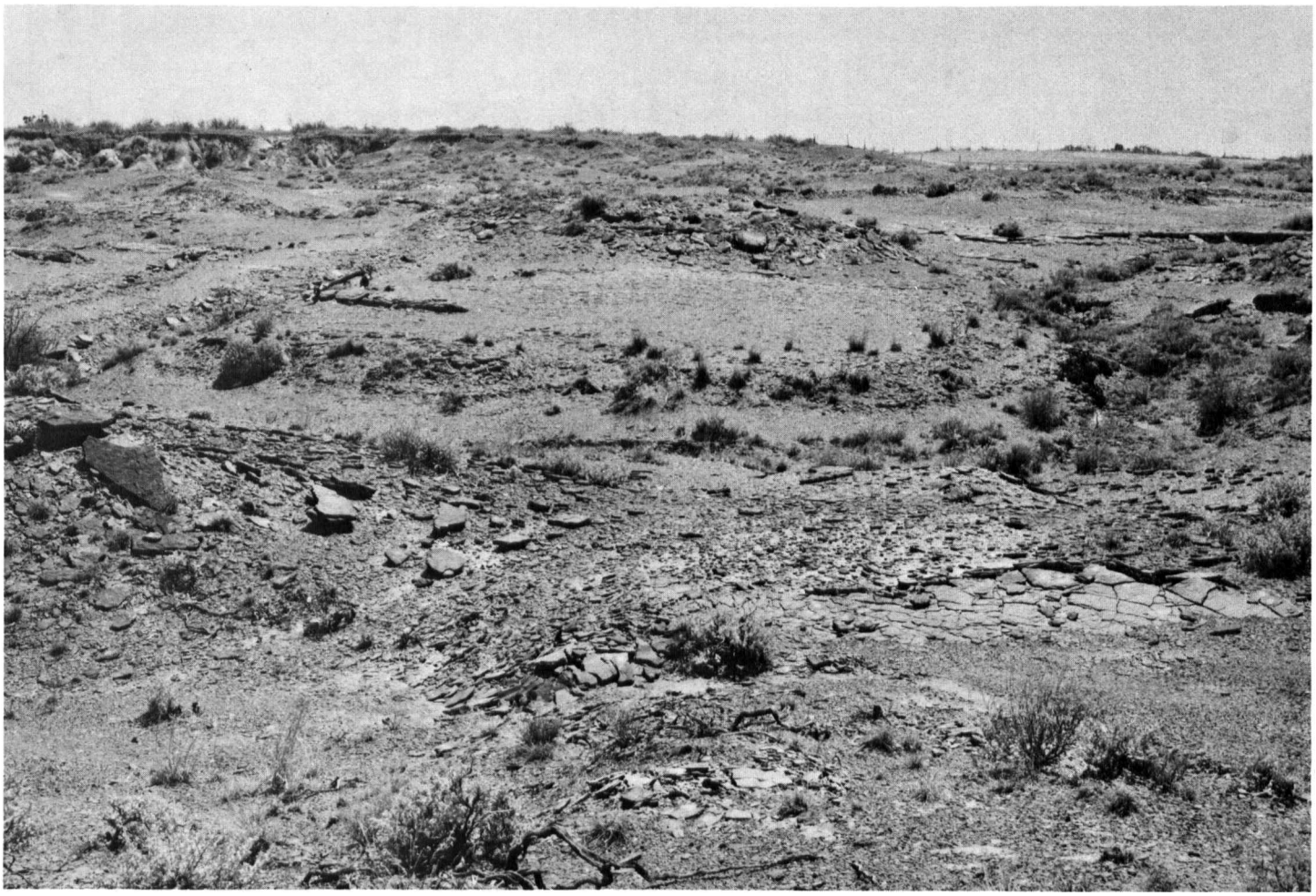

Figure 6.—**Area of Badland.**

Representative profile of Chaney loamy fine sand, 0 to 1 percent slopes, in a cultivated field about 1.8 miles north-northwest of the courthouse in Seymour; 1.2 miles north, on Farm Road 1919, of the junction of U.S. Highway 277 and Farm Road 1919; west 0.5 mile on Farm Road 1153; 1.2 miles south on county road; 300 feet west of road:

Ap—0 to 12 inches, brown (7.5YR 5/4) loamy fine sand, brown (7.5YR 4/4) moist; weak, fine, subangular blocky structure; loose, very friable; common roots; slightly acid; abrupt, smooth boundary.

B21t—12 to 18 inches, reddish-brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate, medium, blocky and subangular blocky structure; hard, friable, sticky; common, thin clay films; neutral; clear, smooth boundary.

B22t—18 to 26 inches, reddish-brown (5YR 5/4) sandy clay, reddish brown (5YR 4/4) moist; fine, common, diffused, brown, yellowish-red, reddish-yellow mottles and fine, faint, olive mottles; moderate, coarse, blocky structure; extremely hard, extremely firm, very sticky and very plastic; common clay films; neutral; clear, smooth boundary.

B23t—26 to 48 inches, reddish-yellow (5YR 6/6) sandy clay, yellowish red (5YR 5/6) moist; fine to medium, distinct to prominent, light brownish-gray, light yellowish-brown, and grayish-brown mottles; moderate, coarse, blocky structure; extremely hard, extremely firm, very sticky and very plastic; common clay films; mildly alkaline; clear, smooth boundary.

B24t—48 to 62 inches, red (2.5YR 5/6) sandy clay, red (2.5YR 4/6) moist; common, medium, distinct, brownish-gray mottles; moderate, coarse, blocky structure; very hard, very firm, very sticky and very plastic; common clay films; fine ferro-manganese concretions; noncalcareous; moderately alkaline; clear, smooth boundary.

B3—62 to 80 inches, yellowish-red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak, fine, subangular blocky structure; hard, friable, sticky; calcareous; moderately alkaline; clear, smooth boundary.

C—80 to 90 inches, reddish-yellow (5YR 6/8) fine sandy loam, yellowish red (5YR 5/8) moist; weak, fine, subangular blocky structure; hard, very friable, slightly sticky; calcareous; moderately alkaline.

The solum ranges from 60 to more than 100 inches in thickness. The A horizon ranges from 10 to 19 inches in thickness. It is brown or light brown. The B21t horizon ranges from 6 to 10 inches in thickness. It is brown or reddish brown. The B22t, B23t, and B24t horizons range from 34 to 54 inches in thickness. They are reddish-brown, reddish-yellow, yellowish-red, or red clay to sandy clay. They have gray, brown, red, olive, and yellow mottles at a depth of 18 to 30 inches. The B3 horizon ranges from 10 to 20 inches in thickness. It is yellowish-red or red sandy clay loam to sandy clay. Reaction ranges from neutral to mod-

erately alkaline in this horizon. In the C horizon color is yellowish red or reddish yellow.

These soils are outside the range of the Chaney series in that the Bt horizon is neutral in the upper part and alkaline in the lower part. Chaney soils range from medium acid to neutral in the Bt horizon, but this difference does not alter their use or management.

Chaney loamy fine sand, 0 to 1 percent slopes (ChA).—This soil is on uplands. Slopes are dominantly less than 0.5 percent. Areas range from about 20 acres to several hundred acres in size.

Included with this soil in mapping are areas of Miles and Grandfield soils that are at a slightly higher elevation. Also included are areas of a soil that has a loamy fine sand surface layer more than 20 inches thick.

Most areas of this soil are cultivated. The hazard of water erosion is slight, and the hazard of soil blowing is moderate. In places water ponds on this soil for several days after a rainfall. Capability unit IIe–2, dryland, and IIe–1, irrigated; Sandyland range site.

Clairemont Series

The Clairemont series consists of deep, nearly level soils that formed in recent alluvium.

In a representative profile the surface layer is reddish-brown, calcareous silt loam about 6 inches thick. The underlying material, to a depth of 80 inches, is reddish-brown, calcareous silty clay loam.

Clairemont soils are well drained. Runoff is slow, and permeability is moderate. Available water capacity is high.

Representative profile of Clairemont silt loam in an area of range about 16.4 miles east of the courthouse in Seymour; 16.5 miles east of the junction of U.S. Highway 277 and Farm Road 422; 30 feet north of road:

A1—0 to 6 inches, reddish-brown (2.5YR 5/4) silt loam, reddish brown (2.5YR 4/4) moist; compound, fine, platy structure parting to weak, subangular blocky; hard, very friable, slightly sticky; common roots; fine pores; common worm casts; calcareous; moderately alkaline; clear, smooth boundary.

C—6 to 80 inches, reddish-brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; massive; hard, very friable, slightly sticky; common roots and worm casts in upper part; stratified layers of loam, very fine sandy loam, and fine sandy loam ¼ to ½ inch thick; distinct bedding planes; films and threads of calcium carbonate in the lower part; calcareous; moderately alkaline.

The A horizon ranges from 5 to 12 inches in thickness. It is reddish brown, light brown, reddish yellow, or brown. The C horizon is red, reddish brown, or strong brown.

Clairemont silt loam (Cm).—This soil is on flood plains. Slopes are dominantly less than 0.5 percent. Areas are 20 acres to several hundred acres in size.

Included with this soil in mapping are small areas of Mangum, Frio, and Yahola soils.

Most areas of this soil are used for range, but a few acres are cultivated. The hazard of water erosion is slight, and the hazard of soil blowing is moderate. This soil is flooded one or more times in 4 to 10 years. Capability unit IIc–2, dryland, and I–2, irrigated; Bottomland range site.

Cobb Series

The Cobb series consists of moderately deep, gently sloping soils on uplands. These soils formed in loamy material over red-bed sandstone.

In a representative profile the surface layer is reddish-brown fine sandy loam about 7 inches thick. The next layer is reddish-brown sandy clay loam about 21 inches thick. The underlying material is red and light-gray, weakly cemented sandstone.

Cobb soils are well drained. Runoff is slow, and permeability is moderate. Available water capacity is low.

Representative profile of Cobb fine sandy loam, 1 to 3 percent slopes, in an area of range 12.3 miles southwest of the courthouse in Seymour; 11.0 miles southwest from the courthouse on U.S. Highway 277 to Bomarton, Texas; 1.5 miles south on Farm Road 1152; 0.25 mile east; 0.95 mile south on county road; 0.3 mile east; 0.4 mile south; 20 feet east of road:

A1—0 to 7 inches, reddish-brown (5YR 5/4) fine sandy loam, dark reddish brown (5YR 4/4) moist; weak, fine to very fine, subangular blocky structure; hard, very friable; common roots; neutral; clear, smooth boundary.

B21t—7 to 20 inches, reddish-brown (2.5YR 4/4) sandy clay loam, dark reddish brown (2.5YR 3/4) moist; compound, prismatic structure parting to moderate, fine, subangular blocky; very hard, very friable, sticky; common roots; common pores; common thin clay films; neutral; clear, smooth boundary.

B22t—20 to 28 inches, reddish-brown (2.5YR 4/4) sandy clay loam, dark reddish brown (2.5YR 3/4) moist; moderate, fine, subangular blocky structure; very hard, very friable, sticky; common pores; thin clay films; mildly alkaline; clear, smooth boundary.

C—28 to 60 inches, red and light-gray, weakly cemented, calcareous sandstone.

The solum ranges from 20 to 40 inches in thickness. The A horizon ranges from 6 to 10 inches in thickness. It is reddish brown or brown. The B2t horizon ranges from 15 to 36 inches in thickness. It is reddish brown or red. The depth to sandstone ranges from 20 to 40 inches.

These soils are slightly redder than the color limit in the defined range for the Cobb series. This difference does not alter their use, management, or behavior.

Cobb fine sandy loam, 1 to 3 percent slopes (CoB).—This soil is on uplands. Areas are irregular in shape and range from 10 to about 150 acres in size. Slopes are convex and average about 2 percent.

Included with this soil in mapping are areas of Cosh, Vernon, and Miles soils.

Most areas of this soil are used for range, but a few acres are cultivated. The hazards of water erosion and soil blowing are moderate. Capability unit IIIe–4, dryland; Sandy Loam range site.

Cosh Series

The Cosh series consists of shallow, gently sloping soils on uplands. These soil formed in loamy material over red-bed sandstone.

In a representative profile the surface layer is reddish-brown fine sandy loam about 6 inches thick. The next layer is reddish-brown, friable sandy clay loam

about 8 inches thick. The underlying material is red, weakly cemented sandstone.

Cosh soils are well drained. Runoff is slow, and permeability is moderate. Available water capacity is low.

Representative profile of Cosh fine sandy loam, 1 to 3 percent slopes, in an area of range 16.1 miles southwest of Seymour; 11.0 miles southwest from the courthouse on U.S. Highway 277 to Bomarton, Texas; 1.5 miles south on Farm Road 1152; 0.25 mile east; 0.85 mile south; 20 feet east of road:

A1—0 to 6 inches, reddish-brown (2.5YR 5/4) fine sandy loam, reddish brown (2.5YR 4/4) moist; weak, fine, subangular blocky structure; hard, very friable; common roots; neutral; clear, smooth boundary.

B2t—6 to 14 inches, reddish-brown (2.5YR 4/4) sandy clay loam, dark reddish brown (2.5YR 3/4) moist; moderate, fine, subangular blocky structure; hard, friable, sticky; common roots; common pores; common, thin clay films; mildly alkaline; clear, wavy boundary.

C—14 to 60 inches, red, weakly cemented sandstone and interbedded, thin strata of silty or clayey red-bed material.

The solum ranges from 12 to 20 inches in thickness. The A horizon ranges from 4 to 8 inches in thickness. It is reddish brown or brown. The B2t horizon ranges from 8 to 12 inches in thickness. It is reddish brown or weak red. The depth to sandstone ranges from 12 to 20 inches.

Cosh fine sandy loam, 1 to 3 percent slopes (CsB).—This soil is on uplands. Areas are irregular in shape and range from 10 to about 150 acres in size. Slopes are convex and average about 2 percent.

Included with this soil in mapping are areas of Cobb and Vernon soils.

About half the areas of this soil are cultivated, and the rest are used for range. The hazards of water erosion and soil blowing are moderate. Capability unit IIIe–7, dryland; Sandy Loam range site.

Enterprise Series

The Enterprise series consists of deep, nearly level to gently sloping soils on uplands. These soils formed in calcareous, loamy eolian material.

In a representative profile the surface layer is reddish-brown, calcareous very fine sandy loam about 18 inches thick. The next layer is yellowish-red, very friable, calcareous very fine sandy loam about 32 inches thick. This layer has films and threads of calcium carbonate. The underlying material is yellowish-red very fine sandy loam.

Enterprise soils are well drained. Runoff is slow, and permeability is moderately rapid. Available water capacity is high.

Representative profile of Enterprise very fine sandy loam, 1 to 3 percent slopes, in a cultivated field about 11.8 miles southeast of Seymour; 11.0 miles southeast on Texas Highway 199 from the junction with U.S. Highway 277, in Seymour, to Farm Road 1285; 2.0 miles south on Farm Road 1285; 0.75 mile northwest on county road; 20 feet south of road:

Ap—0 to 12 inches, reddish-brown (5YR 5/4) very fine sandy loam, reddish brown (5YR 4/4) moist; weak, fine, subangular blocky structure; soft, very friable; calcareous; moderately alkaline; clear, smooth boundary.

A1—12 to 18 inches, reddish-brown (5YR 4/4) very fine sandy loam, dark reddish brown (5YR 3/4) moist; moderate, very fine, subangular blocky structure; soft, very friable; few roots; few worm casts; calcareous; moderately alkaline; gradual, smooth boundary.

B2—18 to 50 inches, yellowish-red (5YR 5/6) very fine sandy loam, yellowish red (5YR 4/6) moist; weak, very fine, subangular blocky structure; slightly hard, very friable; common worm casts; few films and threads of calcium carbonate; calcareous; moderately alkaline; gradual, smooth boundary.

C—50 to 80 inches, yellowish-red (5YR 5/8) very fine sandy loam, yellowish red (5YR 4/8) moist; massive; slightly hard, very friable; films and threads of calcium carbonate; calcareous; moderately alkaline.

The A horizon ranges from 10 to 20 inches in thickness. It is reddish brown or light brown. The B2 horizon ranges from 15 to 36 inches in thickness. It is reddish brown or yellowish red. The C horizon is reddish brown, yellowish red, or strong brown.

Enterprise very fine sandy loam, 0 to 1 percent slopes (EnA).—This soil is on weakly convex uplands. Slopes are dominantly 0.5 percent. The areas are irregular in shape and range from about 15 to about 200 acres in size.

The surface layer is reddish-brown very fine sandy loam about 20 inches thick. It is underlain by yellowish-red very fine sandy loam about 36 inches thick. The underlying material is yellowish-red, structureless very fine sandy loam.

Included with this soil in mapping are areas of Miles and Hardeman soils.

Most areas of this soil are cultivated. The hazard of water erosion is slight, and the hazard of soil blowing is moderate. Capability unit IIc–2, dryland, and I–2, irrigated; Mixedland range site.

Enterprise very fine sandy loam, 1 to 3 percent slopes (EnB).—This soil is on uplands. Slopes are dominantly 2 percent. Areas range from about 20 to 300 acres in size. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Hardeman and Miles soils that are in positions similar to those of the Enterprise soils.

Most of this soil is cultivated. The hazards of water erosion and soil blowing are moderate. Capability unit IIe–3, dryland, and IIe–2, irrigated; Mixedland range site.

Eufaula Series

The Eufaula series consists of deep, gently sloping to sloping soils on uplands. These soils formed in sandy eolian sediment.

In a representative profile the surface layer is brown, loose, neutral fine sand about 4 inches thick. It is underlain by reddish-yellow, loose, slightly acid fine sand about 36 inches thick. The next layer is reddish-yellow, loose fine sand that has bands of fine sandy loam.

Eufaula soils are somewhat excessively drained. Runoff is very slow, and permeability is rapid. Available water capacity is low.

Representative profile of Eufaula fine sand, 3 to 8 percent slopes, in an area of range about 16.0 miles

southeast of the courthouse in Seymour; 11.0 miles southeast, on Texas Highway 199, from the junction of U.S. Highway 277 and Texas Highway 199 to junction with Farm Road 1285; 4.6 miles on Farm Road 1285 to junction with Farm Road 2374; 1.9 miles on Farm Road 2374; 0.1 mile east on county road; 300 feet east of road:

A1—0 to 4 inches, brown (10YR 5/3) fine sand, brown (10YR 4/3) moist; single grained; loose, very friable; neutral; clear, smooth boundary.

A2—4 to 40 inches, reddish-yellow (7.5YR 7/6) fine sand, reddish yellow (7.5YR 6/6) moist; single grained; loose, very friable; slightly acid; clear, wavy boundary.

A2&B2t—40 to 100 inches, reddish-yellow (7.5YR 7/6) fine sand, reddish yellow (7.5YR 6/6) moist; single grained; loose, very friable; wavy, continuous lamellae of red (2.5YR 5/6) fine sandy loam; lamellae are massive, slightly hard, ¼ to 1 inch thick, 2 to 4 inches apart, and have very thin clay films and bridges; slightly acid.

The solum ranges from 72 to 120 inches or more in thickness. The A1 horizon ranges from 3 to 6 inches in thickness. It is dark brown or brown. Reaction ranges from neutral to medium acid. The A2 horizon ranges from 30 to 45 inches in thickness. It is reddish yellow or yellow. Reaction ranges from neutral to medium acid. The A2&B2t horizon ranges from 40 to 80 inches or more in thickness. The fine sand part is reddish yellow or yellow. The lamellae are reddish brown or red. They range from ¼ to 1½ inches in thickness and are 2 to 4 inches apart.

Eufaula fine sand, 3 to 8 percent slopes (EuD).—This soil is on uplands. Slopes are convex and average about 5 percent.

Included with this soil in mapping are areas of Chaney and Grandfield soils.

Most areas of this soil are used for range. The hazard of soil blowing is severe. Capability unit VIe–4, dryland; Sandyland Savannah range site.

Frio Series

The Frio series consists of deep, nearly level soils that formed in recent alluvium.

In a representative profile the surface layer is dark-brown silty clay loam about 17 inches thick over dark-brown, very firm silty clay about 6 inches thick. The next layer is brown, very firm silty clay about 17 inches thick. The layer below it is dark-brown, very firm silty clay about 25 inches thick. The underlying material, to a depth of 70 inches, is brown silty clay loam.

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

Representative profile of Frio silty clay loam, channeled, in an area of range about 7.8 miles southeast of the courthouse in Seymour; 6.5 miles southeast from the junction with U.S. Highway 277 on Texas Highway 199; 1.85 miles south on county road; 0.2 mile west; 100 feet south of county road:

A11—0 to 7 inches, dark-brown (7.5YR 4/3) silty clay loam, dark brown (7.5YR 3/3) moist; strong, fine, subangular blocky and granular structure; hard, friable, sticky; common roots; calcareous; moderately alkaline; clear, smooth boundary.

A12—7 to 17 inches, dark-brown (7.5YR 4/3) silty clay loam, dark brown (7.5YR 3/3) moist; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; common roots; porous; few fine calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

A13—17 to 23 inches, dark-brown (7.5YR 4/2) silty clay, dark brown (7.5YR 3/2) moist; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; fine calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

B—23 to 40 inches, brown (7.5YR 5/4) silty clay, dark brown (7.5YR 4/4) moist; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; thin strata of silt loam ¼ to 1 inch thick; fine, soft calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

Ab1—40 to 50 inches, dark-brown (7.5YR 4/3) silty clay, dark brown (7.5YR 3/3) moist; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; thin strata of silt loam ¼ to 1 inch thick; soft masses of calcium carbonate; calcareous; moderately alkaline; clear, smooth boundary.

Ab2—50 to 65 inches, dark-brown (7.5YR 4/2) silty clay, dark brown (7.5YR 3/2) moist; moderate, fine and coarse, blocky structure; very hard, very firm, sticky and plastic; films, threads, and soft masses of calcium carbonate; calcareous; moderately alkaline; clear, smooth boundary.

Bb—65 to 70 inches, brown (7.5YR 5/4) silty clay loam, dark brown (7.5YR 4/4) moist; moderate, medium, blocky structure; calcareous; moderately alkaline.

The A horizon ranges from 22 to 48 inches in thickness. It is dark brown or dark grayish brown. The B horizon, where present, ranges from 10 to 30 inches in thickness. It is brown or yellowish brown. In places the A horizon grades directly into the C horizon. Buried A and B horizons are in most profiles.

Frio silty clay loam (Fr).—This nearly level soil is just above the flood plain of streams. Areas range from about 40 to 200 acres in size. Slopes are dominantly about 0.5 percent.

The surface layer is dark-brown, calcareous silty clay loam about 16 inches thick. The next layer is dark-brown, calcareous silty clay about 20 inches thick. The underlying material is silty clay that extends to a depth of more than 60 inches.

Included with this soil in mapping are areas of Clairemont and Mangum soils.

Most areas of this soil are cultivated, and the rest are used for range. The hazards of water erosion and soil blowing are slight. This soil floods once in 4 to 10 years. Capability unit IIc–1, dryland; Valley range site.

Frio silty clay loam, channeled (Fs).—This nearly level soil is on flood plains of streams. Slopes are dominantly 0.5 percent. Areas are dissected by stream channels. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Clairemont and Mangum soils.

This soil is used for range. It floods several times each year. Capability unit Vw–1, dryland; Bottomland range site.

Grandfield Series

The Grandfield series consists of deep, nearly level to gently sloping soils on uplands. These soils formed in loamy or sandy outwash material.

In a representative profile the surface layer is reddish-brown loamy fine sand about 12 inches thick. It is

underlain by red, very friable fine sandy loam about 7 inches thick. The next layer is friable sandy clay loam about 33 inches thick. It is red in the upper part and light red in the lower part. The layer below is light-red, very friable fine sandy loam about 6 inches thick. The underlying material is reddish-yellow, very friable loamy fine sand that extends to a depth of 80 inches.

Grandfield soils are well drained. Runoff is slow, and permeability is moderate. Available water capacity is high.

Representative profile of Grandfield loamy fine sand, 0 to 3 percent slopes, in a cultivated field about 3.2 miles northwest of the courthouse in Seymour; 2.1 miles west from the junction with U.S. Highway 277 on U.S. Highway 82; 0.5 mile north on county road; 0.05 mile east; 0.15 mile north; 20 feet west of road:

Ap—0 to 12 inches, reddish-brown (5YR 5/4) loamy fine sand, reddish brown (5YR 4/4) moist; single grained; loose, very friable; neutral; clear, smooth boundary.

B1—12 to 19 inches, red (2.5YR 5/6) fine sandy loam, red (2.5YR 4/6) moist; compound, weak, coarse, prismatic structure parting to weak, fine, subangular blocky; hard, very friable; neutral; clear, smooth boundary.

B21t—19 to 30 inches, red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; compound, moderate, coarse, prismatic structure parting to strong, fine, subangular blocky; very hard, friable, sticky and slightly plastic; common, thin clay films; few roots; neutral; clear, smooth boundary.

B22t—30 to 44 inches, red (2.5YR 5/8) sandy clay loam, red (2.5YR 4/8) moist; strong, fine, subangular blocky structure; very hard, friable, sticky and slightly plastic; few, thin clay films; neutral; clear, smooth boundary.

B23t—44 to 52 inches, light-red (2.5YR 6/8) sandy clay loam, red (2.5YR 5/8) moist; weak, fine, subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; neutral; clear, smooth boundary.

C1—52 to 58 inches, light-red (2.5YR 6/8) fine sandy loam, red (2.5YR 5/8) moist; massive; hard, very friable; calcareous; moderately alkaline; clear, smooth boundary.

C2—58 to 80 inches, reddish-yellow (5YR 6/8) loamy fine sand, yellowish red (5YR 5/8) moist; single grained; loose; very friable; few films and threads of calcium carbonate; calcareous; moderately alkaline.

The solum ranges from 50 to 60 inches in thickness. The Ap horizon ranges from 9 to 13 inches in thickness. It is reddish brown or dark brown fine sandy loam to loamy fine sand. The B1 horizon ranges from 6 to 10 inches in thickness. It is red, reddish brown, or yellowish red. The B2t horizon ranges from 20 to 40 inches in thickness. It is red or reddish brown. The C horizon ranges from fine sandy loam to loamy fine sand.

Grandfield loamy fine sand, 0 to 3 percent slopes (GrB).—This soil is on uplands. Slopes are dominantly about 1.5 percent. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Miles and Chaney soils.

Most areas of this soil are cultivated. The hazard of water erosion is slight, and the hazard of soil blowing is moderate. Capability unit IIIe–6, dryland, and IIIe–1, irrigated; Sandyland range site.

Grandfield fine sandy loam, 3 to 5 percent slopes (GsC).—This soil is on uplands. Slopes are dominantly about 4 percent.

The surface layer is reddish-brown fine sandy loam about 10 inches thick. It is underlain by reddish-brown sandy clay loam about 8 inches thick. The next layer is red sandy clay loam about 30 inches thick. The underlying material is reddish-yellow fine sandy loam.

Included with this soil in mapping are areas of Aspermont and Miles soils.

Most areas of this soil are used for range, and in cultivated areas the soil is mainly planted to wheat. The hazards of water erosion and soil blowing are moderate. Capability unit IIIe–8, dryland; Sandy Loam range site.

Hardeman Series

The Hardeman series consists of deep, gently sloping to strongly sloping soils on uplands. These soils formed in calcareous, loamy eolian material.

In a representative profile the surface layer is reddish-brown, calcareous fine sandy loam about 9 inches thick. The next layer is reddish-yellow, very friable, calcareous fine sandy loam about 31 inches thick. The underlying material is reddish-yellow, very friable, calcareous fine sandy loam.

Hardeman soils are well drained. Runoff is moderate, and permeability is moderately rapid. Available water capacity is medium.

Representative profile of Hardeman fine sandy loam, 5 to 12 percent slopes, in an area of range about 11.2 miles west of the courthouse in Seymour; 5.6 miles southwest from the courthouse on U.S. Highway 277 to junction with Farm Road 2070; 6.0 miles west on Farm Road 2070; 1.1 miles north on county road; 1.0 mile west; 0.6 mile north; 60 feet west of road:

A1—0 to 9 inches, reddish-brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak, fine, subangular blocky structure; loose, very friable; common roots; calcareous; moderately alkaline; clear, smooth boundary.

B2—9 to 40 inches, reddish-yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; weak, fine, subangular blocky structure; loose, very friable; few roots; films and threads of carbonate at lower depths; calcareous; moderately alkaline; clear, smooth boundary.

C—40 to 90 inches, reddish-yellow (5YR 6/8) fine sandy loam, yellowish red (5YR 5/8) moist; single grained; loose, very friable; films and threads of carbonate; calcareous; moderately alkaline.

The A1 horizon ranges from 8 to 20 inches in thickness. It is light brown, brown, or reddish brown. The B2 horizon ranges from 30 to 50 inches in thickness. It is reddish yellow, yellowish red, or brown. The C horizon is reddish yellow or yellowish red.

Hardeman fine sandy loam, 3 to 5 percent slopes (HaC).—This soil is on uplands. Slopes are dominantly about 4 percent. Areas are irregular in shape and range from about 10 to 200 acres in size.

The surface layer is brown, calcareous fine sandy loam about 8 inches thick. It is underlain by yellowish-red, very friable, calcareous fine sandy loam about 12 inches thick. The next layer is reddish-yellow, very friable, calcareous fine sandy loam about 30 inches

thick. The underlying material is reddish-yellow, structureless fine sandy loam.

Included with this soil in mapping are areas of Enterprise and Grandfield soils.

Most areas of this soil are cultivated, and the rest are used for range. The hazards of water erosion and soil blowing are moderate. Capability unit IIIe–3, dryland; Sandy Loam range site.

Hardeman fine sandy loam, 5 to 12 percent slopes (HaE).—This soil is on uplands. Slopes are dominantly about 8 percent. Areas range from about 15 to 800 acres in size. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are small areas of Enterprise soils.

This soil is used for range. It is too steep to be cultivated. The hazard of water erosion is severe, and the hazard of soil blowing is moderate. Capability unit VIe–3, dryland; Sandy Loam range site.

Hensley Series

The Hensley series consists of shallow, gently sloping soils on uplands. These soils formed in loamy and clayey material over limestone.

In a representative profile the surface layer is reddish-brown, noncalcareous clay loam about 6 inches thick. The next layer is reddish-brown, noncalcareous, very firm clay about 12 inches thick. The underlying material is limestone.

Hensley soils are well drained. Runoff and permeability are slow. Available water capacity is low.

Representative profile of Hensley clay loam, 1 to 3 percent slopes, in an area of range about 13.0 miles south of the courthouse in Seymour; 15.0 miles south from the courthouse on U.S. Highway 183 to the Throckmorton County line; 2.1 miles west and 300 feet north of Throckmorton County line:

A1—0 to 6 inches, reddish-brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; strong, fine, subangular blocky structure; hard, friable, sticky; mildly alkaline; clear, smooth boundary.

B2t—6 to 18 inches, reddish-brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; moderate, fine to medium, blocky structure; extremely hard, very firm, very sticky and very plastic; many thin clay films; mildly alkaline; abrupt, smooth boundary.

R—18 to 60 inches, yellowish-brown limestone that has layers 2 to 12 inches thick and has few vertical fractures.

The A horizon ranges from 4 to 6 inches in thickness. It is brown or reddish brown. The B2t horizon ranges from 8 to 14 inches in thickness. It is reddish brown or red. The depth to limestone bedrock ranges from 12 to 20 inches.

Hensley clay loam, 1 to 3 percent slopes (HeB).—This soil is on uplands. Areas range from about 15 to 300 acres in size. Slopes are convex and average about 2 percent.

Included with this soil in mapping are areas of Lindy and Mereta soils.

Most of this soil is used for range. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit IIIe–2, dryland; Rolling Hills range site.

Hollister Series

The Hollister series consists of deep, nearly level soils on uplands. These soils formed in Permian redbed clayey material.

In a representative profile the surface layer is brown, noncalcareous clay loam about 8 inches thick. It is underlain by dark-brown very firm, noncalcareous clay loam about 8 inches. The next layer is extremely firm, calcareous clay about 42 inches thick. It is dark brown in the upper part and grayish brown in the lower part. The next lower layer is pinkish-gray, very firm, calcareous clay about 6 inches thick. The underlying material is yellowish-red, very firm clay that extends to a depth of 80 inches.

Hollister soils are well drained. Runoff and permeability are slow. Available water capacity is high.

Representative profile of Hollister clay loam, 0 to 1 percent slopes, in a cultivated field about 10.6 miles southwest of the courthouse in Seymour; 5.6 miles southwest from the courthouse on U.S. Highway 277 to the junction with Farm Road 2070; 5.6 miles west on Farm Road 2070; 0.5 mile south on county road; 500 feet west of corner of county road:

A1—0 to 8 inches, brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; strong, fine, subangular blocky and granular structure; hard, friable, sticky; mildly alkaline; clear, smooth boundary.

B21t—8 to 16 inches, dark-brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; many thin clay films; mildly alkaline; clear, smooth boundary.

B22t—16 to 36 inches, dark-brown (7.5YR 4/3) clay, dark brown (7.5YR 3/3) moist; moderate, medium, blocky structure; extremely hard, extremely firm, very sticky and very plastic; many thin clay films; soft fine masses of calcium carbonate; calcareous; moderately alkaline; clear, smooth boundary.

B23t—36 to 58 inches, grayish-brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) moist; moderate, medium, blocky structure; extremely hard, extremely firm, very sticky and very plastic; many thin clay films; soft masses and very fine calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

B24tca—58 to 64 inches, pinkish-gray (7.5YR 6/2) clay, brown (7.5YR 5/2) moist; reddish-yellow splotches; moderate, medium, blocky structure; very hard, very firm, very sticky and very plastic; common thin clay films; 5 percent, by volume, calcium carbonate; calcareous; moderately alkaline; clear, smooth boundary.

B25tca—64 to 80 inches, yellowish-red (5YR 5/6) clay, yellowish red (5YR 4/6) moist; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; 5 percent, by volume, calcium carbonate; calcareous; moderately alkaline.

The solum ranges from 60 to 80 inches or more in thickness. The A horizon ranges from 4 to 8 inches in thickness. It is brown or dark grayish brown. The B21t horizon ranges from 8 to 20 inches in thickness. Color ranges from grayish brown to dark brown. The B22t and B23t horizons range from 30 to 50 inches in thickness. They are dark brown or dark grayish brown in the upper part and brown or grayish brown in the lower part. The B24tca and B25tca horizons range from 10 to 30 inches in thickness. They are pinkish gray in the upper part and yellowish red in the lower part. Content of calcium carbonate ranges from 1 to 10 percent.

Hollister clay loam, 0 to 1 percent slopes (HoA).—This soil is on uplands. Areas are 100 acres or more in size.

Included with this soil in mapping are areas of Rotan, Sagerton, and Tillman soils.

About half the acreage of this soil is cultivated, and the rest is used for range. The hazards of water erosion and soil blowing are slight. Capability unit IIc–1, dryland, and I–1, irrigated; Deep Hardland range site.

Kamay Series

The Kamay series consists of deep, nearly level to gently sloping soils on uplands. These soils formed in Permian red-bed clay and shale.

In a representative profile the surface layer is brown silt loam about 7 inches thick. It is underlain by brown, extremely firm clay about 37 inches thick. It is noncalcareous in the upper part and calcareous in the lower part. The next layer is light reddish-brown, very firm, calcareous clay about 22 inches thick. Below it is a layer of reddish-yellow, very firm, calcareous clay about 14 inches thick.

Kamay soils are well drained. Runoff is slow to moderate, and permeability is very slow. Available water capacity is high.

Representative profile of Kamay silt loam, 0 to 1 percent slopes, about 15.5 miles northeast of the courthouse in Seymour; 16.8 miles northeast from the courthouse on U.S. Highway 277; 200 feet south of highway; 0.5 mile north of Cowen Ranch Headquarters:

A1—0 to 7 inches, brown (10YR 4/3) silt loam, dark brown (10YR 3/3) moist; massive; hard, friable, slightly sticky; neutral; abrupt, smooth boundary.

B21t—7 to 17 inches, brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; moderate, coarse, blocky structure; extremely hard, extremely firm, very sticky and very plastic; many thin clay films; noncalcareous; moderately alkaline; clear, smooth boundary.

B22t—17 to 44 inches, brown (7.5YR 5/4) clay, brown (7.5YR 4/4) moist; moderate, coarse, blocky structure; extremely hard, extremely firm, very sticky and very plastic; many thin clay films; few soft masses and fine calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

B23t—44 to 66 inches, light reddish-brown (5YR 6/4) clay, reddish brown (5YR 5/4) moist; moderate, medium, blocky structure; very hard, very firm, very sticky and very plastic; few soft masses of calcium carbonate; calcareous; moderately alkaline; clear, smooth boundary.

B3—66 to 80 inches, reddish-yellow (5YR 6/6) clay, yellowish red (5YR 5/6) moist; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; few calcium carbonate concretions; calcareous; moderately alkaline.

The solum ranges from 60 to 80 inches in thickness. The A horizon ranges from 5 to 10 inches in thickness. It is brown or dark brown. The B21t horizon ranges from 8 to 10 inches in thickness. It is brown or dark brown. The B22t and B23t horizons range from 20 to 60 inches in thickness. Color ranges from brown to light reddish brown or reddish brown. The B3 horizon is yellowish red or reddish yellow.

Kamay silt loam, 0 to 1 percent slopes (KaA).—This soil is on uplands. Slopes are dominantly 0.5 percent. Areas range from 30 to about 350 acres in size. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Tillman and Tobosa soils.

Most areas of this soil are used for range. The hazards of water erosion and soil blowing are slight. Capability Unit IIIs–1, dryland; Tightland range site.

Kamay silt loam, 1 to 3 percent slopes (KaB).—This soil is on uplands. Areas range from 20 to about 300 acres in size. Slopes are dominantly about 2 percent.

The surface layer is brown silt loam about 6 inches thick. The next layer is brown clay about 10 inches thick. The layer below it is reddish-brown clay about 28 inches thick. The underlying material is yellowish-red clay that extends to a depth of 60 inches.

Included with this soil in mapping are areas of Tillman and Tobosa soils.

Most of this soil is used for range. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit IIIe–1, dryland; Tightland range site.

Lincoln Series

The Lincoln series consists of deep, nearly level, slightly hummocky soils on bottom lands. These soils formed in recent alluvium.

In a representative profile the surface layer is reddish-brown silt loam about 4 inches thick. It is underlain by pink fine sand about 48 inches thick. The next layer is reddish-yellow loamy fine sand about 10 inches thick. The underlying material is pink fine sand.

Lincoln soils are somewhat excessively drained. Runoff is slow, and permeability is rapid. Available water capacity is low.

Representative profile of Lincoln silt loam in an abandoned field in an area of Lincoln and Yahola soils, frequently flooded, about 3.2 miles west-southwest of the courthouse in Seymour; 4.8 miles southwest from the courthouse on U.S. Highway 277; 1.8 miles north; 0.4 mile east on private road; 0.75 mile north; 20 feet west of fence:

A1—0 to 4 inches, reddish-brown (2.5YR 5/4) silt loam, reddish brown (2.5YR 4/4) moist; weak, fine, subangular blocky structure; hard, very friable, slightly sticky; calcareous; moderately alkaline; clear, smooth boundary.

C1—4 to 52 inches, pink (5YR 7/4) fine sand, light reddish brown (5YR 6/4) moist; single grained; loose; many thin strata of silt loam and very fine sandy loam, 1/16 inch to 1 inch thick; calcareous; moderately alkaline; clear, smooth boundary.

C2—52 to 62 inches, reddish-yellow (5YR 6/6) loamy fine sand, yellowish red (5YR 5/6) moist; single grained; loose; thin strata of fine sandy loam, 1/16 inch to 1 inch thick; calcareous; moderately alkaline; clear, smooth boundary.

C3—62 to 80 inches, pink (5YR 7/4) fine sand, light reddish brown (5YR 6/4) moist; single grained; loose; few thin strata of fine sandy loam and silt loam, 1/16 inch to 1 inch thick; few quartzite pebbles; calcareous; moderately alkaline.

The A horizon ranges from 4 to 15 inches in thickness. It is reddish-brown, light-red, or light reddish-brown fine sand to silt loam. The C horizon is fine sand and stratified layers of loamy fine sand, fine sandy loam, and silt loam. It is pink or reddish yellow.

Lincoln and Yahola soils, frequently flooded (Lc).—These soils are on flood plains along major rivers. The Yahola soils are nearly level, and the Lincoln soils are nearly level and slightly hummocky. Slopes are dominantly about 1 percent. Areas range from about 20 acres to several hundred acres in size. Lincoln soils make up an average of about 52 percent of most areas of this association and Yahola soils 46 percent, but the proportion varies. The rest is small included areas of Clairemont and Mangum soils.

The Yahola soils have a surface layer of reddish-brown fine sandy loam about 10 inches thick. It is underlain by light reddish-brown fine sandy loam about 30 inches thick. The underlying material is reddish-yellow fine sandy loam that extends to a depth of 70 inches.

Most of these soils are used for range. A few areas have been cleared and sodded to Coastal bermudagrass. These areas may flood several times each year. The hazard of soil blowing is moderate to severe. Capability unit Vw–2, dryland; Sandy Bottomland range site.

Lindy Series

The Lindy series consists of moderately deep, nearly level to gently sloping soils on uplands. These soils formed in loamy and clayey material over limestone.

In a representative profile the surface layer is reddish-brown clay loam about 10 inches thick. It is underlain by reddish-brown, extremely firm clay about 24 inches thick. The underlying material is limestone (fig. 7).

Lindy soils are well drained. Runoff is slow to moderate, and permeability is slow. Available water capacity is high.

Representative profile of Lindy clay loam, 1 to 3 percent slopes, in a cultivated field about 9.0 miles east-southeast of Seymour; 9.0 miles southeast from the junction with U.S. Highway 277 on Texas Highway 199 to the junction with Farm Road 1790; 2.4 miles north to junction with Farm Road 2180; 1.0 mile east; 0.35 mile north; 20 feet west of road:

Ap—0 to 10 inches, reddish-brown (5YR 5/4) clay loam reddish brown (5YR 4/4) moist; moderate, fine, subangular blocky structure; very hard, friable, slightly sticky; neutral; abrupt, smooth boundary.

B21t—10 to 28 inches, reddish-brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; strong, medium, blocky structure; common thin clay films; extremely hard, extremely firm, sticky and plastic; mildly alkaline; clear, smooth boundary.

B22t—28 to 34 inches, reddish-brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; strong, medium and fine, blocky structure; extremely hard, extremely firm; fine, hard, ferro-manganese concretions; noncalcareous; moderately alkaline; abrupt, wavy boundary.

R—34 to 60 inches, limestone in layers 2 to 12 inches thick; few vertical fractures.

The solum ranges from 21 to 40 inches in thickness. The A horizon ranges from 6 to 12 inches in thickness. It is brown or reddish brown. The B2t horizon ranges from 14 to 28 inches in thickness. It is reddish brown, dark brown, or red. The depth to limestone bedrock ranges from 21 to 40 inches.

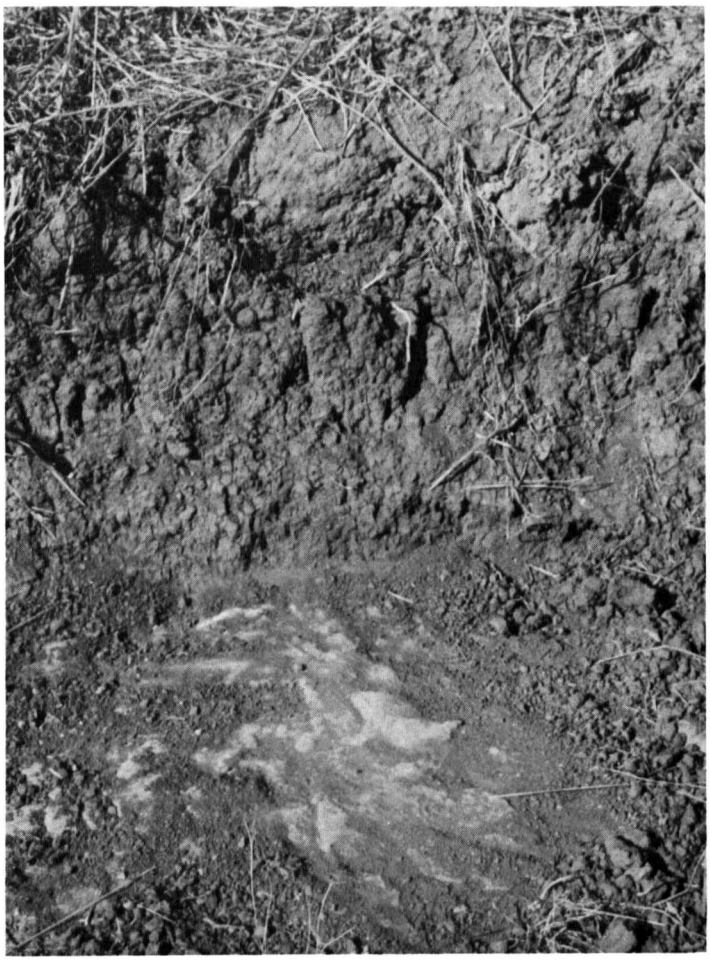

Figure 7.—**Profile of Lindy clay loam showing underlying limestone bedrock.**

Lindy clay loam, 0 to 1 percent slopes (LdA).—This soil is on uplands. Areas range from about 20 to 300 acres in size. Slopes are dominantly about 0.5 percent.

The surface layer is reddish-brown clay loam about 8 inches thick. It is underlain by reddish-brown clay about 10 inches thick. The next layer is red clay about 14 inches thick. The underlying material is limestone.

Included with this soil in mapping are areas of Hensley and Sagerton soils.

About half the acreage of this soil is cultivated, and the rest is used for range. The hazards of water erosion and soil blowing are slight. Capability unit IIs–2, dryland; Deep Upland range site.

Lindy clay loam, 1 to 3 percent slopes (LdB).—This soil is on uplands. Slopes are dominantly about 2 percent. Areas range from about 20 to 400 acres in size. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Hensley and Sagerton soils.

Most of this soil is used for range. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit IIe–1, dryland; Deep Upland range site.

Figure 8.—**Profile of Lueders silty clay loam.**

Lueders Series

The Lueders series consists of very shallow to shallow, gently sloping to sloping soils on uplands. These soils formed in loamy and clayey material over limestone.

In a representative profile the surface layer is dark grayish brown and is about 5 inches thick. The material is silty clay loam and about 20 percent limestone fragments. The layer below is grayish brown and is about 8 inches thick. The material is friable silty clay loam and about 65 percent limestone fragments. The underlying material is fractured, layered limestone (fig. 8).

Lueders soils are well drained. Runoff is medium to high, and permeability is moderate. Available water capacity is low.

Representative profile of Lueders silty clay loam in range in an area of Lueders-Throck complex, 1 to 8 percent slopes, about 11.2 miles south-southwest of the courthouse in Seymour; 5.7 miles southwest from the courthouse on U.S. Highway 277 to the junction with Farm Road 1152; 3.8 miles south; 3.75 miles south on county road; 50 feet east of road:

A1—0 to 5 inches, dark grayish-brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; compound, strong, fine, subangular blocky and strong, granular structure; hard, friable, sticky; common fine roots; common pores; about 20 percent limestone fragments less than 3 inches across long axis; about 32 percent calcium carbonate; calcareous; moderately alkaline; clear, irregular boundary.

A1ca—5 to 13 inches, grayish-brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; compound, strong, fine, subangular blocky and strong, granular structure; hard, friable; common roots; common pores; about 65 percent limestone fragments less than 6 inches across the long axis; fragments coated with carbonate and have pendants of calcium carbonate on lower side; about 55 percent calcium carbonate; calcareous; moderately alkaline; abrupt, wavy boundary.

R—13 to 48 inches, fractured, layered limestone; fractures 6 inches to 2 feet apart, layers 4 inches to 18 inches thick; thin seams and bands of dark-brown (10YR 4/3) silty clay loam in fractures and between upper limestone layers; thin bands of bluish or olive-gray shaly clay in fractures and between lower limestone layers; coatings of secondary carbonate on upper surface; in places fractures in upper limestone layer are plugged or partly plugged with carbonate.

The solum ranges from 7 to 20 inches in thickness. It is, on an average, 35 to 70 percent limestone fragments. The A1 horizon ranges from 4 to 8 inches in thickness. It is dark grayish brown or dark brown. The A1ca horizon ranges from 3 to 10 inches in thickness. It is grayish brown or dark brown.

Lueders-Throck complex, 1 to 8 percent slopes (L+D).—These soils are on uplands (fig. 9). They are so intermingled that it is not practical to separate them on the soil map. The Lueders soils are on ridgetops and sides of hills. The Throck soils are on sides of hills between areas of the Lueders soils and on foot slopes. Areas are several hundred acres in size. Slopes range from 1 to 8 percent but are dominantly about 5 percent. Lueders soils make up an average of about 50 percent of each mapped area, and Throck soils make up about 45 percent; but the proportion varies. The rest is Hensley, Lindy, Owens, and Tobosa soils.

These soils are used for range. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit VIe–2, dryland; Rolling Hills range site.

Mangum Series

The Mangum series consists of deep, nearly level soils on bottom lands. They formed in recent clayey alluvium.

In a representative profile the surface layer is reddish-brown, extremely firm clay about 6 inches thick. It is underlain by red, massive, extremely firm clay about 8 inches thick. The underlying material, to a depth of 70 inches, is clay. It is reddish brown in the upper part and red in the lower part.

Mangum soils are well drained to moderately well drained. Runoff is slow, and permeability is very slow. Available water capacity is high.

Representative profile of Mangum clay in an area of range about 10.4 miles northwest of the courthouse in Seymour; follow Farm Road 1919 7.4 miles north and

Figure 9.—**Typical area of Lueders-Throck complex, 1 to 8 percent slopes.**

northwest of its junction with U.S. Highway 277 north of Seymour; 3.1 miles north on county road; 0.8 mile east of road:

A1—0 to 6 inches, reddish-brown (2.5YR 5/4) clay, reddish brown (2.5YR 4/4) moist; moderate, fine, subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; calcareous; moderately alkaline; clear, smooth boundary.

C1—6 to 14 inches, red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; massive; extremely hard, extremely firm, very sticky and very plastic; thin strata of silt loam and silty clay loam, 1/16 inch to 1/4 inch thick; very fine calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

C2—14 to 56 inches, reddish-brown (2.5YR 5/4) clay, reddish brown (2.5Y 4/4) moist; massive; extremely hard, extremely firm, very sticky and very plastic; thin strata of silt loam and silty clay loam, 1/16 inch to 1/4 inch thick; fine concretions and soft masses of calcium carbonate; calcareous; moderately alkaline; clear, smooth boundary.

C3—56 to 70 inches, red (2.5YR 5/6) clay, red (2.5YR 4/6) moist; massive; extremely hard, extremely firm, very sticky and very plastic; calcareous; moderately alkaline.

The A horizon ranges from 6 to 10 inches in thickness. It is brown, yellowish red, or reddish brown. The C horizon is clay or silty clay. It is red to reddish brown.

Mangum clay (Ma).—This nearly level soil is on the flood plains of streams and rivers. Slopes range from 0 to 1 percent but are dominantly 0.5 percent (fig. 10).

Included with this soil in mapping are areas of Tillman and Clairemont soils.

Most areas of this soil are used for range. Small areas adjacent to drainageways flood frequently and are not suited to crops. The hazards of water erosion and soil blowing are slight. Capability unit IIs–1, dryland; Clay Flat range site.

Mereta Series

The Mereta series consists of shallow, gently sloping soils on uplands. These soils formed in old alluvium outwash.

In a representative profile the surface layer is brown clay loam about 8 inches thick. It is underlain by brown, firm clay loam about 8 inches thick. The next layer is very pale brown, cemented caliche about 6 inches thick. The underlying material is clay loam. It is light gray in the upper part and very pale brown in the lower part.

Figure 10.—Area of Mangum clay dissected by a drainageway.

Mereta soils are well drained. Runoff is slow, and permeability is moderately slow. Available water capacity is low.

Representative profile of Mereta clay loam, 1 to 3 percent slopes, in a cultivated field 3.0 miles east of the courthouse in Seymour; 3.9 miles east from the junction with U.S. Highway 277 on Farm Road 422; 1,100 feet south of road:

Ap—0 to 8 inches, brown (7.5YR 4/3) clay loam, dark brown (7.5YR 3/3) moist; strong, fine, subangular blocky and granular structure; hard, friable, sticky and plastic; common roots; few very fine calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

A1—8 to 16 inches, brown (7.5YR 4/3) clay loam, dark brown (7.5YR 3/3) moist, slightly more clayey than Ap horizon; moderate, medium, blocky and subangular blocky structure; hard, firm, sticky and plastic; few fine calcium carbonate concretions; calcareous; moderately alkaline; abrupt, wavy boundary.

Ccam—16 to 22 inches, very pale brown (10YR 7/3) cemented caliche; 1 percent, by volume, pale-brown clay loam between the plates; clear, wavy boundary.

C1ca—22 to 42 inches, light-gray (2.5Y 7/2) clay loam; massive; 30 percent, by volume, soft, coarse masses of carbonate; gradual, wavy boundary.

C2ca—42 to 60 inches, very pale brown (10YR 7/3) clay loam; massive; 20 percent, by volume, soft masses of calcium carbonate.

The solum ranges from 14 to 20 inches in thickness. It is brown or dark brown. The Ccam horizon ranges from 3 to 8 inches in thickness. It is strongly cemented to indurated caliche. The Cca horizon is very pale brown, light gray, or pale brown.

Mereta clay loam, 1 to 3 percent slopes (MeB).—This soil is on uplands. Areas range from about 20 to 500 acres in size. Slopes are convex and average about 2 percent. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Hensley, Lindy, and Aspermont soils.

Most of this soil is used for range. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit IIIe–5, dryland; Rolling Hills range site.

Mereta clay loam, 3 to 5 percent slopes (MeC).—This soil is on uplands. Slopes are convex and average about 4 percent. Areas range from about 15 to 280 acres in size.

The surface layer is brown clay loam about 10 inches thick. It is underlain by brown clay loam about

5 inches thick. The next layer is pale-brown cemented caliche about 8 inches thick. The underlying material is clay loam that is limy.

Included with this soil in mapping are areas of Hensley and Aspermont soils.

These soils are used for range. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit IVe–1, dryland; Rolling Hills range site.

Miles Series

The Miles series consists of deep, nearly level to gently sloping soils on uplands. These soils formed in loamy outwash material.

In a representative profile the surface layer is brown fine sandy loam about 14 inches thick. It is underlain by reddish-brown, very friable sandy clay loam about 6 inches thick. The next layer is yellowish-red, very friable sandy clay loam about 40 inches thick. It is noncalcareous in the upper part and calcareous in the lower part. The underlying material is red, very friable, calcareous sandy clay loam that extends to a depth of 80 inches. It is about 5 percent calcium carbonate.

Miles soils are well drained. Runoff is slow, and permeability is moderate. Available water capacity is high.

Representative profile of Miles fine sandy loam, 1 to 3 percent slopes, in a cultivated field about 5.6 miles west-northwest of the courthouse in Seymour; 4.75 miles west from the junction of U.S. Highway 277 on U.S. Highway 82; 1.0 mile north on Farm Road 1789; 0.5 mile west on county road; 100 feet north of road:

Ap—0 to 14 inches, brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; weak, fine, subangular blocky structure; soft, very friable; neutral; abrupt, smooth boundary.

B21t—14 to 20 inches, reddish-brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; weak, coarse, prismatic structure parting to moderate, fine, subangular blocky; hard, very friable, sticky; common thin clay films; porous; neutral; clear, smooth boundary.

B22t—20 to 44 inches, yellowish-red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak, coarse, prismatic structure parting to moderate, fine, subangular blocky; hard, very friable, sticky; common thin clay films; porous; mildly alkaline; clear, smooth boundary.

B23t—44 to 60 inches, yellowish-red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; hard, very friable, sticky; few siliceous pebbles; common thin clay films; calcareous; moderately alkaline; clear, smooth boundary.

B24tca—60 to 80 inches, red (2.5YR 5/6) sandy clay loam, red (2.5YR 4/6) moist; moderate, fine, subangular blocky structure; hard, very friable, sticky; 5 percent, by volume, fine calcium carbonate concretions; calcareous; moderately alkaline.

The solum ranges from 60 to 80 inches or more in thickness. The A horizon ranges from 6 to 14 inches in thickness. It is brown or reddish brown. The B21t horizon ranges from 6 to 20 inches in thickness. It is red or reddish brown. The B22t and B23t horizons range from 30 to 60 inches in thickness. They are red, yellowish red, or reddish brown. The Btca horizon is at depths of 50 to 80 inches from the surface. It ranges from prominent to scarcely evident or lacking.

Miles fine sandy loam, 0 to 1 percent slopes (MfA).—This soil is on uplands. Slopes are dominantly about 0.5 percent. Areas range from about 20 acres to several hundred acres in size.

The surface layer is reddish-brown fine sandy loam about 8 inches thick. It is underlain by reddish-brown sandy clay loam about 6 inches thick. The next layer is red sandy clay loam about 66 inches thick. It is noncalcareous in the upper part and calcareous in the lower part.

Included with this soil in mapping are areas of Chaney and Grandfield soils.

Most areas of this soil are cultivated. The hazard of water erosion is slight, and the hazard of soil blowing is moderate. Capability unit IIe–4, dryland, and IIe–3, irrigated; Sandy Loam range site.

Miles fine sandy loam, 1 to 3 percent slopes (MfB).—This soil is on uplands. Slopes are dominantly about 1.5 percent. Areas range from about 30 acres to several hundred acres in size. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Grandfield soils.

Most areas of this soil are cultivated. The hazards of water erosion and soil blowing are moderate. Capability unit IIIe–4, dryland, and IIe–4, irrigated; Sandy Loam range site.

Owens Series

The Owens series consists of shallow, sloping to steep soils on uplands. These soils formed in clay and shale.

In a representative profile the surface layer is light yellowish-brown, calcareous clay about 6 inches thick. It is underlain by pale-olive, extremely firm, calcareous clay about 12 inches thick. The underlying material is pale-yellow shaly clay.

Owens soils are well drained. Runoff is rapid, and permeability is very slow. Available water capacity is low.

Representative profile of Owens stony clay, 5 to 30 percent slopes, in an area of range about 2.5 miles southeast of the courthouse in Seymour; 1.0 mile southeast from the junction with U.S. Highway 277 on Texas Highway 199 to the junction with Farm Road 1286; 1.6 miles south; 300 feet east of road:

A1—0 to 6 inches, light yellowish-brown (2.5Y 6/3) clay, light olive brown (2.5Y 5/3) moist; moderate, fine, subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; few, fine, limestone fragments; calcareous; moderately alkaline; clear, smooth boundary.

B2—6 to 18 inches, pale-olive (5Y 6/4) clay, olive (5Y 5/4) moist; moderate, medium, blocky structure; extremely hard, extremely firm, very sticky and very plastic; few, fine, soft calcium carbonate concretions; common roots in the upper part; calcareous; moderately alkaline; gradual, wavy boundary.

C—18 to 60 inches, pale-yellow (5Y 7/3) shaly clay, pale olive (5Y 6/3) moist; massive; soft masses of carbonate in the upper part; calcareous; moderately alkaline.

Figure 11.—Area of Owens stony clay.

The solum ranges from 12 to 20 inches in thickness. The A horizon ranges from 4 to 8 inches in thickness. It is red, reddish brown, or light yellowish brown. The B2 horizon ranges from 6 to 14 inches in thickness. It is red or pale olive. The C horizon is red or pale-yellow shaly clay.

Owens stony clay, 5 to 30 percent slopes (OsF).—This soil is on uplands. Areas follow the meander of escarpments and range from about 40 acres to several hundred acres in size. Stones, 1 foot to 5 feet wide and 4 to 18 inches thick, occupy 35 to 70 percent of the area (fig. 11). The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Hensley, Lueders, and Mereta soils on narrow ridgetops. Also included are areas of Vernon soils on foot slopes.

These soils are used for range. The hazard of water erosion is severe, and the hazard of soil blowing is slight. Capability unit VIe–1, dryland; Rocky Hills range site.

Owens-Vernon association, rolling (OvD).—These sloping to steep soils are on uplands (fig. 12). Slopes range from 5 to 45 percent. Areas range from 200 acres to several thousand acres in size. Each includes both Owens and Vernon soils. Owens soils are on the short, steep side slopes and Vernon soils are on the more stable narrow divides above side slopes and short foot slopes below side slopes. Owens soils make up about 58 percent of each mapped area, and Vernon soils make up about 40 percent. The rest is included areas of Cobb and Cosh soils on ridgetops and Clairemont and Mangum soils along drainageways.

The Owens soils have a surface layer of red, extremely firm clay about 6 inches thick. It is underlain by red, extremely firm clay about 7 inches thick that contains soft masses of calcium carbonate. The underlying material is red, unweathered shaly clay.

The Vernon soils have a surface layer of reddish-brown, extremely firm clay about 18 inches thick. It is underlain by weak-red, extremely firm clay about 8 inches thick. The underlying material is red shaly clay.

These areas are used for range. The hazard of water erosion is severe, and the hazard of soil blowing is slight. Capability unit VIe–1, dryland; Shallow Clay range site.

Randall Series

The Randall series consists of deep, nearly level and slightly concave soils on the floors of playa basins.

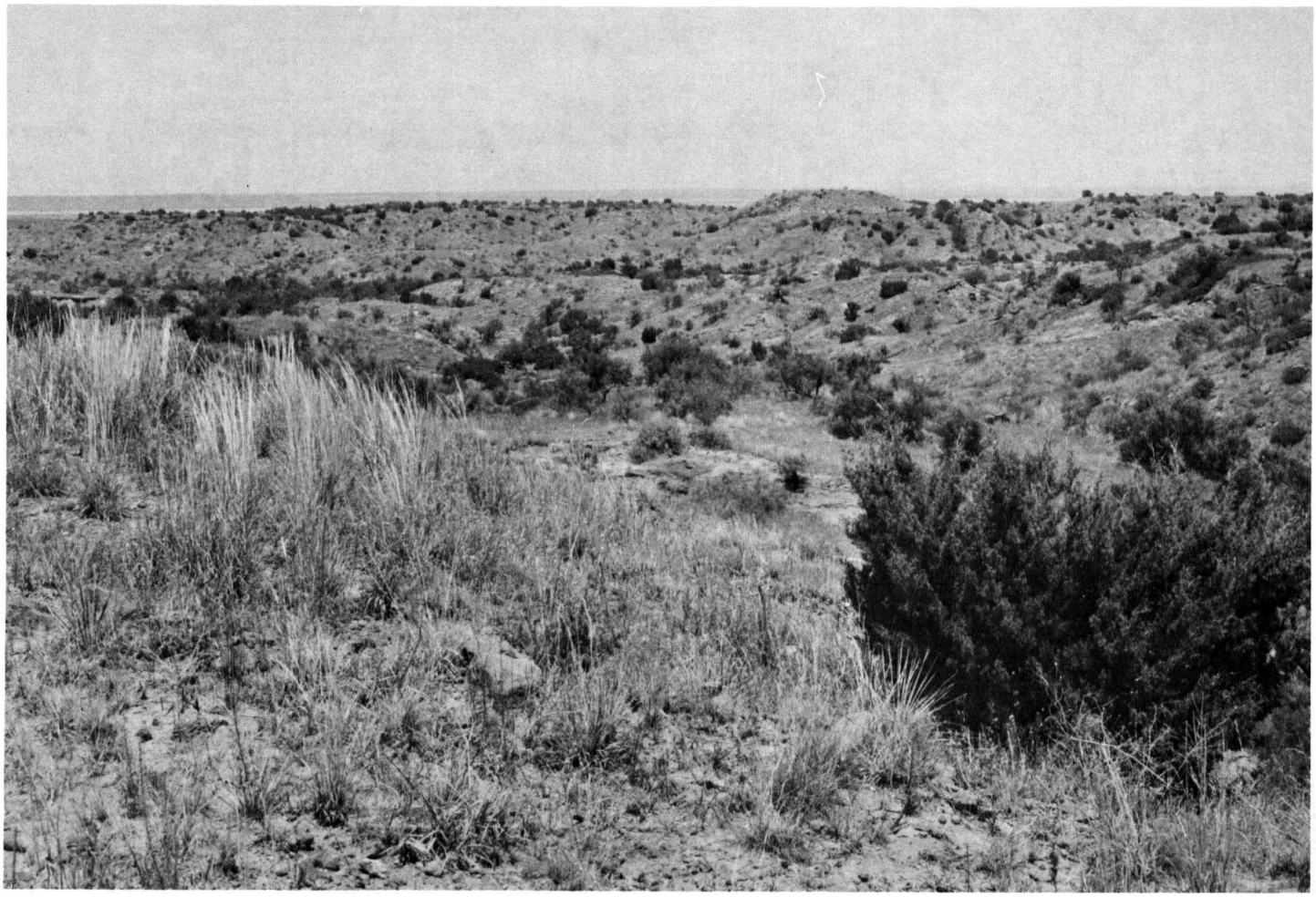

Figure 12.—**Area of Owens-Vernon association, rolling.**

These soils formed under periodically wet conditions in recent clayey alluvium. When dry they crack to a depth of 20 inches or more.

In a representative profile the surface layer is dark-gray, calcareous clay about 26 inches thick. It is underlain by gray, extremely firm, calcareous clay that extends to a depth of 64 inches.

Randall soils are somewhat poorly drained. Water stands until it evaporates, and permeability is very slow. Available water capacity is high.

Representative profile of Randall clay about 5.6 miles northwest of the courthouse in Seymour; 4.75 miles west from the junction with U.S. Highway 277 on U.S. Highway 82 to the junction of U.S. Highway 82 with Farm Road 1789; 3.0 miles north; 0.4 miles east; 60 feet north of road:

A1—0 to 26 inches, dark-gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; moderate, medium and coarse, blocky structure; extremely hard, extremely firm, very sticky and very plastic; shiny pressure faces on peds; many short, intersecting slickensides; few, very fine, calcium carbonate concretions; calcareous; moderately alkaline; gradual, wavy boundary.

AC1—26 to 46 inches, gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; moderate, medium, blocky structure; extremely hard, extremely firm, very sticky and very plastic; many short, intersecting slickensides; few, fine, ferro-manganese and calcium carbonate concretions; calcareous; moderately alkaline; gradual, wavy boundary.

AC2—46 to 64 inches, gray (10YR 5/1) clay, dark gray (10YR 4/1) moist; weak, medium, blocky structure; extremely hard, extremely firm; very sticky and very plastic; few, fine, ferro-manganese and calcium carbonate concretions; calcareous; moderately alkaline.

The A horizon ranges from 12 to 28 inches in thickness. It is dark gray or very dark gray. The AC horizon ranges from 20 to 60 inches or more in thickness. It is gray or dark gray.

Randall clay (Ra).—This soil is in round playas. Areas range from 4 to 150 acres in size.

Included with this soil in mapping, along the outer edges of the mapped areas, are small areas of Rowena, Rotan, and Sagerton soils.

Most areas of this soil are idle cropland. Cultivated crops can be grown only in extremely dry years (fig. 13). Water is ponded after rainfall, and the hazard of erosion is slight. Capability unit VIw–1, dryland; range site is the same as that of surrounding soils.

Figure 13.—**Surface crust on Randall clay. This soil is wet immediately below the surface.**

Rotan Series

The Rotan series consists of deep, nearly level soils on uplands. They formed in loamy outwash material.

In a representative profile the surface layer is dark-brown clay loam about 8 inches thick. It is underlain by dark-brown, firm clay loam about 9 inches thick. The next layer is dark-brown, very firm, calcareous clay loam about 5 inches thick. The layer below it is dark-brown, very firm, calcareous clay about 16 inches thick. The next lower layer is reddish-yellow, friable, calcareous clay loam about 30 inches thick. It is about 30 percent calcium carbonate. The underlying material is yellowish-red clay loam to a depth of 80 inches.

Rotan soils are well drained. Runoff is slow to very slow, and permeability is moderately slow. Available water capacity is high.

Representative profile of Rotan clay loam, 0 to 1 percent slopes, in a cultivated field about 9.5 miles west-northwest of the courthouse in Seymour; 9.0 miles west from the junction with U.S. Highway 277 on U.S. Highway 82 to the junction of Highway 82 with Farm Road 2069 in Red Springs; 2.0 miles north on Farm Road 2069; 0.15 mile west; 30 feet north of road:

Ap—0 to 8 inches, dark-brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; strong, fine, subangular blocky and granular structure; hard, friable, sticky and plastic; noncalcareous; moderately alkaline; clear, smooth boundary.

B21t—8 to 17 inches, dark-brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate, fine, subangular blocky structure; hard, firm, sticky and plastic; many thin clay films; noncalcareous; moderately alkaline; clear, smooth boundary.

B22t—17 to 22 inches, dark-brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; many thin clay films; calcareous; moderately alkaline; clear, smooth boundary.

B23t—22 to 38 inches, dark-brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; moderate, medium, blocky structure; very hard, very firm, very sticky and very plastic; common distinct clay films; fine and very fine calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

B24tca—38 to 68 inches, reddish-yellow (7.5YR 6/8) clay loam, strong brown (7.5YR 5/8) moist; moderate, medium, blocky structure; hard, friable, sticky and plastic; 30 percent, by volume, calcium carbonate; calcareous; moderately alkaline; clear, smooth boundary.

B25tca—68 to 80 inches, yellowish-red (5YR 5/6) clay loam, yellowish red (5YR 4/6) moist; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; 5 percent, by volume, soft masses of calcium carbonate; calcareous; moderately alkaline.

The A horizon ranges from 6 to 12 inches in thickness. It is dark brown or dark grayish brown. The B21t, B22t, and B23t horizons range from 15 to 45 inches in thickness. The B21t and B22t horizons are dark brown or dark grayish brown, and the B23t horizon is brown or dark brown. The B24tca and B25tca horizons range from 30 to 50 inches in thickness. They are reddish yellow or yellowish red. Content of calcium carbonate ranges from 20 to 40 percent in the upper part and from 5 to 10 percent in the lower part.

Rotan clay loam, 0 to 1 percent slopes (RoA).—This soil is on uplands. Slopes are dominantly less than 0.5 percent. Areas range from about 40 acres to several hundred acres in size.

Included with this soil in mapping are areas of Rowena, Sagerton, and Miles soils.

Most of this soil is cultivated. The hazards of water erosion and soil blowing are slight. Capability unit IIc-1, dryland, and I–1, irrigated; Deep Hardland range site.

Rowena Series

The Rowena series consists of deep, nearly level to gently sloping soils on uplands. These soils formed in loamy to clayey outwash material.

In a representative profile the surface layer is dark-brown, calcareous clay loam about 8 inches thick. It is underlain by dark-brown, very firm, calcareous clay about 29 inches thick. The next layer is reddish-yellow, friable, calcareous clay loam about 26 inches thick. The material is 30 percent calcium carbonate. The underlying material is red, calcareous clay loam to a depth of 80 inches. It is about 20 percent calcium carbonate.

Rowena soils are well drained. Runoff is slow, and permeability is moderately slow. Available water capacity is high.

Representative profile of Rowena clay loam, 0 to 1 percent slopes, in a cultivated field about 2.8 miles northeast of the courthouse in Seymour; 3.6 miles north and northeast from the courthouse on U.S.

Highway 277; 2.7 miles east on county road; 0.8 mile south; 100 feet west of road:

Ap—0 to 8 inches, dark-brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate, fine, subangular blocky structure; hard, friable, sticky and plastic; calcareous; moderately alkaline; abrupt, smooth boundary.

B21—8 to 24 inches, dark-brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; moderate, medium, blocky structure parting to fine, subangular blocky; very hard, very firm, very sticky and very plastic; shiny pressure faces on peds; calcareous; moderately alkaline; gradual, smooth boundary.

B22—24 to 37 inches, dark-brown (7.5YR 4/3) clay, dark brown (7.5YR 3/3) moist; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; shiny pressure faces on peds; fine concretions and soft masses of calcium carbonate; calcareous; moderately alkaline; clear, wavy boundary.

C1ca—37 to 63 inches, reddish-yellow (5YR 6/6) clay loam, yellowish red (5YR 5/6) moist; massive; hard, friable, sticky and plastic; 30 percent, by volume, soft masses and fine calcium carbonate concretions; calcareous; moderately alkaline; gradual, smooth boundary.

C2ca—63 to 80 inches, red (2.5YR 6/6) clay loam, red (2.5YR 5/6) moist; massive; hard, friable, sticky and plastic; 20 percent, by volume, calcium carbonate; calcareous; moderately alkaline.

The A horizon ranges from 7 to 10 inches in thickness. It is dark brown or dark grayish brown. The B2 horizon ranges from 14 to 34 inches in thickness. It is dark brown or dark grayish brown. The Cca horizon ranges from 20 to 50 inches or more in thickness. It is reddish yellow, yellowish red, or red. Content of calcium carbonate ranges from 15 to 40 percent.

Rowena clay loam, 0 to 1 percent slopes (RwA).—This soil is on uplands (fig. 14). Slopes are dominantly about 0.5 percent. Areas range from about 30 acres to several hundred acres in size. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Rotan, Sagerton, and Tobosa soils.

Most areas of this soil are cultivated. The hazards of water erosion and soil blowing are slight. Capability unit IIc–1, dryland, and I–1, irrigated; Deep Upland range site.

Rowena clay loam, 1 to 3 percent slopes (RwB).—This soil is on uplands. Slopes are dominantly about 2 percent. Areas range from about 50 acres to several hundred acres in size.

The surface layer is dark-brown clay loam about 7 inches thick. It is underlain by dark-brown clay about 29 inches thick. The next layer, about 20 inches thick, is yellowish-red clay loam that is about 30 percent cal-

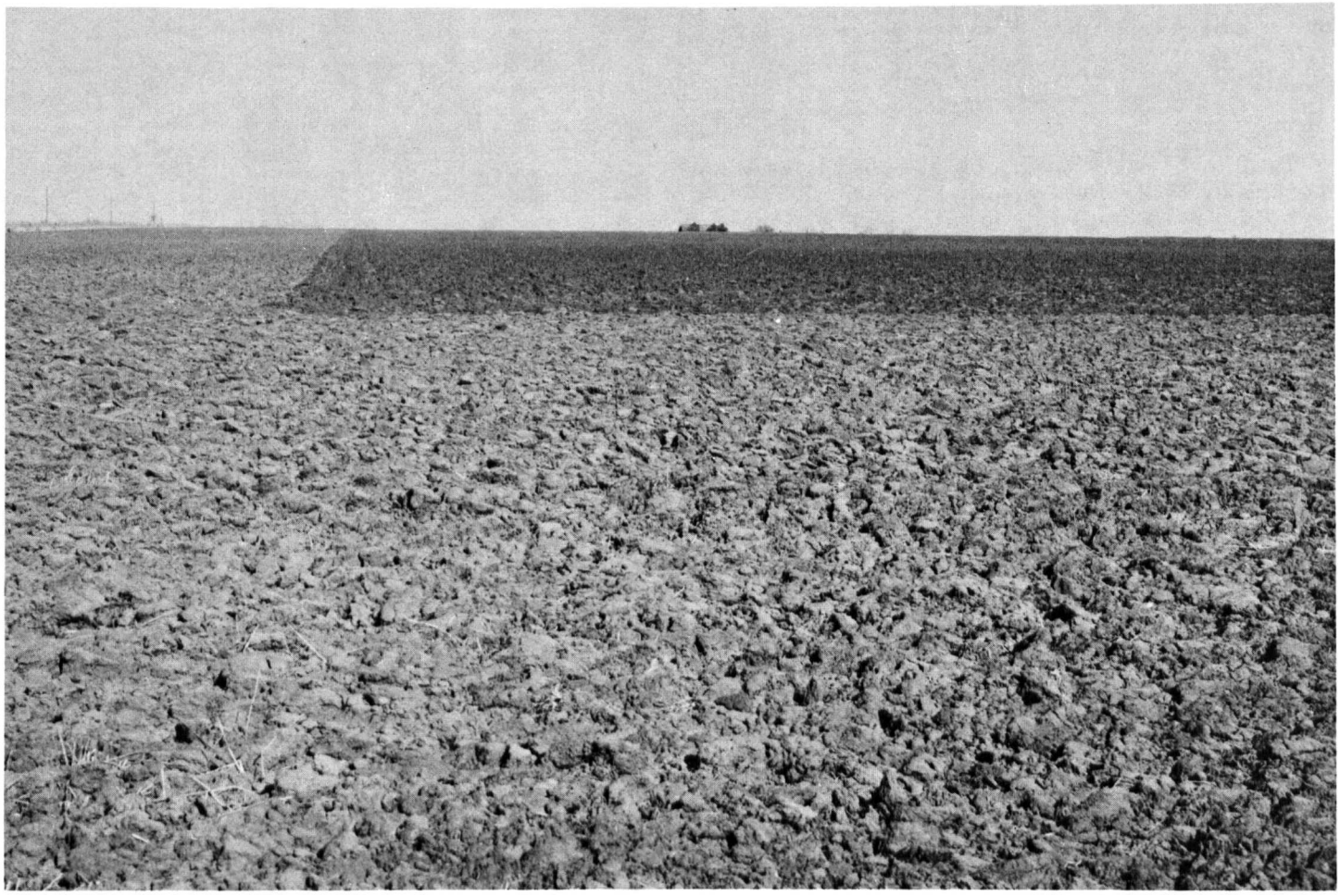

Figure 14.—**Area of nearly level Rowena clay loam that has been deep plowed.**

cium carbonate. The underlying material is red clay loam.

Included with this soil in mapping are areas of Sagerton and Tobosa soils.

Most areas of this soil are cultivated. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit IIe–1, dryland; Deep Upland range site.

Sagerton Series

The Sagerton series consists of deep, nearly level to gently sloping soils. These soils formed in calcareous, loamy outwash material.

In a representative profile the surface layer is dark-brown clay loam about 8 inches thick. It is underlain by dark-brown, firm clay loam about 8 inches thick. The next layer is dark-brown, very firm, calcareous clay about 26 inches thick. The layer below it is reddish-yellow, very firm, calcareous clay loam about 24 inches thick. This material is about 20 percent, by volume, calcium carbonate. The underlying material is reddish-yellow, very firm, calcareous clay that extends to a depth of 80 inches. It is about 5 percent calcium carbonate.

Sagerton soils are well drained. Runoff is slow to medium, and permeability is moderately slow. Available water capacity is high.

Representative profile of Sagerton clay loam, 0 to 1 percent slopes, in a cultivated field about 8.2 miles southwest of the courthouse in Seymour; 9.1 miles southwest from the courthouse on U.S. Highway 277; 0.95 mile north on county road; 700 feet east; 300 feet south of road:

Ap—0 to 8 inches, dark-brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate, very fine, subangular blocky structure; hard, friable, sticky and plastic; few very fine siliceous pebbles; neutral; gradual, smooth boundary.

B21t—8 to 16 inches, dark-brown (7.5YR 4/3) clay loam, dark brown (7.5YR 3/3) moist; moderate, medium, blocky structure; hard, firm, sticky and plastic; common thin clay films; mildly alkaline; gradual, smooth boundary.

B22t—16 to 42 inches, dark-brown (7.5YR 4/4) clay, dark brown (7.5YR 3/4) moist; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; many thin clay films; few very fine calcium carbonate concretions; calcareous; moderately alkaline; gradual, smooth boundary.

B23tca—42 to 66 inches, reddish-yellow (5YR 6/6) clay loam, yellowish red (5YR 5/6) moist; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; 20 percent, by volume, soft masses of calcium carbonate; calcareous; moderately alkaline; gradual, smooth boundary.

B24tca—66 to 80 inches, reddish-yellow (5YR 6/6) clay, yellowish red (5YR 5/6) moist; moderate, medium, blocky structure; very hard, very firm, sticky and plastic; 5 percent, by volume, calcium carbonate; calcareous; moderately alkaline.

The A horizon ranges from 6 to 12 inches in thickness. It is dark brown, or reddish brown. The B21t horizon ranges from 6 to 10 inches in thickness. It is dark brown or reddish brown. The B22t horizon ranges from 6 to 30 inches in thickness. It is dark brown or reddish brown. The B23tca and B24tca horizons range from 30 to 50 inches or more in thickness. They range from reddish brown to reddish yellow or yellowish red. Calcium carbonate makes up 15 to 30 percent of the upper part and 3 to 10 percent of the lower part of these horizons.

Sagerton clay loam, 0 to 1 percent slopes (SaA).—This soil is on uplands. Slopes are dominantly about 0.5 percent. Areas range from about 20 acres to several hundred acres in size. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Rotan, Tillman, and Tobosa soils.

Most areas of this soil are cultivated. The hazards of water erosion and soil blowing are slight. Capability unit IIc–1, dryland, and I–1, irrigated; Deep Hardland range site.

Sagerton clay loam, 1 to 3 percent slopes (SaB).—This soil is on uplands. Slopes are dominantly about 1.5 percent. Areas range from about 20 to 300 acres in size.

The surface layer is dark-brown clay loam about 12 inches thick. The next layer is reddish-brown clay loam about 6 inches thick. The layer below it is reddish-brown, calcareous clay about 30 inches thick. The underlying material is reddish-brown clay that extends to a depth of 80 inches. This material is about 20 percent calcium carbonate.

Included with this soil in mapping are areas of Rotan, Rowena, and Tillman soils.

Most areas of this soil are cultivated. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit IIe–1, dryland; Deep Hardland range site.

Throck Series

The Throck series consists of moderately deep, gently sloping to sloping soils on uplands. These soils formed in clayey material over limestone.

In a representative profile the surface layer is brown silty clay loam about 6 inches thick. It is underlain by brown, firm silty clay about 10 inches thick. The next layer is yellowish-brown, firm silty clay about 14 inches thick. The layer below it is very pale brown, friable silty clay about 8 inches thick. This material is about 35 percent calcium carbonate. The underlying material is olive-gray clay.

Throck soils are well drained. Runoff is slow to medium, and permeability is slow. Available water capacity is high.

Throck soils are mapped only in association with the Lueders soils.

Representative profile of Throck silty clay loam in an area of Lueders-Throck complex, 1 to 8 percent slopes, about 7.9 miles south-southwest of the courthouse in Seymour; 3.6 miles southwest from the courthouse on U.S. Highway 277 to the junction with Farm Road 2395; 4.5 miles south on Farm Road 2395; 1.3 miles south on county road; 0.1 mile east to the Criswell Ranch Headquarters; 0.1 mile north; 0.4 mile east; 10 feet south of road:

A1—0 to 6 inches, brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist; moderate, fine, granular and subangular blocky structure; hard, friable, sticky; about 5 percent, by volume, gravel-sized limestone fragments; calcareous; moderately alkaline; clear, smooth boundary.

B21—6 to 16 inches, brown (10YR 5/3) silty clay, brown (10YR 4/3) moist; moderate, fine, granular and subangular blocky structure; hard, firm, sticky and plastic; common roots; common pores; few calcium carbonate concretions; about 10 percent limestone fragments mostly less than 2 inches in diameter; calcareous; moderately alkaline; clear, smooth boundary.

B22ca—16 to 30 inches, yellowish-brown (10YR 5/4) silty clay, dark yellowish brown (10YR 4/4) moist; moderate, fine and medium, subangular blocky structure; hard, firm, sticky and plastic; few soft masses and concretions of calcium carbonate; about 10 percent limestone fragments less than 2 inches in diameter; calcareous; moderately alkaline; clear, smooth boundary.

B23ca—30 to 38 inches, very pale brown (10YR 7/4) silty clay, light yellowish brown (10YR 6/4) moist; moderate, fine, subangular blocky structure; hard, friable, sticky and plastic; about 35 percent, by volume, calcium carbonate; calcareous; moderately alkaline; abrupt, wavy boundary.

C—38 to 50 inches, olive-gray (5Y 5/2) clay; massive; calcareous; moderately alkaline.

The solum is 21 to 40 inches in thickness. The A horizon ranges from 4 to 8 inches in thickness. It is dark grayish brown, dark brown, or brown. The B21 horizon ranges from 8 to 14 inches in thickness. It is brown or yellowish brown. The B22ca horizon ranges from 10 to 16 inches in thickness. It is yellowish brown or brown. The B23ca horizon ranges from 4 to 10 inches in thickness. It is very pale brown, yellowish brown, or light yellowish brown, and it is 10 to 40 percent calcium carbonate.

Tillman Series

The Tillman series consists of deep, nearly level to gently sloping soils on uplands. These soils formed in Permian red-bed clay and shale.

In a representative profile the surface layer is reddish-brown, firm clay loam about 7 inches thick. It is underlain by reddish-brown, very firm clay about 11 inches thick. The next layer is yellowish-red, extremely firm, calcareous clay about 24 inches thick. The layer below it is red, extremely firm, calcareous clay about 20 inches thick. The underlying material is red shaly clay.

Tillman soils are well drained. Runoff is slow to medium, and permeability is slow. Available water capacity is high.

Representative profile of Tillman clay loam, 1 to 3 percent slopes, in a cultivated field about 12.9 miles southwest of the courthouse in Seymour; 12.4 miles southwest from the courthouse on U.S. Highway 277; 1.0 mile south on county road; 0.3 mile west; 50 feet north of road:

Ap—0 to 7 inches, reddish-brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3) moist; moderate, fine, subangular blocky structure; hard, firm, sticky and plastic; mildly alkaline; abrupt, smooth boundary.

B21t—7 to 12 inches, reddish-brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; moderate, fine and medium, blocky structure; very hard, very firm, sticky and plastic; common thin clay films; mildly alkaline; clear, smooth boundary.

B22t—12 to 18 inches, reddish-brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; moderate, fine and medium, blocky structure; very hard, very firm, very sticky and very plastic; many thin clay films; mildly alkaline; clear, smooth boundary.

B23t—18 to 42 inches, yellowish-red (5YR 4/6) clay, yellowish red (5YR 3/6) moist; moderate, fine and medium, blocky structure; extremely hard, extremely firm, very sticky and very plastic; many thin clay films; soft masses and very fine hard calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

B24t—42 to 62 inches, red (2.5YR 5/6) clay, red (2.5YR 4/6) moist; moderate, medium, blocky structure; extremely hard, extremely firm, very sticky and very plastic; clay films on ped faces; few fine to very fine calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

C—62 to 80 inches, red (2.5YR 5/6) shaly clay, red (2.5YR 4/6) moist; massive; extremely hard, extremely firm, very sticky and very plastic; calcareous; moderately alkaline.

The A horizon ranges from 6 to 10 inches in thickness. It is dark brown or reddish brown. The B21t horizon ranges from 5 to 12 inches in thickness. It is reddish brown or dark brown. The B22t, B23t, and B24t horizons range from 40 to 90 inches in thickness. They are reddish brown, red, or yellowish red. The C horizon is at a depth of 60 to 80 inches.

Tillman clay loam, 0 to 1 percent slopes (TlA).—This soil is on uplands. Slopes are weakly convex and are dominantly 0.5 percent. Areas range from about 20 to 600 acres in size.

The surface layer is dark-brown clay loam about 8 inches thick. It is underlain by reddish-brown clay about 8 inches thick. The next layer is reddish-brown clay about 30 inches thick. The layer below it is red clay about 22 inches thick. The underlying material is red shaly clay.

Included with this soil in mapping are areas of Rotan, Kamay, and Sagerton soils.

Most areas of this soil are cultivated. The hazards of water erosion and soil blowing are slight. Capability unit IIs–1, dryland; Deep Hardland range site.

Tillman clay loam, 1 to 3 percent slopes (TlB).—This soil is on uplands. Slopes are convex and are dominantly about 2 percent. Areas range from about 20 acres to several hundred acres in size. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Sagerton and Vernon soils.

Most areas of this soil are used for range. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit IIe–1, dryland; Deep Hardland range site.

Tobosa Series

The Tobosa series consists of deep, nearly level to gently sloping soils on uplands. These soils formed in clayey material.

In a representative profile the surface layer is dark grayish-brown, calcareous clay about 10 inches thick. It is underlain by dark-brown, extremely firm, calcareous clay about 8 inches thick. The next layer is brown, extremely firm, calcareous clay about 30 inches thick. The layer below it is light-brown, very firm, calcareous clay about 10 inches thick. The underlying material is reddish-yellow, very firm, calcareous clay loam.

Tobosa soils are moderately well drained. Runoff is medium, and permeability is very slow. Available water capacity is high.

Representative profile of Tobosa clay, 1 to 3 percent slopes, in a cultivated field about 6.1 miles southwest of the courthouse in Seymour; 3.6 miles southwest from the courthouse on U.S. Highway 277 to Farm Road 2395; 4.2 miles south; 1,400 feet west of road:

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; fine, medium, blocky structure; very hard, very firm, sticky and plastic; calcareous; moderately alkaline; clear, smooth boundary.

A1—10 to 18 inches, dark-brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; moderate, medium, blocky structure; extremely hard, extremely firm, very sticky and very plastic; very fine calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

AC—18 to 48 inches, brown (7.5YR 5/2) clay, dark brown (7.5YR 4/2) moist; dark-brown vertical streaks as wide as ½ inch extending to a depth of 36 inches; moderate, medium, blocky structure; extremely hard, extremely firm; calcium carbonate concretions; intersecting slickensides as long as 4 inches; calcareous; moderately alkaline; clear, smooth boundary.

C1ca—48 to 58 inches, light-brown (7.5YR 6/4) clay, brown (7.5YR 5/4) moist; very fine, reddish-yellow splotches; massive; very hard, very firm; 1 percent, by volume, fine soft masses of calcium carbonate; fine gypsum crystals; calcareous; moderately alkaline; clear, smooth boundary.

C2ca—58 to 70 inches, reddish-yellow (5YR 6/6) clay loam, yellowish red (5YR 5/6) moist; massive; very hard, very firm; about 5 percent, by volume, calcium carbonate and gypsum crystals; calcareous; moderately alkaline.

The solum ranges from 41 to 60 inches or more in thickness. The A horizon ranges from 12 to 32 inches in thickness. It ranges from grayish brown to dark grayish brown or brown. The AC horizon ranges from 20 to 32 inches in thickness. It is grayish brown or brown. The Cca horizon ranges from 6 to 30 inches in thickness. It is light brown, light olive brown, or reddish yellow.

Tobosa clay, 0 to 1 percent slopes (ToA).—This soil is on uplands. Slopes are dominantly 0.5 percent. Areas range from about 20 acres to several hundred acres in size.

The surface layer is dark grayish-brown, calcareous clay about 28 inches thick. It is underlain by brown, calcareous clay about 20 inches thick. The next layer is light olive-brown, calcareous clay that is about 10 percent calcium carbonate. The underlying material is limestone bedrock.

Included with this soil in mapping are areas of Rotan, Rowena, and Lindy soils.

Most areas of this soil are cultivated. The hazards of water erosion and soil blowing are slight. Capability unit IIs–1, dryland; Deep Upland range site.

Tobosa clay, 1 to 3 percent slopes (ToB).—This soil is on uplands. Slopes are dominantly about 2 percent. Areas range from about 20 to 400 acres in size. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Rowena, Lindy, and Hensley soils.

About half the acres of this soil are cultivated. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit IIe–1, dryland; Deep Upland range site.

Vernon Series

The Vernon series consists of moderately deep, gently sloping to sloping soils on uplands. These soils formed in Permian red-bed clay and shale.

In a representative profile the surface layer is reddish-brown, calcareous clay about 7 inches thick. It is underlain by reddish-brown, extremely firm, calcareous clay about 11 inches thick. The next layer is weak-red, extremely firm, calcareous clay about 8 inches thick. The underlying material is red shaly clay.

Vernon soils are well drained. Runoff is rapid, and permeability is very slow. Available water capacity is high.

Representative profile of Vernon clay, 3 to 8 percent slopes, in an area of range about 10.3 miles southwest of the courthouse in Seymour; 5.7 miles southwest from the courthouse on U.S. Highway 277 to the junction with Farm Road 1152; 3.8 miles south; 1.0 mile west; 1.75 miles south on county road; 50 feet west of road:

A1—0 to 7 inches, reddish-brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; fine to medium, blocky structure; extremely hard, extremely firm, very sticky and very plastic; very fine calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

B21—7 to 18 inches, reddish-brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) moist; moderate, coarse, blocky structure; extremely hard, extremely firm, very sticky and very plastic; fine concretions and soft masses of calcium carbonate; calcareous; moderately alkaline; clear, smooth boundary.

B22—18 to 26 inches, weak-red (10R 4/4) clay, dusky red (10R 3/4) moist; moderate, coarse, blocky structure; extremely hard, extremely firm, very sticky and very plastic; few roots; fine soft masses and calcium carbonate concretions; calcareous; moderately alkaline; clear, smooth boundary.

C—26 to 40 inches, red (2.5YR 5/6) shaly clay, red (2.5YR 4/6) moist; extremely hard, extremely firm, very sticky; calcareous; moderately alkaline.

The solum ranges from 21 to 36 inches in thickness. The A horizon ranges from 5 to 10 inches in thickness. It is red or reddish brown. The B2 horizon ranges from 12 to 24 inches in thickness. It is weak red, red, or reddish brown. The C horizon is red or weak red.

Vernon clay, 1 to 3 percent slopes (VeB).—This soil is on uplands. Slopes are dominantly about 2 percent. Areas range from about 20 to 600 acres in size.

The surface layer is reddish-brown clay about 6 inches thick. It is underlain by reddish-brown clay about 20 inches thick. The underlying material is red shaly clay.

Included with this soil in mapping are areas of Aspermont, Mangum, and Tillman soils.

Most areas of this soil are used for range. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit IVe–1, dryland; Shallow Clay range site.

Vernon clay, 3 to 8 percent slopes (VeD).—This soil is on uplands (fig. 15). Slopes are dominantly about 6 percent. Areas range from about 20 acres to several hundred acres in size. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Aspermont, Mangum, and Tillman soils.

This soil is used for range. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit VIe–1, dryland; Shallow Clay range site.

Winters Series

The Winters series consists of nearly level to gently sloping soils on uplands. These soils formed in loamy outwash material.

In a representative profile the surface layer is reddish-brown loam about 9 inches thick. It is underlain by reddish-brown, firm sandy clay about 15 inches thick. The next layer is reddish-brown, extremely firm sandy clay about 18 inches thick. The layer below it is yellowish-red, very firm sandy clay loam about 10 inches thick. The underlying material is yellowish-red, friable sandy clay loam about 28 inches thick.

Winters soils are well drained. Runoff is medium, and permeability is moderately slow. Available water capacity is high.

Representative profile of Winters loam, 0 to 1 percent slopes, in a cultivated field about 5.6 miles west-southwest of the courthouse in Seymour; 5.6 miles southwest from the courthouse on U.S. Highway 277 to junction with Farm Road 2070; 1.1 miles west; 1.0 mile north on county road; 0.4 mile west; 0.25 mile north; 50 feet west of road:

A—0 to 9 inches, reddish-brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; moderate, fine, subangular blocky and granular structure; hard, very friable, sticky and plastic; slightly acid; gradual, smooth boundary.

B21t—9 to 24 inches, reddish-brown (5YR 4/4) sandy clay, dark reddish brown (5YR 3/4) moist; moderate, medium, blocky structure; very hard, firm, sticky and plastic; many thin clay films; neutral; clear, smooth boundary.

B22t—24 to 42 inches, reddish-brown (5YR 5/4) sandy clay, reddish brown (5YR 4/4) moist; moderate, medium, blocky structure; extremely hard, extremely firm, sticky and plastic; many thin clay films; mildly alkaline; clear, smooth boundary.

B23t—42 to 52 inches, yellowish-red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate, medium, blocky structure; very hard, very firm,

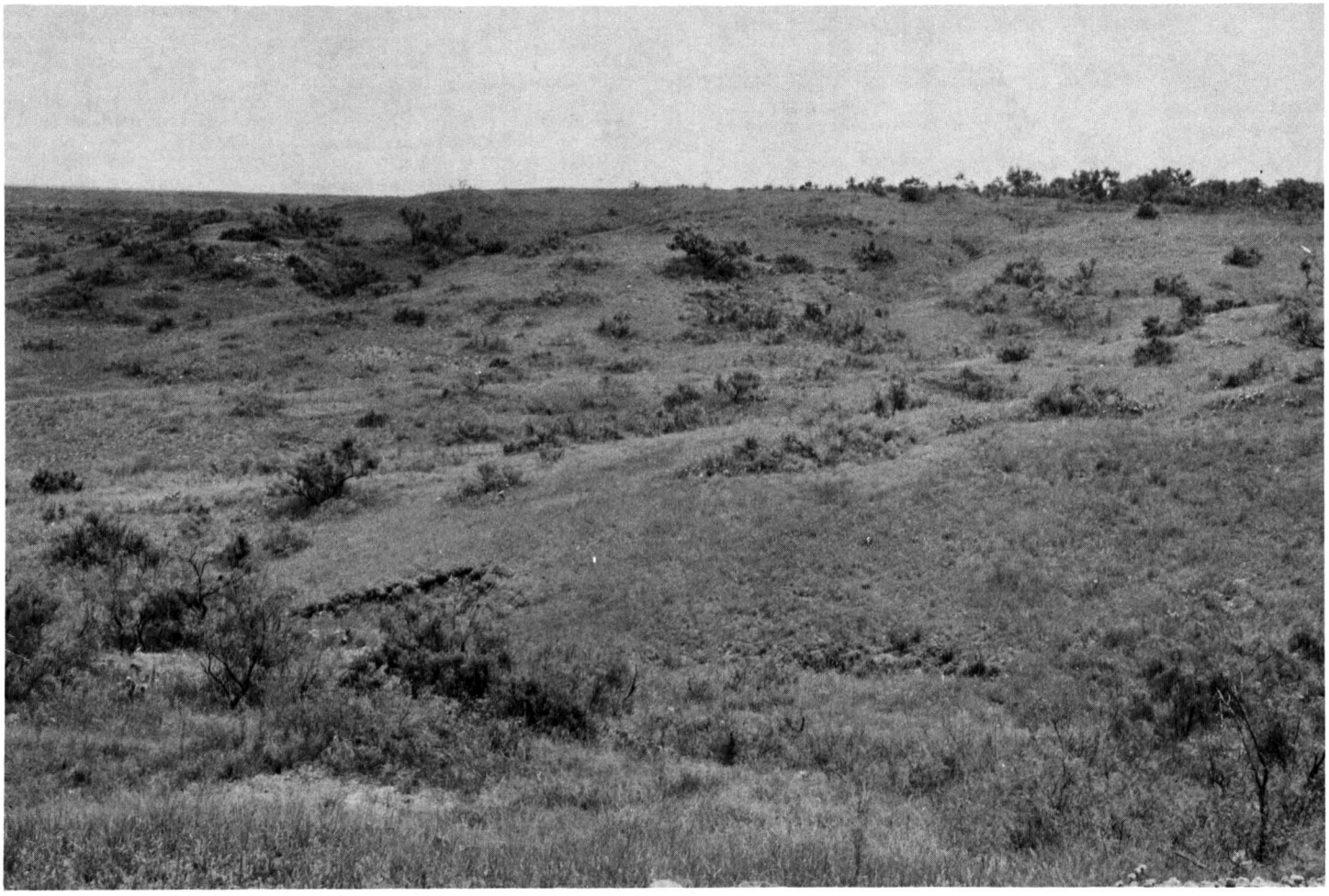

Figure 15.—**Area of Vernon clay, 3 to 8 percent slopes.**

sticky and plastic; common thin clay films; few siliceous pebbles; calcareous; moderately alkaline; clear, smooth boundary.

B24t—52 to 80 inches, yellowish-red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate, fine, subangular blocky structure; hard, friable, sticky and plastic; thin clay films; few very fine calcium carbonate concretions; calcareous; moderately alkaline.

The solum ranges from 60 to 80 inches or more in thickness. The A horizon ranges from 6 to 12 inches in thickness. It is brown or reddish brown. The B21t and B22t horizons range from 25 to 40 inches in thickness. They are reddish brown or dark reddish brown. The B23t and B24t horizons range from 30 to 50 inches in thickness. They are yellowish red or red.

Winters loam, 0 to 1 percent slopes (WnA).—This soil is on uplands. Slopes are dominantly about 0.5 percent. Areas range from about 30 to 700 acres in size. The profile of this soil is the one described as representative of the series.

Included with this soil in mapping are areas of Miles, Rotan, and Sagerton soils.

Most areas of this soil are cultivated. The hazards of water erosion and soil blowing are slight. Capability unit IIc–1, dryland, and I–1, irrigated; Deep Hardland range site.

Winters loam, 1 to 3 percent slopes (WnB).—This soil is on uplands. Slopes are dominantly about 1.5 percent. Areas range from about 25 to 300 acres in size.

The surface layer is reddish-brown loam about 9 inches thick. It is underlain by reddish-brown sandy clay about 26 inches thick. The next layer is red sandy clay loam about 49 inches thick.

Included with this soil in mapping are areas of Miles, Rotan, and Sagerton soils.

Most areas of this soil are cultivated. The hazard of water erosion is moderate, and the hazard of soil blowing is slight. Capability unit IIe–1, dryland; Deep Hardland range site.

Yahola Series

The Yahola series consists of deep, nearly level soils on bottom lands. They formed in calcareous, recent loamy alluvium.

In a representative profile the surface layer is reddish-brown fine sandy loam about 10 inches thick. It is underlain by light reddish-brown, very friable fine sandy loam about 30 inches thick. The underlying material is reddish-yellow fine sandy loam about 30 inches thick.

Yahola soils are well drained. Runoff is slow, and permeability is moderately rapid. Available water capacity is high.

Representative profile of Yahola fine sandy loam in a cultivated field about 7.4 miles south of Seymour; 8.5 miles south from the courthouse on U.S. Highway 183; 0.7 mile east on private road; 500 feet north; 950 feet east; 50 feet north; 50 feet east of fence:

A1—0 to 10 inches, reddish-brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak, fine, subangular blocky structure; loose, very friable; calcareous; moderately alkaline; clear, smooth boundary.

C1—10 to 40 inches, light reddish-brown (5YR 6/4) fine sandy loam, reddish brown (5YR 5/4) moist; single grained; loose, very friable; thin strata of loamy fine sand and silty clay loam ½ to ¼ inch thick; calcareous; moderately alkaline; clear, smooth boundary.

C2—40 to 70 inches, reddish-yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6) moist; single grained; loose; thin strata of loamy fine sand and silty clay loam ¼ to ½ inch thick; calcareous; moderately alkaline.

The A horizon ranges from 6 to 12 inches in thickness. It is brown, reddish brown, or yellowish red. The C horizon ranges from 50 to 70 inches or more in thickness. It is red, light reddish brown, reddish yellow, or yellowish red.

Yahola fine sandy loam (Ya).—This nearly level soil is on flood plains. Slopes are dominantly less than 0.5 percent. Areas range from about 30 to 700 acres in size.

Included with this soil in mapping are areas of Clairemont, Mangum, and Lincoln soils.

Most areas of this soil are used for range. The hazard of water erosion is slight, and the hazard of soil blowing is moderate. Capability unit IIw–1, dryland, and IIw–1, irrigated; Sandy Bottomland range site.

Use and Management of the Soils

Use and management of soils in Baylor County for crops, range, wildlife habitat, recreational areas, and engineering purposes are discussed in this section.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when used for field crops, the risk of damage when they are so used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible, but unlikely, major reclamation projects; and does not apply to horticultural crops or other crops that require special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering.

In the capability system, the kinds of soils are grouped at three levels: the capability class, the subclass, and the unit. These levels are described in the following paragraphs.

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

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that re-

duce the choice of plants or require moderate conservation practices.

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

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

Class V soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife.

Class VI soils have severe limitations that make them generally unsuitable for cultivation and limit their use largely to pasture, range, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuitable for cultivation and that restrict their use largely to pasture, range, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial crop production and restrict their use to recreation, wildlife, water supply, or to use for esthetic purposes.

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

In class I there are no subclasses because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, although they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example IIc–1 or IIIe–5. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

In the following pages, the capability units are described and suggestions for the use and management of the soils are given.

Capability unit numbers generally are assigned locally, but are part of a statewide system. All of the units in the system are not represented by the soils of Baylor County; therefore, the numbers are not consecutive.

CAPABILITY UNIT IIc–1, DRYLAND

This unit consists of deep, nearly level soils on bottom lands and uplands. The surface layer is loam, clay loam, or silty clay loam. Permeability is slow to moderately slow. Available water capacity is high. The hazards of water erosion and soil blowing are slight.

Most areas of these soils are cultivated, and a few areas on large ranches are used for range. Cotton, grain sorghum, and wheat are the main crops.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture and maintain good tilth. Terraces help to reduce runoff and conserve moisture. Diversion terraces are needed in places for protection against runoff from adjacent areas.

CAPABILITY UNIT IIc–2, DRYLAND

This unit consists of deep, nearly level soils on bottom lands and uplands. The surface layer is very fine sandy loam or silt loam. Permeability is moderate to moderately rapid. Available water capacity is high. The hazard of water erosion is slight, and the hazard of soil blowing is moderate.

These soils are well suited to cultivation, but most areas on large ranches are used for range. Where cultivated, cotton, grain sorghum, and wheat are the main crops.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to prevent soil blowing and helps to conserve moisture and maintain good tilth. Diversion terraces are needed in some areas for protection against runoff from higher areas.

CAPABILITY UNIT IIe–1, DRYLAND

This unit consists of moderately deep to deep, gently sloping soils on uplands. The surface layer is loam, clay loam, or clay. Permeability is moderately slow to very slow. Available water capacity is high. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Most areas of these soils are cultivated and some areas on large ranches are used for range. Cotton, grain sorghum, and wheat are the main crops.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture and maintain good tilth. In cultivated areas terraces and contour farming help to conserve moisture and prevent water erosion. Grassed waterways are needed in areas of high water concentration. Diversion terraces are needed for protection against runoff from adjacent areas.

CAPABILITY UNIT IIe–2, DRYLAND

Chaney loamy fine sand, 0 to 1 percent slopes, is the only soil in this unit. It is a deep soil on uplands. The

surface layer is loamy fine sand. Permeability is slow. Available water capacity is high. The hazard of water erosion is slight, and the hazard of soil blowing is moderate. In some areas water is ponded for a short time after rainfall.

Most areas of this soil are cultivated, and small areas are used for range. Alfalfa, cotton, grain sorghum, and wheat are the main crops.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture and prevent soil blowing.

CAPABILITY UNIT IIe–3, DRYLAND

Enterprise very fine sandy loam, 1 to 3 percent slopes, is the only soil in this unit. It is a deep soil on uplands. The surface layer is very fine sandy loam. Permeability is moderately rapid. Available water capacity is high. The hazards of water erosion and soil blowing are moderate.

Most areas of this soil are cultivated, and the remaining areas are used for range. Cotton, grain sorghum, and wheat are the main crops.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture, reduce runoff, and prevent soil blowing. In cultivated areas terraces and contour farming help to conserve moisture and prevent water erosion. Grassed waterways are needed in areas of high water concentration. Diversion terraces are also needed in some areas for protection against runoff from higher areas.

CAPABILITY UNIT IIe–4, DRYLAND

Miles fine sandy loam, 0 to 1 percent slopes, is the only soil in this unit. It is a deep soil on uplands. The surface layer is fine sandy loam. Permeability is moderate. Available water capacity is high. The hazard of water erosion is slight, and the hazard of soil blowing is moderate.

Most areas of this soil are cultivated and some areas are used for range. Cotton, grain sorghum, and wheat are the main crops.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture, maintain good tilth, and prevent soil blowing (fig. 16). Terraces help to conserve moisture.

Figure 16.—**Wheat stubble left on Miles fine sandy loam, 0 to 1 percent slopes.**

CAPABILITY UNIT IIw–1, DRYLAND

Yahola fine sandy loam is the only soil in this unit. It is a deep soil on bottom lands. The surface layer is fine sandy loam. Permeability is moderately rapid. Available water capacity is high. The hazard of water erosion is slight, and the hazard of soil blowing is moderate.

Most areas of this soil are cultivated. Wheat is the main crop.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture, control soil blowing, and maintain soil tilth. Diversion terraces are needed for protection against runoff from higher areas.

CAPABILITY UNIT IIs–1, DRYLAND

This unit consists of deep, nearly level soils on bottom lands and uplands. The surface layer is clay or clay loam. Permeability is slow to very slow. Available water capacity is high. The hazards of water erosion and soil blowing are slight.

These soils are cultivated and also are used for range. Where cultivated, wheat is the main crop.

A suitable cropping system includes wheat or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture and improve tilth. Diversion terraces are needed in some areas for protection against runoff from higher areas.

CAPABILITY UNIT IIs–2, DRYLAND

Lindy clay loam, 0 to 1 percent slopes, is the only soil in this unit. It is a moderately deep soil on uplands. The surface layer is clay loam. Permeability is slow. Available water capacity is high. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

This soil is cultivated and also is used for range. Where cultivated, wheat is the main crop.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture and maintain good tilth.

CAPABILITY UNIT IIIe–1, DRYLAND

Kamay silt loam, 1 to 3 percent slopes, is the only soil in this unit. It is a deep soil on uplands. The surface layer is silt loam. Permeability is very slow. Available water capacity is high. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Most areas of this soil are used for range. Where cultivated, wheat is the main crop.

A suitable cropping system includes wheat or other high-residue crops. Terraces help to prevent water erosion and conserve moisture in cultivated areas. Grassed waterways are needed in areas of high water concentration.

CAPABILITY UNIT IIIe–2, DRYLAND

Hensley clay loam, 1 to 3 percent slopes, is the only soil in this unit. It is a shallow soil over limestone on uplands. The surface layer is clay loam. Permeability is slow. Available water capacity is low. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Most areas of this soil are used for range. Where areas are cultivated, wheat is the main crop.

Where cultivated, a suitable cropping system includes wheat or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture and improve tilth. In cultivated areas terraces and contour farming help to conserve moisture and prevent water erosion. Grassed waterways are needed in areas of high water concentration.

CAPABILITY UNIT IIIe–3, DRYLAND

Hardeman fine sandy loam, 3 to 5 percent slopes, is the only soil in this unit. It is a deep soil on uplands. The surface layer is fine sandy loam. Permeability is moderately rapid. Available water capacity is medium. The hazards of water erosion and soil blowing are moderate.

Most areas of this soil are cultivated, and some areas are used for range. Where areas are cultivated, wheat is the main crop.

A suitable cropping system includes wheat or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture, prevent soil blowing, and maintain good tilth. Terraces help reduce runoff and prevent water erosion. Grassed waterways are needed in areas of high water concentration.

CAPABILITY UNIT IIIe–4, DRYLAND

This unit consists of moderately deep to deep soils on uplands. The surface layer is fine sandy loam. Permeability is moderate. Available water capacity is low to high. The hazards of water erosion and soil blowing are moderate.

Most areas of these soils are cultivated. Where areas are cultivated, wheat and grain sorghum are the main crops.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture and maintain good tilth. In cultivated areas terraces and contour farming help to prevent erosion and reduce runoff. Grassed waterways are needed in areas of high water concentration.

CAPABILITY UNIT IIIe–5, DRYLAND

This unit consists of shallow to moderately deep, gently sloping soils on uplands. The surface layer is silty clay loam or clay loam. Permeability is moderate to moderately slow. Available water capacity is low to high. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

These soils are cultivated and also are used for range. Where areas are cultivated, wheat is the main crop.

A suitable cropping system includes wheat or other high-residue crops. In cultivated areas terraces and contour farming help to prevent water erosion and conserve moisture. Grassed waterways are needed in areas of high water concentration.

CAPABILITY UNIT IIIe–6, DRYLAND

Grandfield loamy fine sand, 0 to 3 percent slopes, is the only soil in this unit. It is a deep soil on uplands. The surface layer is loamy fine sand. Permeability is moderate. Available water capacity is high. The hazard of water erosion is slight, and the hazard of soil blowing is moderate.

Most areas of this soil are cultivated. Cotton, grain sorghum, and wheat are the main crops.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture and prevent soil blowing.

CAPABILITY UNIT IIIe–7, DRYLAND

Cosh fine sandy loam, 1 to 3 percent slopes, is the only soil in this unit. It is a shallow, gently sloping soil on uplands. The surface layer is fine sandy loam. Permeability is moderate. Available water capacity is low. The hazards of water erosion and soil blowing are moderate.

Most areas of this soil are used for range. Where cultivated, wheat is the main crop.

A suitable cropping system includes wheat or other high-residue crops. In cultivated areas terraces are needed to help conserve moisture and prevent water erosion. Grassed waterways are needed in areas of high water concentration.

CAPABILITY UNIT IIIe–8, DRYLAND

Grandfield fine sandy loam, 3 to 5 percent slopes, is the only soil in this unit. It is a deep soil on uplands. The surface layer is fine sandy loam. Permeability is moderate. Available water capacity is high. The hazards of water erosion and soil blowing are moderate.

Most areas of this soil are used for range. In cultivated areas, wheat is the main crop.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture, prevent soil blowing, and maintain good tilth. Terraces and contour farming help to prevent water erosion and conserve moisture. Grassed waterways are needed in areas of high water concentration.

CAPABILITY UNIT IIIs–1, DRYLAND

Kamay silt loam, 0 to 1 percent slopes, is the only soil in this unit. It is a deep, nearly level soil on uplands. The surface layer is silt loam. Permeability is very slow. Available water capacity is high. The hazards of water erosion and soil blowing are slight.

Most areas of this soil are used for range. Where cultivated, wheat is the main crop.

A suitable cropping system includes wheat or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture and maintain tilth.

CAPABILITY UNIT IVe–1, DRYLAND

This unit consists of shallow to deep, gently sloping soils on uplands. The surface layer is clay loam, silty clay loam, or clay. Permeability is moderate to very slow. Available water capacity is low to high. The hazard of water erosion is moderate, and the hazard of soil blowing is slight.

Most areas of these soils are used for range. Where cultivated, wheat is the main crop.

A suitable cropping system includes wheat or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture and maintain tilth. Terraces help to conserve moisture and prevent water erosion. Grassed waterways are needed in areas of high water concentration.

CAPABILITY UNIT Vw–1, DRYLAND

Frio silty clay loam, channeled, is the only soil in this unit. It is a deep soil on bottom lands that are subject to frequent flooding. The surface layer is silty clay loam. Permeability is moderately slow. Available water capacity is high.

This soil is best suited to range. Frequent flooding prevents cultivation. Most areas are dissected by meandering stream channels.

CAPABILITY UNIT Vw–2, DRYLAND

Lincoln and Yahola soils, frequently flooded, are the only soils in this unit. These are deep soils on bottom lands. Available water capacity is low to high. The hazard of soil blowing is moderate to severe.

These soils are best suited to range or wildlife habitat. They are subject to frequent flooding, scouring, runoff from higher areas, and deposition of fresh material.

CAPABILITY UNIT VIe–1, DRYLAND

This unit consists of shallow to moderately deep, gently sloping to steep soils on uplands. The surface layer is clay. Permeability is very slow. Available water capacity is low to high. The hazard of water erosion is moderate to severe.

These soils are better suited to range or wildlife habitat than to other uses. They are too shallow, too steep, or too stony to be cultivated.

CAPABILITY UNIT VIe–2, DRYLAND

Only Lueders-Throck complex, 1 to 8 percent slopes, is in this unit. These soils are very shallow to moderately deep and gently sloping to sloping. They are on uplands. The surface layer is silty clay loam to clay loam. Permeability is slow to moderate. Available water capacity is low to high. The hazard of water erosion is moderate.

These soils are better suited to range than to other uses. They are too shallow and too intermingled to be cultivated.

CAPABILITY UNIT VIe–3, DRYLAND

Hardeman fine sandy loam, 5 to 12 percent slopes, is the only soil in this unit. This is a deep, sloping to strongly sloping soil on uplands. The surface layer is fine sandy loam. Permeability is moderately rapid. Available water capacity is medium. The hazard of water erosion is severe, and the hazard of soil blowing is moderate.

This soil is better suited to range than to other uses. It is too steep and too droughty to be cultivated.

CAPABILITY UNIT VIe–4, DRYLAND

Eufaula fine sand, 3 to 8 percent slopes, is the only soil in this unit. It is a deep, gently sloping to sloping

soil on uplands. The surface layer is fine sand. Available water capacity is low. The hazard of soil blowing is severe.

This soil is better suited to range or wildlife habitat than to other uses. It is too sandy and droughty to be cultivated.

CAPABILITY UNIT VIw–1, DRYLAND

Randall clay is the only soil in this unit. It is a deep, nearly level, somewhat poorly drained soil on the floors of playa basins. Permeability is very slow. Available water capacity is high. This soil is frequently flooded by runoff from surrounding areas. Water stands on the surface for several months in most years.

This soil is best suited to pasture, range, or wildlife habitat. It is too wet to be cultivated in most years.

CAPABILITY UNIT VIIs–1, DRYLAND

Only Badland and Owens soils, undulating, is in this unit. It consists of barren shaly clay and shallow, very slowly permeable clay. Available water capacity is low. The hazard of water erosion is severe.

These areas are better suited to recreation or wildlife habitat than to other uses. Most areas are too sparsely vegetated to be used for range.

CAPABILITY UNIT I–1, IRRIGATED

This unit consists of deep, nearly level soils on uplands. The surface layer is loam or clay loam. Permeability is moderately slow to slow. Available water capacity is high. The hazards of water erosion and soil blowing are slight.

These soils are well suited to irrigation. Cotton and grain sorghum are the main crops, but small areas of wheat also are grown.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture and maintain good tilth. Diversion terraces are needed in some areas for protection against runoff from adjacent areas. A surface or sprinkler irrigation system can be used.

CAPABILITY UNIT I–2, IRRIGATED

This unit consists of deep, nearly level soils on bottom lands and uplands. The surface layer is very fine sandy loam or silt loam. Permeability is moderate to moderately rapid. Available water capacity is high. The hazard of water erosion is slight, and the hazard of soil blowing is moderate.

These soils are well suited to irrigation. Cotton, grain sorghum, and wheat are the main crops. Some alfalfa and Coastal bermudagrass also are grown.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to prevent soil blowing, conserve moisture, and maintain good tilth. Diversion terraces are needed in some areas for protection against runoff from higher areas. These soils are better suited to sprinkler systems than to other types of irrigation systems.

CAPABILITY UNIT IIe–1, IRRIGATED

Chaney loamy fine sand, 0 to 1 percent slope, is the only soil in this unit. It is a deep soil on uplands. The surface layer is loamy fine sand. Permeability is slow. Available water capacity is high. The hazard of water erosion is slight, and the hazard of soil blowing is moderate. Water ponds on some areas for a short time after rainfall but not long enough to destroy crops.

This soil is well suited to irrigation. Alfalfa, cotton, and grain sorghum are the main crops.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture and prevent soil blowing. A sprinkler irrigation system is preferred for efficient irrigation and water management.

CAPABILITY UNIT IIe–2, IRRIGATED

Enterprise very fine sandy loam, 1 to 3 percent slopes, is the only soil in this unit. It is a deep soil on uplands. The surface layer is very fine sandy loam. Permeability is moderately rapid. Available water capacity is high. The hazards of water erosion and soil blowing are moderate.

This soil is well suited to irrigation. Cotton, grain sorghum, and Coastal bermudagrass are the main crops, but wheat is grown in places.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture, reduce runoff, and prevent soil blowing. Efficient irrigation by a surface or sprinkler system, in combination with terraces, bench leveling, or contour farming, helps to control erosion and conserve water. Grassed waterways are needed in areas of high water concentration.

CAPABILITY UNIT IIe–3, IRRIGATED

Miles fine sandy loam, 0 to 1 percent slopes, is the only soil in this unit. It is a deep soil on uplands. The surface layer is fine sandy loam. Permeability is moderate. Available water capacity is high. The hazard of water erosion is slight, and the hazard of soil blowing is moderate.

This soil is well suited to irrigation. Cotton and grain sorghum are the main crops, and some wheat and Coastal bermudagrass also are grown.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture, maintain good tilth, and prevent soil blowing. A surface or sprinkler irrigation system can be used. Land leveling is often needed for surface irrigation.

CAPABILITY UNIT IIe–4, IRRIGATED

Miles fine sandy loam, 1 to 3 percent slopes, is the only soil in this unit. It is a deep soil on uplands. The surface layer is fine sandy loam. Permeability is moderate. Available water capacity is high. The hazards of water erosion and soil blowing are moderate.

This soil is suited to irrigation. Cotton and grain sorghum are the main crops, and some wheat and Coastal bermudagrass also are grown.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture, prevent soil blowing, and maintain good tilth. Efficient irrigation by a surface or sprinkler system, in combination with terraces, bench leveling, or contour farming, helps to control erosion and conserve water.

CAPABILITY UNIT IIw–1, IRRIGATED

Yahola fine sandy loam is the only soil in this unit. It is a deep soil on bottom lands. The surface layer is fine sandy loam. Permeability is moderately rapid. Available water capacity is high. The hazard of water erosion is slight, and the hazard of soil blowing is moderate.

This soil is suited to irrigation. Wheat and Coastal bermudagrass are the main crops.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture. Diversion terraces sometimes are needed for protection against runoff from higher areas. A sprinkler irrigation system is preferred for efficient irrigation and water management.

CAPABILITY UNIT IIIe–1, IRRIGATED

Grandfield loamy fine sand, 0 to 3 percent slopes, is the only soil in this unit. It is a deep soil on uplands. The surface layer is loamy fine sand. Permeability is moderate. Available water capacity is high.

These soils are suited to irrigation. Cotton and grain sorghum are the main crops (fig. 17). Peanuts are grown in a few areas.

A suitable cropping system includes wheat, grain sorghum, or other high-residue crops. Crop residue left on or near the surface helps to conserve moisture and prevent soil blowing. A sprinkler system is preferred for efficient irrigation and water management.

Predicted Yields

Crop yields in Baylor County depend on how well the soils have been managed. Consistent high yields can be obtained if the soils are used within their capabilities and managed according to their needs.

In table 2 are the predicted average yields per acre of principal crops grown on dryland and irrigated soils. These predictions are for cotton, grain sorghum, and wheat grown under a high level of management.

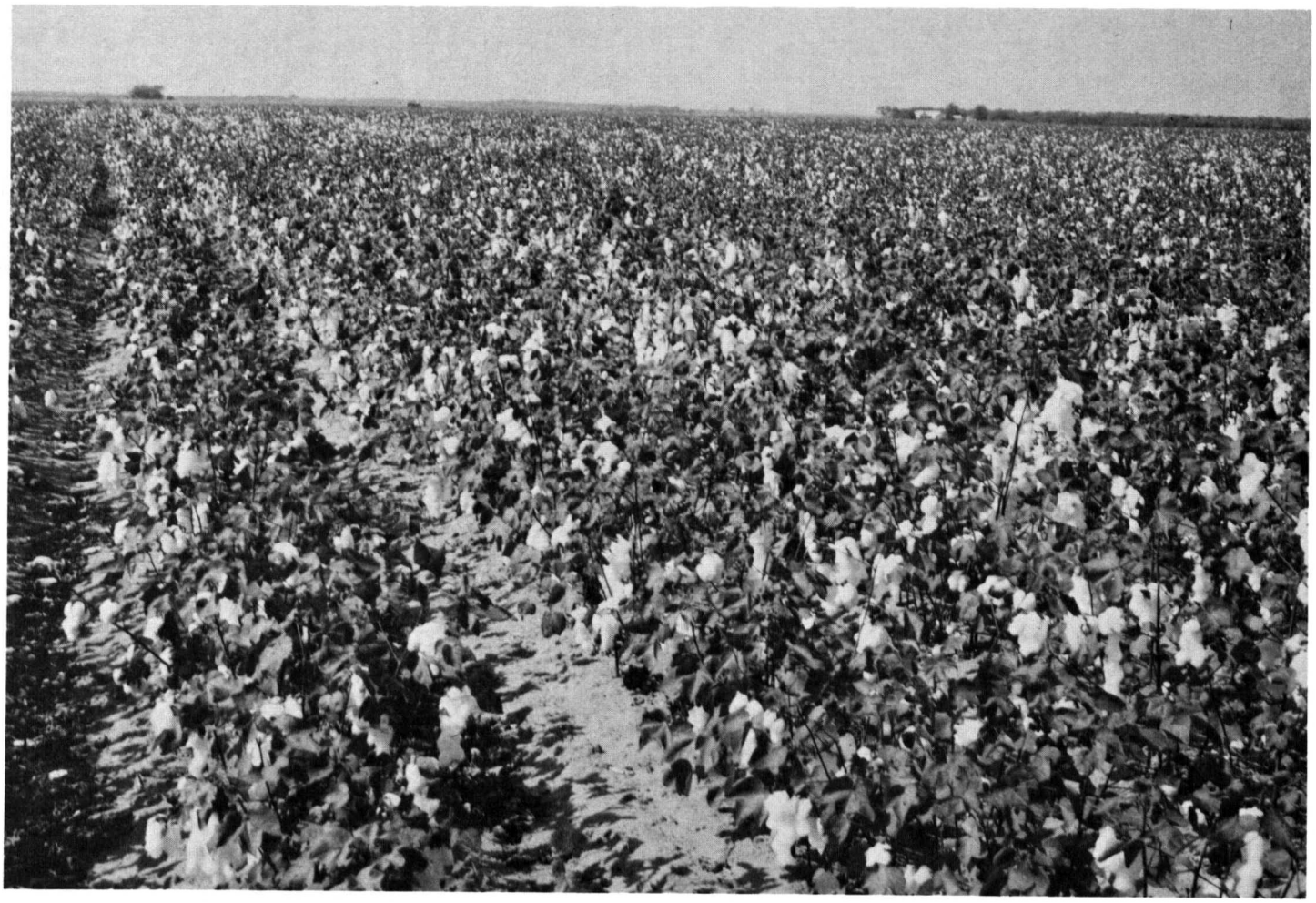

Figure 17.—Cotton in an irrigated area of Grandfield loamy fine sand.

TABLE 2.—*Predicted average yield per acre of principal crops on dryland and irrigated soils under a high level of management*

[Dashes indicate that the crop is not grown or the particular soil is not irrigated]

	Cotton		Grain sorghum		Wheat	
	Dryland	Irrigated	Dryland	Irrigated	Dryland	Irrigated
	Lbs	*Lbs*	*Lbs*	*Lbs*	*Bu*	*Bu*
Aspermont silty clay loam, 1 to 3 percent slopes	200		1,500		15	
Aspermont silty clay loam, 3 to 5 percent slopes					15	
Chaney loamy fine sand, 0 to 1 percent slopes	250	500	2,500	4,700	25	45
Clairemont silt loam	350	525	2,500	5,000	25	45
Cobb fine sandy loam, 1 to 3 percent slopes	250		1,500		20	45
Cosh fine sandy loam, 1 to 3 percent slopes					10	
Enterprise very fine sandy loam, 0 to 1 percent slopes	350	500	2,500	4,800	25	45
Enterprise very fine sandy loam, 1 to 3 percent slopes	300	475	2,500	4,600	25	40
Frio silty clay loam	325		3,000		30	
Grandfield loamy fine sand, 0 to 3 percent slopes	250	500	1,800	4,700	20	45
Grandfield fine sandy loam, 3 to 5 percent slopes	250		1,500		20	
Hardeman fine sandy loam, 3 to 5 percent slopes	200		1,000		10	
Hensley clay loam, 1 to 3 percent slopes					20	
Hollister clay loam, 0 to 1 percent slopes	300	450	2,500	4,500	25	40
Kamay silt loam, 0 to 1 percent slopes	225		1,400		20	
Kamay silt loam, 1 to 3 percent slopes	200		1,300		20	
Lindy clay loam, 0 to 1 percent slopes	250		2,000		25	
Lindy clay loam, 1 to 3 percent slopes	225		1,800		20	
Mangum clay					20	
Mereta clay loam, 1 to 3 percent slopes	160		1,250		15	
Mereta clay loam, 3 to 5 percent slopes					15	
Miles fine sandy loam, 0 to 1 percent slopes	300	500	2,200	4,800	25	45
Miles fine sandy loam, 1 to 3 percent slopes	290	475	1,800	4,600	25	43
Rotan clay loam, 0 to 1 percent slopes	300	450	2,500	4,500	25	40
Rowena clay loam, 0 to 1 percent slopes	300	450	2,500	4,500	25	40
Rowena clay loam, 1 to 3 percent slopes	225		2,000		25	
Sagerton clay loam, 0 to 1 percent slopes	300	450	2,500	4,500	25	40
Sagerton clay loam, 1 to 3 percent slopes	225		2,000		25	
Tillman clay loam, 0 to 1 percent slopes	225		1,600		25	
Tillman clay loam, 1 to 3 percent slopes	200		1,500		20	
Tobosa clay, 0 to 1 percent slopes	225		1,600		25	
Tobosa clay, 1 to 3 percent slopes	175		1,500		20	
Vernon clay, 1 to 3 percent slopes					15	
Winters loam, 0 to 1 percent slopes	300	450	2,500	4,500	25	40
Winters loam, 1 to 3 percent slopes	225		2,000		25	
Yahola fine sandy loam	200	360	1,600	4,000	20	40

The yields are based on records kept and on information gathered from farmers and others who have a knowledge of the crop yields in the county. Only those soils suitable for crops are shown in the table.

A high level of management of soils in this county consists of:

1. Using a cropping sequence that maintains an adequate supply of organic matter.
2. Managing crop residue in a way that effectively controls erosion and protects the soil.
3. Conserving moisture.
4. Maintaining fertility by the timely application of fertilizer and by growing soil-improving crops.
5. Controlling insects, diseases, and weeds in a timely manner.
6. Keeping tillage to a minimum and tilling only when the moisture content is such that compaction is minimized.
7. Planting improved crop varieties.
8. Using terraces and other mechanical aids and effectively maintaining them.

Range Management [2]

Ranching and livestock farming are important economic enterprises in Baylor County. Native grassland covers about 69 percent of the county. Thirty-seven ranching units in the county range from 750 to 182,000 acres in size, and 110 livestock farms are less than 750 acres in size.

About 6,000 acres of cropland are annually used for growing crops that supplement ranching and farming operations. These supplemental crops include hybrid forage sorghums and alfalfa. Hay is baled annually for use within the county. Surplus hay is sold as a cash crop. Although cow-calf projects are significant, feeding steers until they are ready for market is the main type of livestock project. The small-grain fields are used as forage for the steers.

Cattle population totals more than 40,000 head. Frequently, 30,000 to 35,000 of these are stocker cattle that are purchased in October and November. By the

[2] By JOE B. NORRIS, range conservationist, Soil Conservation Service.

following June, gains are such that the animals are shipped to cattlemen who have previously contracted the animals for feedlots or slaughter.

Raising stocker cattle has a built-in safety factor to guard against low forage production caused by extended dry weather. Since no stockers are run during the summer months, the cowmen are able to determine total forage production of native grassland. To a large part, production from fall-sown small grains can be determined prior to buying stocker animals. From this calculated information, stockmen can anticipate the forage available for fall and winter use. Stocking rates are adjusted to forage available prior to purchase of animals.

Several registered cattle breeders are in the county; however, their animals are used mainly to furnish registered sires and dams for crossbreeding. Within the past several years, crossbreed calves have been in demand as stocker cattle.

Four broad kinds of grassland are in the county. The clayey "hardlands" are in the northern half of the county and extend over two-thirds of the eastern half of the county. Also, the southwestern fourth of the county has similar clayey soil. This area is short-grass country, but lesser amounts of mid grasses are also present.

Another distinct kind of range is along the north side of the Brazos River. Although much of this area is cultivated, the loam and sandy loam soils are capable of producing stands of mid grasses. A few stands of tall grasses are produced in areas where moisture conditions are more favorable.

Tall grasses are produced in the sandy soils on bottom land adjacent to the Brazos River throughout the county.

The fourth kind of grassland is in the south-central part of the county. This is the northernmost extension of a group of limestone and shaly soils that occur north and south throughout north-central Texas. It is mid-grass country where a wide variety of grasses, forbs, and browse are produced. Native vegetation of this area shows a delicate balance between summer and winter forage, thus creating a favorable grassland for cow-calf pasture and range.

Range sites and condition classes

One range site differs from another in its potential to produce native plants.

Range sites differ in their capacity to produce different kinds or proportions of plant species or in total annual yield. Significant differences require some variation in management, such as different rate of stocking.

The kinds, proportion, and production of plants that different range sites can support depend mainly on the environmental factors of soil, topography, and climate. Range sites, therefore, can be identified by the kinds of soil known to be capable of producing the distinctive potential plant community which characterizes a specific soil.

Most native grasslands of Baylor County have been heavily grazed for several generations, and their original plant cover has been altered. Range condition is the present state of vegetation on a range site in relation to its potential (climax) plant cover. Range condition classes measure the degree to which the present plant composition, expressed in percent by weight, resembles the potential plant community. Four range condition classes are recognized. A range site is in *excellent* condition if 76 to 100 percent of the present vegetation is the same as the potential vegetation. It is in *good* condition if 51 to 75 percent of the present vegetation is the same as the potential vegetation and in *fair* condition if 26 to 50 percent of the present vegetation is the same. A range site is in *poor* condition if only 25 percent or less of the present vegetation is the same as the potential vegetation.

In determining present range condition class, plants are grouped according to their response to grazing. These groups of plants are decreasers, increasers, and invaders.

Decreasers are species in the potential plant community that decrease in relative abundance when the plant community is subject to continued, moderately heavy to heavy grazing use. Most of these plants have a high grazing preference and decrease from excessive use. The total of all such species is counted in determining range condition class.

Increasers are species present in the potential plant community that generally increase in relative abundance if the community is subject to continued, moderately heavy to heavy grazing use. Some increasers that have a moderately high grazing preference may initially increase and then decrease as grazing pressure continues. Others of low grazing preference may continue to increase, either in actual plant numbers or in relative proportion. Only the percentage of increaser plants that are generally expected to occur in the potential plant community are counted in determining range condition.

Invaders are not members of the potential plant community for the site. They invade the community as a result of various kinds of disturbance. They may be annuals or perennials, grasses, weeds, or woody plants. Some have relatively high grazing value, but many are worthless. Invader plants are not counted in determining range condition class.

For most range sites and most range livestock operations, the higher the range condition class, the better the quality and the greater the amount of available forage.

Descriptions and interpretations of range sites

The components of soil mapping units that serve to delineate range sites may consist of one or more soils, phases, complexes, undifferentiated units, or miscellaneous land types.

Fourteen range sites have been identified and described in Baylor County. Throughout the clayey rangelands of the county are areas practically devoid of vegetation that were created by severe soil loss and have little potential to produce vegetation. These areas are called Badlands and also are included.

The range sites of Baylor County are described on the following pages.

BOTTOMLAND RANGE SITE

This site consists of nearly level, loamy soils on bottom lands along major drainageways, intermittent streams, small creeks, and major streams. Permeability is moderate to moderately slow. Available water capacity is high. Areas receive runoff from higher lying soils. Although they become flooded these soils are under water for only short periods. Any damage to vegetation is generally from sedimentation rather than from wetness.

This site produces a large amount of mid and tall grasses if it is in good to excellent condition. These grasses remain green longer on this site because it receives extra water from runoff. Trees, such as elm, hackberry, pecan, and cottonwood, are scattered along the banks of the major streams. This site rapidly deteriorates if overused. Tall grasses are the first to vanish under heavy grazing pressure; mid grasses are replaced by perennial weeds, numerous annuals, and heavy stands of brush; and finally all grazable forage is killed.

The climax plant community varies from place to place, depending on the origin of the deposited alluvium. On the average, however, it is 15 percent (by weight) sand bluestem, 10 percent indiangrass, 10 percent switchgrass and false switchgrass, 10 percent little bluestem, 10 percent western wheatgrass, 10 percent vine-mesquite, and 10 percent Texas wintergrass, Canada wildrye, and side-oats grama. Forbs make up 5 percent and woody species make up 10 percent of the climax plant community. The remaining 10 percent is such grasses as feathery bluestem, blue grama, plains bristlegrass, and Arizona cottontop.

If the climax vegetation is not maintained, the site is invaded by such annuals as sunflower, cocklebur, buffalobur, hairy caltrop, common broomweed, croton, thistles, and sandbur. Other common invaders are mesquite, sand dropseed, three-awn, windmillgrass, Texas grama, and hairy tridens.

This site responds well to brush control, reseeding, rest, and other management. An effective way to control brush is to apply a basal treatment of oil or a combination of oil and chemical herbicide. Dozing is often used on the more open stands. Root plowing dense stands of brush is common practice. The soils are fertile and receive extra water. The cost-benefit ratio indicates that this is one of the first sites that should receive improvement treatment.

When this site is in excellent condition, total annual yield of air-dry herbage ranges from 2,000 to 3,600 pounds per acre. The exact amount depends on rainfall and overflow received annually. About two-thirds, by weight, of this vegetation is palatable to cattle.

CLAY FLAT RANGE SITE

This site is made up of broad, nearly level, clayey soils on flats along flood plains. These soils are droughty, and they crack open during a prolonged absence of rainfall. Permeability is very slow. Available water capacity is high.

The climax plant community does not produce a wide variety of vegetation because only a limited number of species can survive on these clayey soils. The climax plant community is 35 percent, by weight, tobosagrass; 15 percent side-oats grama; 15 percent vine-mesquite; 10 percent white tridens; 10 percent blue grama; and 10 percent buffalograss. Forbs and browse make up 5 percent.

Continuous heavy grazing causes side-oats grama and blue grama to give way to buffalograss and tobosagrass, and then to mesquite, pricklypear, cholla cactua, and annuals.

Since this site is droughty, expensive treatments are seldom applied. Because tobosagrass is palatable only 6 weeks to 2 months in the spring, management problems arise. Grazing management under these conditions consists of heavy use in spring followed by rest in summer.

When this site is in excellent condition, total annual yield of air-dry herbage ranges from 800 to 2,000 pounds per acre. About 50 percent, by weight, of this vegetation is palatable to livestock.

DEEP HARDLAND RANGE SITE

This site is made up of nearly level to gently sloping, loamy soils on upland plains. It is accessible to livestock and is a favorite for grazing. Permeability is moderately slow to slow. In many places, intake of moisture is reduced by surface crusting and by the compacted layer, or "hoof pan," caused by trampling. If these soils are not protected, water erosion becomes a concern.

The climax plant community consists of short to mid grasses. It is approximately 25 percent, by weight, side-oats grama; 15 percent vine-mesquite; 10 percent Arizona cottontop; 10 percent Texas wintergrass; 10 percent buffalograss; 5 percent feathery bluestem; 5 percent blue grama; 5 percent tall dropseed; 5 percent sand dropseed; and 5 percent western wheatgrass. An additional 5 percent is browse and forbs.

Continuous overgrazing results in an immediate loss of side-oats grama followed by a dominance of buffalograss. Further deterioration causes perennial three-awn, Texas grama, hairy tridens, pricklypear, and mesquite to increase in the plant community. In lower condition classes and during years in which spring is wet, such invading annuals as Texas filaree, evax, various plantains, bladderpods, bitterweed, common broomweed, and little barley occupy bare spots. Western ragweed and silverleaf nightshade are common invading perennial forbs on this site.

Soils of this site are capable of only limited plant production. A cover of vegetation is required to reduce surface crusting and prevent erosion. If the range is in poor condition, recovery is slow because of lack of seed plants of desirable species and because of the crusted soil and infestation by mesquite.

When this site is in excellent condition, total annual yield of air-dry herbage ranges from 1,800 to 2,500 pounds per acre, depending on the amount of rainfall received. Approximately 85 percent, by weight, of this vegetation is palatable to livestock and wildlife.

DEEP UPLAND RANGE SITE

This site is made up of nearly level to gently sloping soils on uplands. Permeability is moderately slow to very slow. Available water capacity is high.

This site is open prairie that supports an abundant growth of mid grasses. Tall grasses are produced in moist areas. The climax plant community is approximately 15 percent, by weight, side-oats grama; 10 percent feathery bluestem; 10 percent vine mesquite; 10 percent western wheatgrass; 5 percent meadow dropseed; 5 percent white tridens; 5 percent buffalograss; 5 percent Arizona cottontop; 5 percent plains bristlegrass; 5 percent blue grama; 5 percent Texas wintergrass; and 5 percent Texas cupgrass. Only small amounts of browse are produced. The remaining 15 percent is areas of tall grass and a wide variety of forbs such as heath aster.

Continuous heavy grazing causes such plants as mesquite, pricklypear, Texas grama red grama, western ragweed, and annuals to increase in the plant community.

When this site is in excellent condition, total annual yield of air-dry herbage ranges from 2,000 pounds per acre in unfavorable years of rainfall to 3,000 pounds in favorable years. About 90 percent, by weight, of this vegetation is palatable to domestic livestock and wildlife.

MIXEDLAND RANGE SITE

This site is made up of nearly level to gently sloping, loamy soils on uplands that have defined drainage patterns. Permeability is moderately rapid. Available water capacity is high.

The climax plant community consists of a wide variety of plants. It is dominantly mid grasses, but lesser amounts of short grasses are present. The climax plant community is approximately 20 percent, by weight, side-oats grama; 15 percent buffalograss; 10 percent Arizona cottontop; 10 percent blue grama; 5 percent plains bristlegrass; 5 percent western wheatgrass; 5 percent hairy grama; 5 percent sand dropseed; 5 percent feathery bluestem; and 5 percent meadow dropseed. The rest is 10 percent other grasses, such as little bluestem, fall witchgrass, and perennial three-awn, and 5 percent woody plants and forbs.

Deterioration of the vegetation causes an immediate loss in side-oats grama, Arizona cottontop, plains bristlegrass, and blue grama. Continuous overgrazing causes such plants as buffalograss, red grama, Texas grama, six-weeks grama, tumble windmillgrass, hooded windmillgrass, gummy lovegrass, little barley, tumblegrass, and hairy tridens to increase in the plant community. Woody invaders are mesquite, pricklypear, tasajillo, small soapweed, and juniper.

This site is capable of moderate production if it is in good or excellent condition. Recovery is slow because of a lack of viable seeds of climax plants and surface crusting. The site responds well to reseeding.

Where this site is in excellent condition, total annual yield of air-dry herbage ranges from 1,600 to 2,400 pounds per acre, depending on amount of moisture received. About 75 percent, by weight, of this vegetation is palatable to livestock and wildlife.

ROCKY HILLS RANGE SITE

This site is made up of sloping to steep, clayey soils on uplands. Large limestone rocks are embedded in the surface. Permeability is very slow. Available water capacity is low.

Because slopes are steep, the direction of exposure has an important influence on vegetative growth. Moisture conditions are best on north slopes. Under these conditions, the climax plant community is a mixture of tall and mid grasses, forbs, and woody plants. It is approximately 20 percent, by weight, sand or big bluestem, or both; 15 percent indiangrass; 10 percent side-oats grama; 10 percent feathery bluestem; 5 percent Texas wintergrass; 5 percent little bluestem; 5 percent buffalograss; and 5 percent rough tridens. An additional 15 percent is such woody plants as skunkbush sumac, hackberry, catclaw, bumelia, and elbowbush. Another 10 percent is such forbs as heath aster and dotted gayfeather.

Continuous heavy stocking causes such plants as western ragweed, mesquite, pricklypear, queen's delight, hairy tridens, Texas grama, and annuals to increase in the plant community.

When this site is in excellent condition, total annual yield of airdry herbage ranges from 1,200 pounds per acre on a north slope in unfavorable years of rainfall to 1,800 pounds per acre in favorable years. South slopes have yields of up to 40 percent less than north slopes because the direct sunlight reduces the amount of moisture. An estimated 65 percent, by weight, of this vegetation is palatable to domestic livestock and wildlife.

ROLLING HILLS RANGE SITE

This site is made up of gently sloping to sloping, loamy soils on uplands. The soils have no steep escarpments, and livestock can traverse the areas easily. Permeability is moderate to slow. Available water capacity ranges from low to high.

The climax plant community consists of mid grasses and a variety of forbs. The quantity of browse plants is negligible. The climax plant community is approximately 35 percent, by weight, side-oats grama; 15 percent Texas wintergrass; 15 percent buffalograss; 10 percent Texas cupgrass; 5 percent blue grama; and 5 percent feathery bluestem. An additional 5 percent is such grasses as hairy grama, slim tridens, and green sprangletop; and 10 percent is such forbs as heath aster, dotted gayfeather, daleas, and prairie clover.

Continuous heavy grazing causes such plants as Texas grama, hairy tridens, three-awn, red grama, mesquite, yucca, lotebush, and annuals to increase in the plant community.

Although these soils are not capable of outstanding production, they are still good grassland. Soils in this site respond well to good management.

When this site is in excellent condition, total annual yield of airdry herbage ranges from 1,800 to 2,500 pounds per acre. About 85 percent, by weight, of this vegetation is palatable to domestic livestock and wildlife.

SANDY BOTTOMLAND RANGE SITE

This site is made up of loamy soils on bottom lands. These soils are frequently benefited by a fluctuating water table and overflow. Permeability is moderately

rapid to rapid. Available water capacity is low to high.

Vegetation on this site consists of tall grasses. The climax plant community is 20 percent, by weight, sand bluestem; 15 percent indiangrass; 10 percent little bluestem; 10 percent switchgrass; 5 percent side-oats grama; 5 percent Texas wintergrass; 5 percent feathery bluestem; and 5 percent vine-mesquite. About 5 percent is such forbs as Illinois bundleflower, daleas, and prairie clover. Another 10 percent is such woody plants as cottonwood, pecan, hackberry, bumelia, and skunkbush sumac. An additional 10 percent is other grasses.

It is not uncommon to find that the soils of this site have regressed to a saline condition. When the salt content is sufficient to affect the vegetation, alkali sacaton increases in the plant community. Salt-tolerant grasses such as switchgrass are the last species to decrease. Continuous overgrazing causes alkali sacaton to be invaded by inland saltgrass and salt cedar.

Silt banks sometimes are created by soil being deposited after floods. In such instances vegetation is hampered by overwash material. Depending on the depth of alluvium, these areas may take a few months to several years to re-establish vegetation.

When this site is in excellent condition, total annual yield of air-dry herbage ranges from 2,400 to 3,600 pounds per acre. Under saline conditions this production may be reduced as much as 50 percent. About 70 percent, by weight, of this vegetation is palatable to domestic livestock and wildlife.

SANDYLAND RANGE SITE

This site is made up of smooth, nearly level to gently sloping, sandy soils on uplands. Permeability is slow to moderate. Available water capacity is high.

The climax plant community consists of tall and mid grasses, forbs, and browse. It is approximately 25 percent, by weight, sand bluestem; 20 percent indiangrass; 15 percent little bluestem; 5 percent feathery bluestem; 5 percent hooded windmillgrass; 5 percent fall witchgrass; and 5 percent hairy grama. Other grasses and forbs make up 10 percent of the community. Havard oak (shin oak), present in scattered motts throughout the landscape, makes up 10 percent.

Deterioration of this site causes a rapid increase in small soapweed (yucca), shin oak, and annuals. Invading grasses include annual three-awn, fringed signalgrass, tumble windmillgrass, gummy lovegrass, red lovegrass, and tumble lovegrass. The chief invading weeds are tumble ringwing, annual wild buckwheat, prairie sunflower, wooly-white, beebalm, pricklepoppy, Riddell groundsel, and stillingia.

On many ranches shin oak must be controlled before grasses can make any recovery. Mechanical methods of control are not feasible because of the hazard of soil blowing. This site responds favorably to control of shin oak by chemicals. If management is good and there is an available seed source, it has the ability to recover to a good or excellent condition. When response is slow, overseeding by the best known methods speeds up recovery.

When this site is in excellent condition, total annual yield of air-dry herbage ranges from 1,900 to 3,200 pounds per acre, depending on the amount of rainfall received during the growing season. About two-thirds, by weight, of this vegetation is palatable to livestock and wildlife.

SANDYLAND SAVANNAH RANGE SITE

This site is made up of gently sloping to sloping, sandy soils on uplands. In areas previously cultivated, but now in native grass, the topography is hummocky, sometimes presenting a "blowout" appearance. Permeability is rapid. Available water capacity is low.

The climax plant community consists of tall grasses with motts of post oak and blackjack oak. A wide variety of plants is present. The climax plant community is approximately 20 percent, by weight, sand bluestem; 15 percent indiangrass; 15 percent little bluestem; 10 percent post oak and blackjack oak; 5 percent purpletop tridens; 5 percent switchgrass; 5 percent sand lovegrass; 5 percent feather bluestem; and 5 percent side-oats grama. The remaining 15 percent consists of a wide variety of vegetation such as hooded windmillgrass, sand paspalum, sand dropseed, sand plum, skunkbush sumac, fall witchgrass, hairy grama, bumelia, and many forbs.

Continuous overuse of the grass causes woody plants and shinoak to increase in the plant community. Brush must be controlled upon complete deterioration and heavy invasion of post oak and blackjack oak. Seeding is effective following this treatment. Once the treatment has been applied, this site requires intense management for sprout control.

When the site is in excellent condition, total annual yield of air-dry herbage ranges from 2,000 pounds per acre in unfavorable years of rainfall to 3,000 pounds in favorable years. Approximately 70 percent, by weight, of this vegetation is palatable to domestic livestock and wildlife.

SANDY LOAM RANGE SITE

This site is made up of nearly level to strongly sloping, loamy soils on uplands. Permeability is moderate to moderately rapid. Available water capacity is low to high.

Vegetation on this site is mid grasses. Limited amounts of tall grass are also present. The climax plant community is approximately 25 percent, by weight, side-oats grama; 15 percent Arizona cottontop; 15 percent plains bristlegrass; 10 percent buffalograss; 10 percent blue grama; 5 percent hooded windmillgrass; 5 percent perennial three-awn; and 5 percent sand dropseed. The remaining 10 percent is browse and forbs.

This site is capable of supporting a wide variety of vegetation. "Hoof pans" and surface crusts form, however, in areas where there is no plant cover. Deterioration causes such plants as sand dropseed, three-awn, mesquite, and numerous annuals to increase in the plant community.

This site frequently is treated for the invasion of brush by mechanical and chemical methods. Pastures need to be rested long enough following brush control to permit grass recovery.

When this site is in excellent condition, total annual yield of air-dry herbage ranges from 2,000 pounds per acre in unfavorable years to 2,800 pounds in favorable years. About two-thirds, by weight, of this vegetation is palatable to livestock and wildlife.

SHALLOW CLAY RANGE SITE

This site is made up of gently sloping to steep, clayey soils on uplands. Permeability is very slow. Available water capacity is low to high.

The climax plant community varies with slope, exposure, and thickness of topsoil. The potential plant community is approximately 35 percent, by weight, side-oats grama, 10 percent vine-mesquite, 10 percent little bluestem; 10 percent buffalograss; 5 percent tobosagrass; 5 percent blue grama and hairy grama; and 5 percent silver bluestem. An additional 10 percent is such forbs as groundplum milkvetch, dalea, prairie-clover, scurf-pea, heath aster, engelmanndaisy, dotted gayfeather, penstemon, sagewort, and gaura. These forbs are important indicators, in determining trends in the condition of the range. Shrubs, such as acacia, mimosa, vine ephedra, agarito, and skunkbush sumac, make up about 10 percent.

As conditions decline, such plants as mesquite, grassland croton, pricklypear, and lotebush increase in the plant community. Common invading perennial grasses are hairy tridens, sand dropseed, Texas grama, red grama, and tumblegrass. The chief invading forbs are broom snakeweed, wavy leaf thistle, plains actinea, gray goldaster, rock daisy, threadleaf groundsel, and Texas stillingia. Invading forbs are common broomweed, bitterweed, one-seed croton, Texas filaree, evax, plantain, and bladderpod.

It is important to keep a good plant cover on the surface to reduce evaporation and control water erosion.

When this site is in excellent condition, total annual yield of air-dry herbage ranges from 1,000 pounds per acre in unfavorable years to 1,800 pounds in favorable years. About 80 percent, by weight, of this yield is palatable to livestock and wildlife.

TIGHTLAND RANGE SITE

This site is made up of nearly level to gently sloping, loamy soils on uplands. Permeability is very slow. Available water capacity is high.

The soils of this site make up an open prairie. The climax plant community is mainly mid grasses with lesser amounts of short grasses. It is approximately 20 percent, by weight, side-oats grama; 15 percent vine-mesquite; 15 percent western wheatgrass; 10 percent feathery bluestem; 10 percent buffalograss; 10 percent Texas wintergrass; 10 percent Arizona cottontop; and 5 percent white tridens. An additional 5 percent is several forbs.

Continuous overgrazing causes such plants as mesquite, condalias, tasajillo, pricklypear, western ragweed, silverleaf nightshade, and annuals to increase in the plant community.

When this site is in excellent condition, total annual yield of air-dry herbage ranges from 1,600 pounds per acre in unfavorable years to 2,100 pounds in favorable years. Because the surface of these soils crusts, vegetation is less reliable than it is at other clayey sites. About 95 percent, by weight, of this vegetation is palatable to domestic livestock and wildlife.

VALLEY RANGE SITE

This site is made up of nearly level, loamy soils on bottom lands. Permeability is moderately slow. Available water capacity is high. Extra water is received from runoff. Although flooded from time to time, this site is under water for only a short period. Any damage to vegetation is usually from sedimentation rather than wetness.

The climax plant community consists of mid grasses with lesser amounts of short grasses. It is approximately 15 percent, by weight, side-oats grama; 15 percent vine-mesquite; 10 percent white tridens; 10 percent Texas wintergrass; 10 percent buffalograss; 10 percent western wheatgrass; 5 percent feathery bluestem; 5 percent blue grama; and 10 percent other grasses. The remaining 10 percent is such browse as hackberry, bumelia, elbowbush, and perennial forbs.

Continuous heavy grazing causes such plants as mesquite and annuals to increase in the plant community.

When in good and excellent condition, this site is capable of producing an abundance of mid and short grasses. Grasses remain green longer on soils of this site because of the extra water from runoff. This site responds favorably to rest, particularly when managed before the more desirable grasses are grazed out.

When this site is in excellent condition, total annual yield of air-dry herbage ranges from 1,800 to 2,800 pounds per acre depending on the amount of extra rainfall received annually. About 90 percent, by weight, of this vegetation is palatable to cattle and wildlife.

Use of the Soils for Wildlife [3]

Wildlife has become an important source of recreation and income in some areas of Baylor County. Many small ranches and farm-ranch enterprises have leased hunting rights, mainly to nonresidents.

Bobwhite quail hunting is the most popular attraction at present. Scaled (blue) quail also are hunted in some areas. Dove and waterfowl offer good hunting during migration. A few white-tailed deer are along the Brazos River and in the southern and eastern parts of the county. A few deer are harvested in the county each year. Also present are coyotes, bobcats, jackrabbits, cottontail rabbits, badgers, skunks, raccoons, opossums, small rodents, lizards, and snakes. The rattlesnake is the only poisonous snake in this county.

Fishing in Baylor County is good to excellent. Lake Kemp and Lake Diversion attract fishermen from wide areas. Farm ponds, mostly less than 1½ acres in size, generally are stocked with fish supplied by the State and Federal governments. Largemouth bass, sunfish, and channel catfish are the most common fish in the lakes and ponds.

[3] By JAMES HENSON, biologist, Soil Conservation Service.

Interpretations for wildlife habitat

Successful management of wildlife on any tract of land requires, among other things, that food, cover, and water be available in a suitable combination. Lack of any one of these necessities creates an unfavorable balance or an inadequate distribution, and it may severely limit or account for the absence of desired wildlife species. Soil information provides a valuable tool in creating, improving, or maintaining suitable food, cover, and water for wildlife.

Most wildlife habitat is managed by planting suitable vegetation, by manipulating existing vegetation to bring about natural establishment, by increasing or improving desired plants, or by combinations of such measures. The influence of a soil on the growth of plants is known for many kinds of plants, and it can be inferred for others from knowledge about the characteristics and behavior of the soil. In addition, water areas can be created for wildlife habitat, or natural ones can be improved.

Soil interpretations for wildlife habitat serve a variety of purposes. They aid in selecting the more suitable sites for various kinds of management, and they serve as indicators for the level of management intensity needed to achieve satisfactory results. Also, they serve as a means of showing why it may not be generally feasible to manage a particular area for a given kind of wildlife. The interpretations also may serve in broad-scale planning of wildlife management areas, parks, and nature areas, or they may be used as a guide for acquiring wildlife lands.

Soil properties that affect the growth of wildlife habitat are thickness of soil useful to crops, texture of the surface layer, available water capacity to a depth of 40 inches, wetness, surface stoniness or rockiness, flood hazard, and slope.

The soil areas shown on the soil survey maps are rated without regard to positional relationships with adjoining delineated areas. The size, shape, or location of the outlined area does not affect the rating. Certain influences on habitat, such as elevation and aspect, must be appraised on the site.

In table 3 the soils of Baylor County are rated for the creation, improvement, or maintenance of six wildlife-habitat elements. These ratings are based on limitations imposed by the characteristics or behavior of the soil. Four levels of suitability are recognized. These are explained in the subsection "Suitability Ratings for Wildlife."

TABLE 3.—*Ratings of soils for*

Soil series and map symbols	Elements of wildlife habitat		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants
Aspermont: AsB, AsC	Fair	Good	Fair
Badland: BoC	Unsuited	Unsuited	Unsuited
For Owens part of BoC, see Owens series.			
Chaney: ChA	Good	Good	Good
Clairemont: Cm	Good	Good	Good
Cobb: CoB	Fair	Good	Good
Cosh: CsB	Poor	Poor	Fair
Enterprise: EnA, EnB	Good	Good	Good
Eufaula: EuD	Fair	Fair	Poor
Frio: Fr, Fs	Good	Fair	Good
Grandfield: GrB, GsC	Good	Good	Good
Hardeman: HaC, HaE	Fair	Good	Good
Hensley: HeB	Poor	Poor	Fair
Hollister: HoA	Good	Good	Good
Kamay: KaA, KaB	Good	Good	Good
Lincoln: Lc	Fair	Fair	Poor
For Yahola part of Lc, see Yahola series.			
Lindy: LdA, LdB	Fair	Good	Good
Lueders: LtD	Poor	Unsuited	Poor
For Throck part of LtD, see Throck series.			
Mangum: Ma	Fair	Fair	Fair
Mereta: MeB, MeC	Poor	Poor	Fair
Miles: MfA, MfB	Good	Good	Good
Owens: OsF, OvD	Poor	Poor	Fair
For the Vernon part of OvD, see the Vernon series.			
Randall: Ra	Fair	Fair	Fair
Rotan: RoA	Good	Good	Good
Rowena: RwA, RwB	Good	Good	Good
Sagerton: SaA, SaB	Good	Good	Good
Throck	Fair	Good	Good
Mapped only in a complex with the Lueders series.			
Tillman: TlA, TlB	Good	Good	Good
Tobosa: ToA, ToB	Fair	Fair	Fair
Vernon: VeB, VeD	Fair	Fair	Fair
Winters: WnA, WnB	Good	Good	Good
Yahola: Ya	Good	Good	Good

Elements of wildlife habitat

The six elements of wildlife habitat rated in table 3 are defined and explained in the following paragraphs.

Grain and seed crops.—These are grains from plants in cultivated areas or seeds from annuals planted to produce food for wildlife. Examples are corn, sorghums, millets, soybeans, wheat, oats, and sunflower.

Grasses and legumes.—These are domestic perennial grasses and legumes that will be established by planting and which furnish food and cover for wildlife. Examples are ryegrass, fescue, and panicgrass. Legumes include species of clovers.

Wild herbaceous plants.—These are perennial grasses, forbs, and weeds that provide food and cover for wildlife. Examples are croton, common sunflower, beggarweed, wild bean, indiangrass, wildrye, and bluestems.

Hardwood trees and shrubs.—These are nonconiferous trees, shrubs, and woody vines that produce fruits, nuts, buds, catkins, or forage used extensively as food by wildlife. These plants commonly become established through natural processes, but they can be planted. Examples are oak, mesquite, white-brush, catclaw, grape, honeysuckle, greenbrier, autumn olive, and multiflora rose.

Wetland food and cover plants.—These are annual and perennial wild herbaceous plants in moist to wet sites, exclusive of submerged or floating aquatics, that produce food or cover extensively and dominantly used by wetland forms of wildlife. Examples are smartweed, wild millet, bulrush, spike-sedge, rushes, sedges, burreeds, sourdock, and cattails.

Shallow-water developments.—These are low dikes and water-control structures established to create habitat principally for waterfowl. They can be designed to be drained, planted, and flooded, or they can be used as permanent impoundments to grow submerged aquatics. Both freshwater and brackish water structures are included.

Kinds of wildlife

Three general kinds of wildlife, used in table 3, are defined in the following paragraphs.

Open-land wildlife.—This group consists of birds and mammals that generally frequent cropland, pasture, and areas overgrown with grasses, herbs, and shrubby growth. Examples of this kind of wildlife are

wildlife habitat and kinds of wildlife

Elements of wildlife habitat—Continued			Kinds of wildlife		
Hardwood trees and shrubs	Wetland food and cover plants	Shallow-water developments	Open-land wildlife	Brushland wildlife	Wetland wildlife
Unsuited	Unsuited	Unsuited	Fair	Poor	Unsuited.
Unsuited	Unsuited	Unsuited	Poor	Poor	Unsuited.
Poor	Unsuited	Unsuited	Good	Good	Unsuited.
Fair	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Unsuited	Unsuited	Fair	Fair	Unsuited.
Fair	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Unsuited	Unsuited	Poor	Poor	Unsuited.
Fair	Unsuited	Unsuited	Fair	Good	Unsuited.
Poor	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Unsuited	Unsuited	Unsuited	Poor	Poor	Unsuited.
Unsuited	Fair	Good	Fair	Poor	Good.
Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Unsuited	Unsuited	Fair	Poor	Unsuited.
Unsuited	Unsuited	Unsuited	Fair	Poor	Unsuited.
Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Fair	Unsuited	Unsuited	Good	Good	Unsuited.

quail, doves, cottontail rabbits, jackrabbits, meadowlarks, and lark sparrows.

Brushland wildlife.—This group consists of birds and mammals that generally frequent wooded areas of hardwood trees and shrubs. Examples of brushland wildlife are deer, turkeys, squirrels, and raccoons.

Wetland wildlife.—This group consists of birds and mammals that generally frequent such areas as ponds, streams, ditches, marshes, and swamps. Examples of this kind of wildlife are ducks, geese, rails, shorebirds, and snipes.

Suitability ratings for wildlife

The following definitions are given for habitat suitability ratings used in table 3.

Good indicates that habitats generally are easily created, improved, or maintained; that the soil has few or no limitations that affect management; and that satisfactory results can be expected.

Fair indicates that habitats can be created, improved, or maintained in most places; that the soil has moderate limitations that affect management; and that moderate intensity of management and fairly frequent attention may be required for satisfactory results.

Poor indicates that habitats can be created, improved, or maintained in most places; that the soil has rather severe limitations; that habitat management is difficult and expensive and requires intensive effort; and that results are not always satisfactory.

Unsuited indicates that the soil limitations are so extreme that it is impractical, if not impossible, to manage the designated habitat element. Unsatisfactory results are probable.

Use of the Soils for Recreational Areas

Knowledge of soils is necessary in planning, developing, and maintaining recreation areas. In table 4 the soils of Baylor County are rated according to the limitations that affect their suitability for camp areas, playgrounds, picnic areas, and paths and trails.

In table 4 the soils are rated as having slight, moderate, or severe limitations for the specified uses. For all of these ratings, it is assumed that a good cover of vegetation can be established and maintained. A limitation of *slight* means that soil properties generally are favorable and limitations are so minor that they can easily be overcome. A *moderate* limitation can be overcome or modified by planning, design, or special maintenance. A *severe* limitation means that costly soil reclamation, special design, intense maintenance, or a combination of these is required.

Camp areas are used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Little preparation of the site is required, other than shaping and leveling for tent and parking areas. Camp areas are subject to heavy foot traffic and limited vehicular traffic. The best soils have gentle slopes, good drainage, a surface free of rocks and coarse fragments, freedom from flooding during periods of heavy use, and a surface that is firm after rain but not dusty when dry.

Picnic areas are attractive natural or landscaped tracts used mainly for preparing meals and eating outdoors. These areas are subject to heavy foot traffic. Most of the vehicular traffic, however, is confined to access roads. The best soils are firm when wet but not dusty when dry; are free of flooding during the season of use; do not have slopes or stones that greatly increase cost of leveling sites or of building access roads.

Playgrounds are areas used intensively for baseball, football, badminton, and similar organized games. Soils suitable for this use need to withstand intensive foot traffic. The best soils have a nearly level surface free of coarse fragments and rock outcrops, good drainage, freedom from flooding during periods of heavy use, and a surface that is firm after rain but not dusty when dry. If grading and leveling are required, depth to rock is important.

Paths and trails are used for local and cross-country travel by foot or horseback. Design and layout should require little or no cutting and filling. The best soils are at least moderately well drained, are firm when wet but not dusty when dry, are flooded not more than once during the season of use, have slopes of less than 15 percent, and have few or no rocks or stones on the surface.

Engineering Uses of the Soils [4]

This section is useful to those who need information about soils used as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, strength, compaction characteristics, soil drainage, shrink-swell potential, grain-size distribution, plasticity, and soil reaction. Also important are depth to the water table, depth to bedrock, and slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

The information in this section can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the kinds of soil on which they are built, for the purpose of predicting performance of structures on the same or similar kinds of soil in other locations.

[4] By ROBERT L. GRAY, area engineer, Soil Conservation Service.

TABLE 4.—*Degree of soil limitations and major features affecting recreational development*

Soil series and map symbols	Camp areas	Picnic areas	Playgrounds	Paths and trails
Aspermont: AsB, AsC	Moderate: silty clay loam.	Moderate: silty clay loam.	Moderate: silty clay loam.	Moderate: silty clay loam.
Badland: BoC. Too variable for valid estimates to be made.				
Chaney: ChA	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: loamy fine sand.
Clairemont: Cm	Severe: flooding	Moderate: flooding	Severe: flooding	Moderate: flooding.
Cobb: CoB	Slight	Slight	Slight	Slight.
Cosh: CsB	Slight	Slight	Severe: bedrock at a depth of 12 to 20 inches.	Slight.
Enterprise: EnA, EnB	Slight	Slight	Slight	Slight.
Eufaula: EuD	Severe: fine sand	Severe: fine sand	Severe: fine sand	Severe: fine sand.
Frio: Fr	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding.
Frio, channeled: Fs	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Grandfield:				
GrB	Moderate: loamy fine sand.	Moderate: loamy fine sand.	Severe: loamy fine sand.	Moderate: loamy fine sand.
GsC	Slight	Slight	Moderate: slope of 3 to 5 percent.	Slight.
Hardeman:				
HaC	Slight	Slight	Moderate: slope	Slight.
HaE	Moderate: slope	Moderate: slope	Severe: slope	Slight.
Hensley: HeB	Moderate: clay loam	Moderate: clay loam	Severe: bedrock at a depth of 12 to 20 inches.	Moderate: clay loam.
Hollister: HoA	Moderate: clay loam	Moderate: clay loam	Moderate: clay loam	Moderate: clay loam.
Kamay: KaA, KaB	Moderate: very slow permeability.	Slight	Moderate: very slow permeability.	Slight.
Lincoln: Lc	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
For Yahola part, see Yahola series.				
Lindy: LdA, LdB	Moderate: clay loam	Moderate: clay loam	Moderate: clay loam	Moderate: clay loam.
Lueders: LtD	Moderate: silty clay loam.	Moderate: silty clay loam.	Severe: bedrock at a depth of 7 to 20 inches.	Moderate: silty clay loam.
For Throck part, see Throck series.				
Mangum: Ma	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Mereta: MeB, MeC	Moderate: clay loam	Moderate: clay loam	Severe: cemented caliche at a depth of 14 to 20 inches.	Moderate: clay loam.
Miles:				
MfA	Slight	Slight	Slight	Slight.
MfB	Slight	Slight	Moderate: slope	Slight.
Owens: OsF, OvD	Severe: 50 to 70 percent stones; clay.	Severe: 50 to 70 percent stones; clay.	Severe: 35 to 70 percent stones; clay.	Severe: 50 to 70 percent stones; clay.
For Vernon part of OvD, see Vernon Series.				
Randall: Ra	Severe: clay; flooding	Severe: clay; flooding	Severe: clay; flooding	Severe: clay; flooding.
Rotan: RoA	Moderate: clay loam	Moderate: clay loam	Moderate: clay loam	Moderate: clay loam.
Rowena: RwA, RwB	Moderate: clay loam	Moderate: clay loam	Moderate: clay loam	Moderate: clay loam.
Sagerton: SaA, SaB	Moderate: clay loam	Moderate: clay loam	Moderate: clay loam	Moderate: clay loam.
Throck	Moderate: silty clay loam.	Moderate: silty clay loam.	Moderate: silty clay loam.	Moderate: silty clay loam.
Mapped only in a complex with the Lueders soils.				
Tillman: TlA, TlB	Moderate: clay loam	Moderate: clay loam	Moderate: clay loam	Moderate: clay loam.
Tobosa: ToA, ToB	Severe: clay	Severe: clay	Severe: clay	Severe: clay.
Vernon: VeB, VeD	Severe: clay	Severe: clay	Severe: clay	Severe: clay.
Winters: WnA, WnB	Moderate: moderately slow permeability.	Slight	Moderate: moderately slow permeability.	Slight.
Yahola: Ya	Severe: flooding	Moderate: flooding	Severe: flooding	Slight.

6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 5, 6, and 7, which show, respectively, several estimated soil properties significant to engineering; interpretations for various engineering uses; and results of engineering laboratory tests on soil samples.

This section is useful to those who need information parts of this publication, can be used to make interpretations in addition to those given in tables 5, 6, and 7; and it also can be used to make other useful maps.

This information, however, does not eliminate need for further investigation at sites selected for engineer-

TABLE 5.—*Estimated soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such to other series that appear in the first column of this

Soil series and map symbols	Depth to bedrock	Depth from surface	USDA texture	Classification	
				Unified	AASHO
	Inches	*Inches*			
Aspermont: AsB, AsC	>60	0–40	Silty clay loam	CL	A–6
		40–60	Shaly clay.		
*Badland: BoC. Too variable for valid interpretation. For Owens part of BoC, see Owens series.					
Chaney: ChA	>60	0–12	Loamy fine sand	SM, SP–SM	A–2–4
		12–18	Sandy clay loam	CL	A–6 or A–7
		18–62	Sandy clay	CL	A–7 or A–6
		62–80	Sandy clay loam	CL	A–6 or A–7
		80–90	Fine sandy loam	SM	A–2–4
Clairemont: Cm	>60	0–80	Silt loam or silty clay loam	CL, ML–CL	A–6
Cobb: CoB	20–40	0–7	Fine sandy loam	SM	A–2–4, A–4
		7–28	Sandy clay loam	SC, CL	A–6
		28–60	Weakly cemented sandstone.		
Cosh: CsB	12–20	0–6	Fine sandy loam	SM	A–4
		6–14	Sandy clay loam	SC, CL	A–6
		14–60	Weakly cemented sandstone.		
Enterprise: EnA, EnB	>60	0–80	Very fine sandy loam	ML, ML–CL	A–4
Eufaula: EuD	>60	0–100	Fine sand	SM–SP, SM	A–3
Frio: Fr, Fs	>60	0–70	Silty clay loam and silty clay	CL	A–6, A–7–6
Grandfield: GrB, GsC	>60	0–19	Loamy fine sand	SM–SC, SM	A–4, A–2
		19–52	Sandy clay loam	SC, CL	A–4, A–6
		52–58	Fine sandy loam	SM, SC	A–2, A–4
		58–80	Loamy fine sand	SM–SC, SM	A–4, A–2
Hardeman: HaC, HaE	>60	0–90	Fine sandy loam	SM–SC, CL	A–4
Hensley: HeB	12–20	0–6	Clay loam	CL, SC	A–6
		6–18	Clay	CL	A–7
		18–60	Limestone.		
Hollister: HoA	>60	0–16	Clay loam	CL, ML	A–6, A–7–6
		16–80	Clay	CL, CH	A–7–6
Kamay: KaA, KaB	>60	0–7	Silt loam	ML, CL	A–4, A–6
		7–80	Clay	CL, CH	A–7–6, A–6
*Lincoln: Lc For Yahola part, see Yahola series.	>60	0–4	Silt loam, fine sand	ML, SM	A–2, A–4, A–6
		4–52	Fine sand	SM	A–2
		52–62	Loamy fine sand	SM	A–4
		62–80	Fine sand	SM	A–2
Lindy: LdA, LdB	21–40	0–10	Clay loam	ML, CL	A–4, A–6
		10–34	Clay	CL, CH	A–6, A–7
		34–60	Limestone.		
*Lueders: LtD For Throck part, see Throck series.	7–20	0–13	Silty clay loam	ML, CL, GC	A–2, A–6, A–7
		13–48	Limestone.		
Mangum: Ma	>60	0–70	Clay	CL, CH	A–7–6
Mereta: MeB, MeC	14–20	0–16	Clay loam	CL	A–6, A–7–6
		16–22	Cemented caliche.[1]		
		22–60	Clay loam	CL	A–6, A–7

See footnotes at end of table.

significant in engineering

mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring table. < means less than; > means more than]

Percentage passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential	Hydrologic soil group
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)					
				Inches per hour	*Inches per inch of soil*	*pH*		
95–100	90–100	85–98	75–90	0.6–2.0	0.18–0.22	7.9–8.4	Moderate	B
90–100	90–100	60–95	7–30	2.0–6.0	0.07–0.10	6.1–6.5	Very low	C
90–100	90–100	80–90	50–65	0.6–2.0	0.15–0.18	6.6–7.3	Moderate.	
90–100	90–100	90–100	50–85	0.06–0.2	0.15–0.18	6.6–8.4	Moderate.	
90–100	90–100	80–90	50–65	0.6–2.0	0.15–0.17	6.6–8.4	Moderate.	
95–100	95–100	80–85	25–30	2.0–6.0	0.11–0.15	7.9–8.4	Very low.	
100	100	100	85–98	0.6–2.0	0.16–0.19	7.9–8.4	Low	B
100	98–100	75–90	30–50	2.0–6.0	0.11–0.14	6.6–7.3	Low	B
95–100	90–99	90–98	40–60	0.6–2.0	0.12–0.16	6.6–7.8	Low.	
95–100	95–100	70–85	36–50	2.0–6.0	0.11–0.13	6.6–7.3	Low	C
90–98	90–98	90–98	40–55	0.6–2.0	0.12–0.15	7.4–7.8	Low.	
100	100	95–99	80–90	2.0–6.0	0.18–0.20	7.9–8.4	Low	B
100	100	85–95	9–20	6.0–20.0	0.04–0.06	5.6–7.3	Low	A
95–100	95–100	75–100	70–95	0.2–0.6	0.15–0.22	7.9–8.4	Moderate	B
100	100	90–100	30–50	2.0–6.0	0.09–0.13	6.6–7.3	Low	B
100	100	90–100	40–60	0.6–2.0	0.12–0.16	6.6–7.3	Low.	
100	100	90–100	30–50	2.0–6.0	0.09–0.13	7.9–8.4	Low.	
100	100	90–100	30–50	2.0–6.0	0.09–0.11	7.9–8.4	Low.	
95–100	90–100	85–95	40–65	2.0–6.0	0.11–0.13	7.9–8.4	Low	B
93–99	90–98	85–95	36–65	0.6–2.0	0.14–0.18	7.4–7.8	Low	D
80–95	80–95	80–90	60–75	0.06–0.2	0.15–0.19	7.4–7.8	Moderate.	
100	100	100	95–99	0.6–2.0	0.14–0.18	7.4–7.8	Moderate	D
100	100	95–99	90–98	0.06–0.2	0.12–0.16	7.9–8.4	High.	
100	100	100	70–90	0.6–2.0	0.16–0.20	6.6–7.3	Low	D
100	97–100	94–99	70–98	<0.06	0.13–0.17	7.9–8.4	High.	
100	100	60–100	20–90	2.0–6.3	0.06–0.20	7.9–8.4	Low	A
100	90–100	50–90	15–35	6.0–20.0	0.04–0.06	7.9–8.4	Low.	
100	100	50–90	36–50	6.0–20.0	0.06–0.09	7.9–8.4	Low.	
100	90–100	50–90	15–35	6.0–20.0	0.04–0.06	7.9–8.4	Low.	
85–95	85–95	85–95	60–75	0.6–2.0	0.12–0.16	6.6–7.3	Low	C
90–100	90–100	90–98	75–90	0.06–0.2	0.12–0.17	7.4–8.4	Moderate.	
40–70	30–65	25–55	25–55	0.6–2.0	0.10–0.14	7.9–8.4	Low	C
100	100	100	90–100	<0.06	0.14–0.18	7.9–8.4	High	D
95–100	90–100	80–90	65–80	0.2–0.6	0.15–0.20	7.9–8.4	Moderate	C
90–100	90–100	80–90	65–85	0.2–0.6	0.10–0.15	7.9–8.4	Low.	

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to bedrock	Depth from surface	USDA texture	Classification	
				Unified	AASHO
	Inches	*Inches*			
Miles: MfA, MfB	>60	0–14	Fine sandy loam	SM–SC, SM	A–2–4, A–4
		14–80	Sandy clay loam	SC, CL	A–6
*Owens: OsF, OvD	>60	0–18	Clay	CL, CH	A–7–6
		18–60	Shaly clay	CL, CH	A–6, A–7–6
For Vernon part of OvD, see Vernon series.					
Randall: Ra	>60	0–64	Clay	CH, CL	A–7–6
Rotan: RoA	>60	0–22	Clzy loam	CL	A–6, A–4
		22–38	Clay	CL	A–7–6
		38–80	Clay loam	CL	A–6, A–7–6
Rowena: RwA, RwB	>60	0–8	Clay loam	CL	A–6, A–7
		8–37	Clay	CL, CH	A–7
		37–80	Clay loam	CL	A–6, A–7
Sagerton: SaA, SaB	>60	0–16	Clay loam	CL	A–6
		16–42	Clay	CL	A–6, A–7
		42–66	Clay loam	CL	A–6
		66–80	Clay	CL	A–6, A–7
Throck	>60	0–6	Silty clay loam	CL, ML	A–6, A–7
		6–38	Silty clay	CL, ML	A–6, A–7
		38–50	Clay	CL	A–7
Mapped only in a complex with the Leuders series.					
Tillman: TlA, TlB	>60	0–7	Clay loam	CL	A–7–6, A–6
		7–62	Clay	CL, CH	A–6, A–7–6
		62–80	Shaly clay	CL, CH	A–7, A–6
Tobosa: ToA, ToB	>60	0–58	Clay	CH	A–7–6
		58–70	Clay loam	CL	A–6, A–7–6
Vernon: VeB, VeD	>60	0–26	Clay	CL, CH	A–6, A–7–6
		26–40	Shaly clay	CL, CH	A–6, A–7–6
Winters: WnA, WnB	>60	0–9	Loam	CL	A–4, A–6
		9–42	Sandy clay	CL	A–6
		42–80	Sandy clay loam	CL	A–6
Yahola: Ya	>60	0–70	Fine sandy loam	SM, ML	A–2, A–4

[1] Too variable for valid interpretations.

ing works, especially works that involve heavy loads or that require excavations to depths greater than those shown in the tables, generally depths greater than 6 feet. Also, inspection of sites, especially the small ones, is needed because many delineated areas of a given soil mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some of the terms used in this soil survey have special meaning to soil scientists that are not known to all engineers. The Glossary defines many of these terms commonly used in soil science.

Engineering classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system[5] used by the Soil Conservation Service engineers, Department of Defense, and others, and the AASHO system adopted by the American Association of State Highway Officials.[6]

In the Unified system soils are classified according to particle-size distribution, plasticity, liquid limit, and organic matter. Soils are grouped in 15 classes: eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as

[5] United States Department of Defense. 1968. *Unified Soil Classification System for Roads, Airfields, Embankments and Foundations.* MIL-STD-619B, 30 pp., illus.

[6] American Association of State Highway Officials. 1961. *Standard Specifications for Highway Materials and Methods of Sampling and Testing.* Ed. 8, 2 v., illus. Washington, D.C.

significant in engineering—Continued

Percentage passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential	Hydrologic soil group
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)					
				Inches per hour	*Inches per inch of soil*	*pH*		
100	100	80–95	24–40	2.0–6.0	0.11–0.14	6.6–7.3	Low	B
96–100	92–100	90–97	36–72	0.6–2.0	0.13–0.17	6.6–8.4	Low.	
95–100	95–100	90–100	80–95	<0.06	0.13–0.17	7.9–8.4	High	D
90–100	85–100	80–90	55–80	<0.06	0.03–0.08	7.9–8.4	High.	
100	100	96–100	70–98	<0.06	0.14–0.18	7.9–8.4	High	D
100	100	95–99	70–85	0.6–2.0	0.15–0.19	7.9–8.4	Moderate	C
100	100	95–99	80–95	0.2–0.6	0.14–0.18	7.9–8.4	High.	
100	90–100	90–98	75–92	0.2–0.6	0.12–0.15	7.9–8.4	Moderate.	
95–100	90–100	85–100	70–85	0.2–0.6	0.15–0.20	7.9–8.4	Moderate	C
95–100	95–100	90–100	75–95	0.2–0.6	0.14–0.18	7.9–8.4	High.	
95–100	90–100	85–100	85–100	0.2–0.6	0.15–0.20	7.9–8.4	Moderate	
95–100	95–100	90–100	60–90	0.2–0.6	0.15–0.20	6.6–7.8	Low	C
95–100	95–100	90–100	65–90	0.2–0.6	0.15–0.18	7.9–8.4	Moderate.	
90–100	90–100	75–90	60–75	0.2–0.6	0.10–0.15	7.9–8.4	Low.	
95–100	95–100	90–100	65–90	0.2–0.6	0.15–0.18	7.9–8.4	Moderate.	
80–100	80–98	70–95	65–80	0.2–0.6	0.15–0.17	7.9–8.4	Moderate	C
80–95	80–95	75–90	75–85	0.06–0.2	0.15–0.18	7.9–8.4	Moderate.	
100	100	95–100	85–95	0.06–0.2	0.13–0.15	7.9–8.4	Moderate.	
100	95–100	90–98	70–95	0.2–0.6	0.16–0.20	7.4–7.8	Moderate	C
95–100	95–100	90–98	70–95	0.06–0.2	0.14–0.18	7.4–8.4	High.	
90–100	85–100	80–90	60–95	0.06–0.2	0.13–0.15	7.9–8.4	Moderate.	
98–100	95–100	90–100	75–95	<0.06	0.15–0.20	7.9–8.4	High	D
95–100	90–100	85–100	70–95	0.2–0.6	0.10–0.16	7.9–8.4	High.	
95–100	90–100	90–100	80–95	<0.06	0.13–0.17	7.9–8.4	High	D
90–100	85–100	65–100	65–90	<0.06	0.08–0.12	7.9–8.4	High.	
100	98–100	75–95	50–75	0.6–2.0	0.15–0.19	6.1–6.5	Low	C
100	98–100	80–100	50–75	0.2–0.6	0.14–0.18	6.6–7.8	Moderate.	
98–100	98–100	80–90	50–75	0.6–2.0	0.14–0.17	7.9–8.4	Moderate.	
100	100	85–98	30–60	2.0–6.0	0.11–0.15	7.9–8.4	Low	B

Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, ML-CL.

The AASHO system is used to classify soils according to those properties that affect use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups that range from A–1 to A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A–7, are clay soils that have low strength when wet and that are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The AASHO classification for tested soils, with group index numbers in parentheses, is shown in table 7; the estimated classification, without group index numbers, is given in table 5 for all soils mapped in the survey area.

Soil properties significant in engineering

Several estimated properties significant in engineering are shown in table 5. These estimates are made for typical soil profiles, by layers sufficiently different to have different significance for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. The following are explanations of some of the columns in table 5.

TABLE 6.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such to other series that appear in

Soil series and map symbols	Suitability as a source of—		Degree of limitations and soil features affecting—				
	Topsoil	Road fill	Local roads and streets	Light industry	Septic-tank filter fields	Sewage lagoons	Sanitary landfill [1]
Aspermont: AsB, AsC	Fair: silty clay loam.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Moderate: moderate shrink-swell potential.	Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: silty clay loam.
*Badland: BoC. Too variable for valid interpretation. For Owens part of BoC, see the Owens series.							
Chaney: ChA	Poor: loamy fine sand.	Fair: moderately well drained.	Moderate: moderately well drained; fair traffic-supporting capacity.	Moderate: moderately well drained; moderate shrink-swell potential.	Severe: permeability.	Slight	Moderate: restricted drainage; loamy fine sand.
Clairemont: Cm	Fair: silty clay loam.	Fair: fair traffic-supporting capacity.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.	Moderate: moderate permeability.	Severe: hazard of flooding.
Cobb: CoB	Fair: sandy clay loam.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Slight	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Moderate: bedrock at a depth of 20 to 40 inches.
Cosh: CsB	Fair: sandy clay loam.	Poor: 12 to 20 inches of material.	Severe: bedrock at a depth of 12 to 20 inches.	Severe: bedrock at a depth of 12 to 20 inches.	Severe: bedrock at a depth of 12 to 20 inches.	Severe: bedrock at a depth of 12 to 20 inches.	Severe: bedrock at a depth of 12 to 20 inches.
Enterprise: EnA, EnB	Good	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Moderate: low strength.	Slight	Severe: moderately rapid permeability.	Slight
Eufaula: EuD	Poor: fine sand.	Good	Slight	Slight if slope is 3 to 4 percent, moderate if 4 to 8 percent.	Slight	Severe: rapid permeability.	Severe: fine sand; rapid permeability.
Frio: Fr, Fs	Fair: silty clay loam.	Fair: moderate shrink-swell potential.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: moderately slow permeability; hazard of flooding.	Slight	Severe: hazard of flooding.

See footnotes at end of table.

interpretations

mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring the first column of this table]

Soil features affecting—						Corrosivity of uncoated steel
Farm ponds		Dikes and levees	Irrigation	Terraces and diversions	Waterways	
Reservoir areas	Embankments					
Moderate permeability	Fair resistance to piping and erosion.	(2)	Slopes	(2)	Slopes	Moderate: silty clay loam.
(2)	Fair slope stability.	Slopes erodible	Subject to soil blowing.	Subject to soil blowing and siltation.	Erodible; subject to sand duning.	High: sandy clay.
Moderate permeability	Fair resistance to piping and erosion.	Unstable embankments.	Subject to flooding.	Subject to flooding.	(2)	Moderate: silty clay loam.
Bedrock at a depth of 20 to 40 inches.	Bedrock at a depth of 20 to 40 inches.	Moderate permeability.	Sandstone restricts available water capacity and root development.	Cuts expose sandstone in places.	Cuts expose sandstone in places.	Low.
Bedrock at a depth of 12 to 20 inches.	Bedrock at a depth of 12 to 20 inches.	Bedrock at a depth of 12 to 20 inches.	Sandstone at a depth of 12 to 20 inches; restricts available water capacity.	Sandstone at a depth of 12 to 20 inches.	Sandstone at a depth of 12 to 20 inches.	Low.
Moderately rapid permeability.	Poor resistance to piping and erosion.	Erosive; steep slopes.	High intake rate; moderate available water capacity.	Erosive; siltation hazard.	Erosive; siltation hazard.	Low.
Rapid permeability	Poor slope stability; poor resistance to piping and erosion.	Fine sand	Low available water capacity; high intake rate.	Fine sand	Fine sand	Low.
Moderately slow permeability.	Moderate: fair resistance to piping and erosion.	Fair stability on steep slopes.	Slow intake rate; hazard of flooding.	Not applicable; hazard of flooding.	Not applicable; hazard of flooding.	High: silty clay.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as a source of—		Degree of limitations and soil features affecting—				
	Topsoil	Road fill	Local roads and streets	Light industry	Septic-tank filter fields	Sewage lagoons	Sanitary landfill [1]
Grandfield:							
GrB	Poor: loamy fine sand.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Slight	Slight	Moderate: moderate permeability.	Slight
GsC	Fair: fine sandy loam at a depth of 9 to 13 inches.	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Slight	Slight	Moderate: moderate permeability.	Slight
Hardeman: HaC, HaE	Good	Fair: fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Slight if slope is 3 to 4 percent, moderate if 4 to 8 percent, severe if 8 to 12 percent.	Slight if slope is 3 to 8 percent, moderate if 8 to 12 percent.	Severe: moderately rapid permeability.	Severe: moderately rapid permeability.
Hensley: HeB	Fair: clay loam.	Poor: 12 to 20 inches of material.	Severe: bedrock at a depth of 12 to 20 inches.	Severe: bedrock at a depth of 12 to 20 inches.	Severe: bedrock at a depth of 12 to 20 inches.	Severe: bedrock at a depth of 12 to 20 inches.	Severe: bedrock at a depth of 12 to 20 inches.
Hollister: HoA	Fair: clay loam.	Poor: high shrink-swell potential.	Severe: high shrink-swell potential; poor traffic-supporting capacity.	Severe: high shrink-swell potential.	Severe: slow permeability.	Slight	Severe: clay.
Kamay: KaA, KaB	Fair: silt loam at a depth of 8 to 10 inches. Poor: silt loam at a depth of 5 to 8 inches.	Poor: poor traffic-supporting capacity; high shrink-swell potential.	Severe: high shrink-swell potential.	Severe: high shrink-swell potential.	Severe: very slow permeability.	Slight if slope is 0 to 2 percent, moderate if 2 to 3 percent.	Severe: clay.
*Lincoln: Lc For Yahola part, see Yahola series.	Poor: silt loam at a depth of 4 to 8 inches.	Good	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: rapid permeability.	Severe: hazard of flooding.
Lindy: LdA, LdB	Fair: clay loam.	Poor: low strength.	Severe: low strength.	Moderate: moderate shrink-swell potential.	Severe: bedrock at a depth of 21 to 40 inches.	Severe: bedrock at a depth of 21 to 40 inches.	Severe: bedrock at a depth of 21 to 40 inches; clay.
*Lueders: LtD For Throck part, see Throck series.	Poor: coarse fragments of about 10 to 20 percent.	Poor: bedrock at a depth of 7 to 20 inches.	Severe: bedrock at a depth of 7 to 20 inches.	Severe: bedrock at a depth of 7 to 20 inches.	Severe: bedrock at a depth of 7 to 20 inches.	Severe: bedrock at a depth of 7 to 20 inches.	Severe: bedrock at a depth of 7 to 20 inches.
Mangum: Ma	Poor: clay	Poor: high shrink-swell potential.	Severe: high shrink-swell potential; hazard of flooding.	Severe: high shrink-potential; hazard of flooding.	Severe: very slow permeability; hazard of flooding.	Slight	Severe: clay.

See footnotes at end of table

interpretations—Continued

Soil features affecting—						Corrosivity of uncoated steel
Farm ponds		Dikes and levees	Irrigation	Terraces and diversions	Waterways	
Reservoir areas	Embankments					
Moderate permeability	Moderate: slope stability.	Moderate: slope stability.	Moderate permeability; seepage loss in ditches.	Undulating topography.	Erosive; accumulation hazard from blowing.	Moderate: sandy clay loam
Moderate permeability	Moderate: slope stability.	Moderate: slope stability.	Moderate permeability; seepage loss in ditches.	Undulating topography.	Erosive; accumulation hazard from blowing.	Moderate: sandy clay loam.
Moderately rapid permeability.	Fair resistance to piping and erosion.	Moderate: seepage.	High intake rate.	Erosive; unstable outlets.	Erosive	Low.
Bedrock at a depth of 12 to 20 inches.	Bedrock at a depth of 12 to 20 inches.	Bedrock at a depth of 12 to 20 inches.	Slow intake rate; limestone at a depth of 12 to 20 inches.	Cuts may expose limestone.	Cuts may expose limestone.	High: clay.
(2)	High shrink-swell potential.	High shrink-swell potential.	Slow intake rate.	(2)	(2)	High: clay.
(2)	High shrink-swell potential.	High shrink-swell potential.	Slow intake rate.	Hazard of ponding: cuts may expose dense clay.	Cuts may expose dense clay.	High: clay.
Rapid permeability	Moderate resistance to piping and erosion.	Fine sand	Hazard of flooding.	Hazard of flooding.	Hazard of flooding.	Low.
Bedrock at a depth of 21 to 40 inches.	Limited fill material.	Moderate shrink-swell potential; bedrock at a depth of 21 to 40 inches.	Slow intake rate; limestone restricts root development.	Cuts may expose limestone.	Cuts may expose limestone.	High: clay.
Bedrock at a depth of 7 to 20 inches.	Bedrock at a depth of 7 to 20 inches.	Bedrock at a depth of 7 to 20 inches.	Bedrock at a depth of 7 to 20 inches.	Bedrock at a depth of 7 to 20 inches.	Bedrock at a depth of 7 to 20 inches.	High: conductivity.
(2)	Fair: slope stability.	High shrink-swell potential; hazard of cracking.	Slow intake rate.	Hazard of flooding.	Dense clay; difficult to vegetate.	High: clay.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as a source of—		Degree of limitations and soil features affecting—				
	Topsoil	Road fill	Local roads and streets	Light industry	Septic-tank filter fields	Sewage lagoons	Sanitary landfill [1]
Mereta: MeB, MeC	Fair: clay loam.	Fair: moderate shrink-swell potential; fair traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Moderate: moderate shrink-swell potential.	Severe: slow permeability; cemented caliche at a depth of 14 to 22 inches.	Severe: cemented caliche at a depth of 14 to 22 inches.	Severe: cemented caliche at a depth of 14 to 22 inches.
Miles: MfA, MfB	Fair: fine sandy loam at a depth of 8 to 16 inches. Poor: fine sandy loam at a depth of 6 to 8 inches.	Fair: traffic-supporting capacity.	Moderate: fair traffic-supporting capacity.	Slight	Slight	Moderate: moderate permeability.	Slight
*Owens: OsF, OvD. For Vernon part of OvD, see Vernon series.	Poor: clay; surface contains 35 to 70 percent stones.	Poor: high shrink-swell potential; surface contains 35 to 70 percent stones.	Severe: high shrink-swell potential; surface contains 35 to 70 percent stones.	Severe: slope; high shrink-swell potential.	Severe: very slow permeability.	Moderate if slope is 5 to 7 percent, severe if 7 to 45 percent.	Severe: clay.
Randall: Ra	Poor: clay.	Poor: high shrink-swell potential.	Severe: high shrink-swell potential; hazard of flooding.	Severe: hazard of flooding; high shrink-swell potential.	Severe: very slow permeability.	Slight	Severe: hazard of flooding; clay.
Rotan: RoA	Fair: clay loam.	Poor: high shrink-swell potential.	Severe: high shrink-swell potential.	Severe: high shrink-swell potential.	Severe: moderately slow permeability.	Slight	Moderate: clay loam.
Rowena: RwA, RwB	Fair: clay loam.	Poor: high shrink-swell potential.	Severe: high shrink-swell potential.	Severe: high shrink-potential.	Severe: moderately slow permeability.	Slight	Severe: clay.
Sagerton: SaA, SaB	Fair: clay loam.	Fair: fair traffic-supporting capacity; moderate shrink-swell potential.	Moderate: fair traffic-supporting capacity; moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Severe: moderately slow permeability.	Slight if slope is 0 to 2 percent, moderate if 2 to 3 percent.	Moderate: clay loam.
Throck. Mapped only in a complex with the Lueders series.	Fair: silty clay loam.	Fair: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential; fair traffic-supporting capacity.	Moderate: moderate shrink-swell potential; slopes.	Severe: slow permeability.	Slight if slope is 1 to 2 percent, moderate if 2 to 7 percent, severe if 7 to 8 percent.	Severe: silty clay.
Tillman: TlA, TlB	Fair: clay loam.	Poor: high shrink-swell potential.	Severe: high shrink-swell potential.	Severe: high shrink-swell potential.	Severe: slow permeability.	Slight if slope is 0 to 2 percent, moderate if 2 to 3 percent.	Severe: clay.

See footnotes at end of table.

interpretations—Continued

Soil features affecting—						Corrosivity of uncoated steel
Farm ponds		Dikes and levees	Irrigation	Terraces and diversions	Waterways	
Reservoir areas	Embankments					
Excessive seepage	Limited material.	Erosive if slopes are steep; susceptible to piping.	Limited root zone; slow intake rate.	Cuts may expose caliche.	Cuts may expose caliche; difficult to vegetate.	High: conductivity.
Moderate permeability	Moderate: erosive.	Erosive on steep slopes.	High seepage loss in ditches.	(2)	Hazard of accumulation from soil blowing.	Moderate: sandy clay loam.
Stones on surface	Fair slope stability; stones on surface.	Slopes; stones	Slopes; stones	Slopes; stones	Slopes; erosive	High: clay.
(2)	Fair stability; very high shrink-swell potential.	Hazard of cracking; very high shrink-swell potential.	Slow intake rate; subject to ponding.	Hazard of flooding; depressed area.	Hazard of flooding; depressed area.	High: clay; poorly drained.
Moderately slow permeability.	Fair resistance to piping and erosion.	High shrink-swell potential.	Slow intake rate.	Hazard of ponding in level terraces.	Cuts may expose clay.	High: clay.
Moderately slow permeability.	Fair slope stability.	High shrink-swell potential.	Slow intake rate.	Hazard of ponding in level terraces.	Cuts may expose clay.	High: clay.
Moderately slow permeability.	Fair resistance to piping and erosion.	Fair resistance to piping and erosion.	Slow intake rate.	Hazard of ponding in level terraces.	Cuts may expose clay.	High: clay.
(2)	Fair resistance to piping and erosion.	Slopes	Slopes	Slopes	Slopes	High: clay.
(2)	Fair slope stability.	Hazard of cracking.	Very slow intake rate.	Unstable outlets; hazard of ponding.	Difficult to vegetate.	High: clay.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as a source of—		Degree of limitations and soil features affecting—				
	Topsoil	Road fill	Local roads and streets	Light industry	Septic-tank filter fields	Sewage lagoons	Sanitary landfill [1]
Tobosa: ToA, ToB	Poor: clay	Poor: high shrink-swell potential.	Severe: high shrink-swell potential.	Severe: high shrink-swell potential.	Severe: very slow permeability.	Slight if slope is 0 to 2 percent, moderate if 2 to 3 percent.	Severe: clay.
Vernon: VeB, VeD	Poor: clay	Poor: high shrink-swell potential.	Severe: high shrink-swell potential.	Severe: high shrink-swell potential.	Severe: very slow permeability.	Slight if slope is 1 to 2 percent, moderate if 2 to 7 percent, severe if 7 to 8 percent.	Severe: clay.
Winters: WnA, WnB	Fair: loam at a depth of 8 to 12 inches.	Fair: fair traffic-supporting capacity.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Moderate: moderately slow permeability.	Slight if slope is 0 to 2 percent, moderate if 2 to 3 percent.	Moderate: sandy clay.
Yahola: Ya	Good	Fair: fair traffic-supporting capacity.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: moderately slow permeability.	Severe: hazard of flooding.

[1] Onsite deep studies of the underlying strata, the water table, and the hazards of aquifer pollution and drainage into ground water need to be made for landfills deeper than 5 or 6 feet.
[2] All features favorable.

Depth to bedrock is the distance from the surface of the soil to the upper surface of the rock layer.

Soil texture is described in table 5 in the standard terms used by the Department of Agriculture. These terms take into account the relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added; for example, "gravelly loamy sand." "Sand," "silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary of this soil survey.

Permeability is that quality of a soil that enables it to transmit water or air. It is estimated on the basis of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 5 do not take into account lateral seepage or such transient soil features as plowplans and surface crusts. These ratings should not be equated with the coefficient of permeability (K) as used by engineers.

Available water capacity is the capability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at wilting point of most plants.

Reaction is the degree of acidity or alkalinity of a soil expressed in pH value. The pH value and terms used to describe soil reaction are explained in the Glossary.

Shrink-swell potential is the relative change in volume to be expected of soil material with changes in moisture content; that is, the extent to which the soil shrinks as it dries out or swells when it gets wet. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A *high* shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with materials that have this rating.

Hydrologic soil groups give the runoff potential from rainfall. The soil groups are classified A, B, C, or D based on intake of water at the end of long-duration storms that occur after the soil has had prior wetting and an opportunity for swelling, and when the soil was without the protection of vegetation. Group A consists mainly of deep, well-drained to excessively drained sand or gravel. These soils have a high infiltration rate, even when wetted. They have a high rate of water transmission and a slow rate of runoff. Group B consists mainly of moderately deep to deep, moderately fine textured to moderately coarse textured, mod-

interpretations—Continued

Soil features affecting—						Corrosivity of uncoated steel
Farm ponds		Dikes and levees	Irrigation	Terraces and diversions	Waterways	
Reservoir areas	Embankments					
(2)	Fair slope stability.	High shrink-swell potential.	Very slow intake rate.	(2)	Erosive	High: clay.
(2)	Fair slope stability.	High shrink-swell potential.	Very slow intake rate.	Cuts may expose shale; hazard of ponding.	Cuts may expose shale; difficult to vegetate.	High: clay.
Moderately slow permeability.	(2)	(2)	Slow intake rate.	Unstable outlets.	(2)	Moderate: sandy clay loam.
Moderately rapid permeability.	Poor resistance to piping.	(2)	Moderately rapid permeability.	(2)	(2)	Low.

erately well drained to well drained soils. These soils have a moderate infiltration rate when wet and a moderate rate of water transmission. Group C consists mainly of soils with a layer that impedes downward movement of water or moderately fine textured to fine textured soils. These soils have a slow infiltration rate when wet and a slow rate of water transmission. Group D consists mainly of clay soils with a high swelling potential, a permanent high water table, a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very slow infiltration rate when wet and a very slow rate of water transmission.

Depth to seasonal high water table is the distance from the surface of the soil to the highest level that ground water reaches in the soil in most years. This is not a concern in Baylor County except for the Chaney and Randall soils where water ponds a few days after rainfall. This column was not included in the table.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil increases from a dry state, the material changes from a semisolid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material changes from a semisolid to a plastic state, and the liquid limit is the moisture content at which it changes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic. Liquid limit and plasticity index data are listed in table 7. This data is based on tests of soil samples.

Salinity refers to the amount of soluble salts in the soil. It is expressed as the electrical conductivity of the saturation extract in millimhos per centimeter at 25° C. Salinity affects the suitability of a soil for crop production, its stability when used as a construction material, and its corrosiveness to metals and concrete. Salinity is not a problem of any of the soils in Baylor County, so this column was not included in the table.

Engineering interpretations of soils

The estimated interpretations in table 6 are based on the engineering properties of soils shown in table 5, on test data for soils in this survey area and others nearby or adjoining, and on the experience of engineers and soil scientists with the soils of Baylor County. In table 6, ratings are used to summarize limitation or suitability of the soils for all listed purposes other than for dikes and levees, irrigation, waterways, and terraces and diversions. For these particular uses,

TABLE 7.—*Engineering*

Soil name and location	Parent material	Texas Report No.	Depth from surface	Mechanical analysis		
				Shrinkage—		
				Limit	Linear	Ratio
			Inches	*Percent*	*Percent*	*Percent*
Aspermont silty clay loam:						
6.6 miles southwest of Seymour, Texas, 100 feet south of Farm Road 2070, and 1.3 miles west of the junction with U.S. Highway 277. (Modal)	Clayey Permian redbeds.	70–100–R 70–101–R	8–18 18–40	18 18	8.3 8.3	1.79 1.79
Kamay silt loam:						
17 miles northeast of Seymour, Texas, 50 feet south of fence, and 0.2 mile east of entrance to Cowen Ranch on U.S. Highway 277. (Modal)	Clayey Permian redbeds.	70–109–R 70–110–R	18–39 52–68	13 12	15.5 14.0	2.01 2.03
Miles fine sandy loam:						
5.6 miles west northwest of Seymour, Texas; 1 mile north of the junction of Farm Road 1789 and U.S. Highway 82; west 0.5 mile, north 100 feet; in cultivated field. (Modal)	Loamy alluvium.	70–107–R 70–108–R	20–44 60–80	16 15	7.7 6.4	1.84 1.88
Winters loam:						
6 miles west southwest of Seymour, Texas; west for 1.1 miles on Farm Road 2070 from junction with U.S. Highway 277; north 1.1 miles, west 0.4 mile, north 0.25 mile, west 50 feet; in cultivated field. (Modal)	Loamy alluvium.	70–105–R 70–106–R	24–42 52–80	14 14	10.2 8.5	1.95 1.92

[1] Test performed by Texas Highway Department, Austin, Texas.
[2] Unified and AASHO classification made by SCS personnel.

table 6 lists those soil features not to be overlooked in planning, installation, and maintenance.

Soil limitations are indicated by the ratings slight, moderate, and severe. *Slight* means soil properties are generally favorable for the rated use, or, in other words, limitations are minor and easily overcome or modified by special planning and design. *Moderate* means soils have properties favorable for the rated use. Limitations can be overcome or modified with planning, design, or special maintenance. Some of these limitations can be tolerated. *Severe* means soil properties are so unfavorable and so difficult to correct or overcome as to require major soil reclamation, special designs, or intensive maintenance. For some uses, the rating of severe is divided to obtain ratings of severe and very severe.

Soil suitability is rated by the terms *good, fair,* and *poor,* which have, respectively, meanings approximately the same as the terms slight, moderate, and severe.

The following are explanations of the columns in table 6.

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, as, for example, when preparing a seedbed; by the natural fertility of the material or the response of plants when fertilizer is applied; and by the absence of substances toxic to plants. Texture of the soil material and the content of stone fragments are characteristics that affect suitability. Also considered in the ratings is damage that will result to the area from which topsoil is taken.

Road fill is soil material used in embankments for roads. The suitability ratings reflect the predicted performance of the soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage, and the relative ease of excavating the material at borrow areas.

Local roads and streets, as rated in table 6, have an all-weather surface expected to carry automobile traffic all year. They have a subgrade of underlying soil material; a base consisting of gravel, crushed rock, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. These roads are graded to shed water and have ordinary provisions for drainage. They are mainly built from soil at hand, and most cuts and fills are less than 6 feet deep. Soil properties that most affect design and construction of roads and streets are load-supporting capacity and stability of the subgrade, and the workability and quantity of available cut and fill material. The AASHO and Unified classifications of the soil material, and also the shrink-swell potential, indicate load-supporting capacity. Wetness and flooding affect stability of the material. Slope, depth to hard rock, content of stones and rocks, and wetness affect ease of excavation and amount of cut and fill needed to reach an even grade.

Ratings for *light industry* are for undisturbed soils that are used to support building foundations. Emphasis is on foundations, ease of excavation for under-

test data [1]

Mechanical analysis—Continued									Liquid limit	Plasticity index	Classification [2]	
Percentage passing sieve—						Percentage smaller than—					AASHO	Unified
¾ in	⅜ in	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.74 mm)	0.05 mm	0.005 mm	0.002 mm				
									Percent			
------	100	96	91	87	79	70	46	31	34	17	A-6(11)	CL
100	99	95	91	87	79	68	48	28	34	18	A-6(11)	CL
------	------	100	97	94	88	79	43	37	46	29	A-7-6(17)	CL
------	------	---------	100	98	91	84	52	41	40	26	A-6(14)	
------	------	---------	100	96	62	49	22	20	31	16	A-6(8)	CL
100	98	96	94	90	72	59	25	17	26	13	A-6(8)	CL
------	------	100	99	92	71	----------	----------	----------	33	19	A-6(11)	CL
------	100	99	98	84	53	----------	----------	----------	36	16	A-6(6)	CL

ground utilities, and corrosion potential of uncoated steel pipe. The undisturbed soil is rated for spread footing foundations for buildings less than three stories high or foundation loads not in excess of that weight. Properties affecting load-supporting capacity and settlement under load are wetness, flooding, texture, plasticity, density, and shrink-swell potential. Properties affecting excavation are wetness, flooding, slope, and depth to bedrock. Properties affecting corrosion of buried uncoated steel pipe are wetness, texture, total acidity, and electrical resistivity.

Septic-tank filter fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into natural soil. The soil material between depths of 18 inches to 6 feet is evaluated. The soil properties considered are those that affect both absorption of effluent and construction and operation of the system. Properties that affect absorption are permeability, depth to water table or rock, and susceptibility to flooding. Slope is a soil property that affects difficulty of layout and construction and also the risk of soil erosion, lateral seepage, and downslope flow of effluent. Large rocks or boulders increase construction costs.

Sewage lagoons are shallow ponds constructed to hold sewage within a depth of 2 to 5 feet long enough for bacteria to decompose the solids. A lagoon has a nearly level floor and sides, embankments, or compacted soil material. The assumption is made that the embankment is compacted to medium density and the pond is protected from flooding. Properties are considered that affect the pond floor and the embankment. Those that affect the pond floor are permeability, organic matter, and slope. If the floor needs to be leveled, depth to bedrock becomes important.

Sanitary landfill provides a method of disposing of refuse in dug trenches. The waste is spread in thin layers, compacted, and covered with soil throughout the disposal period. Landfill areas are subject to heavy vehicular traffic. Some soil properties that affect suitability for landfill are ease of excavation, hazard of polluting ground water, and trafficability. The best soils have moderately slow permeability, withstand heavy traffic, and are friable and easy to excavate. Unless otherwise stated, the ratings in table 6 apply only to a depth of about 6 feet. Limitation ratings of *slight* or *moderate* may not be valid if trenches are to be much deeper than that. For some soils, reliable predictions can be made to a depth of 10 or 15 feet. Every site, however, should be investigated before it is selected.

Farm-pond reservoir areas hold water behind a dam or embankment. Soils suitable for pond reservoir areas have low seepage, which is related to their permeability and depth to fractured or permeable bedrock or other permeable material.

Farm-pond embankments are raised structures of soil material constructed across drainageways in order to impound water. These embankments generally are less than 20 feet high, are constructed of "homogeneous" soil material and compacted to medium density. Embankments that have core- and shell-type construction are not rated in this table. Embankment founda-

tion, reservoir area, and slope are assumed to be suitable for pond construction. Soil properties are considered that affect the embankment and the availability of borrow material. The best soils have stable slopes, slow permeability, slight compressibility under load, and good resistance to piping and erosion. The best borrow material is free of stones or rocks and is thick enough for easy excavation.

Dikes and levees require soil material that is resistant to seepage and piping and of favorable stability, shrink-swell potential, shear strength, and compactibility. Presence of stones or organic material in a soil is among the factors that are unfavorable.

Irrigation of a soil is affected by such features as slope; susceptibility to flooding, water erosion, or soil blowing; soil texture; content of stones; accumulations of salts and alkali; depth of root zone; rate of water intake at the surface; permeability of soil layers below the surface layer and in fragipans or other layers that restrict movement of water; amount of water held available to plants; and need for drainage, or depth to water table or bedrock.

Terraces and diversions are embankments, or ridges, constructed across the slope to intercept runoff so that it soaks into the soil or flows slowly to a prepared outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock or other unfavorable material; presence of stones; permeability; and resistance to water erosion, soil slipping, and soil blowing. A soil suitable for these structures provides outlets for runoff and is not difficult to vegetate.

Waterways are either natural or shaped channels seeded with grass to carry runoff water without causing erosion. The suitability of a soil for grassed waterways is determined by the hazard of erosion; the amount of shaping that can be done, which in turn depends on slope, stoniness, and depth to bedrock; and the difficulty in establishing vegetation.

Corrosivity, as used in table 6, pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. Rate of corrosion of uncoated steel is related to soil properties such as drainage, texture, total acidity, and electrical conductivity of the soil material. Corrosivity for concrete is mainly influenced by the content of sodium or magnesium sulfate but also by soil texture and acidity. Installations of uncoated steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely in one kind of soil or in one soil horizon. A corrosivity rating of *low* means that there is a low probability of soil-induced corrosion damage. A rating of *high* means that there is a high probability of damage and that protective measures for steel and more resistant concrete should be used to avoid or minimize damage. The soils in Baylor County are rated only for uncoated steel.

Soil test data

Table 7 shows engineering test data for some of the major soil series in Baylor County. These tests were made to help evaluate the soils for engineering purposes. The engineering classifications given are based on data obtained by mechanical analyses and by tests to determine liquid limits and plastic limits. The mechanical analyses were made by combined sieve and hydrometer methods.

Shrinkage limit is the percentage of moisture at which shrinkage of soil material stops.

Linear shrinkage is the decrease in one dimension, expressed as a percentage of the original dimension, of the soil mass when the moisture content is reduced from the given value to the shrinkage limit.

Shrinkage ratio is the relation of change in volume of soil material to the water content of the soil material when at the shrinkage limit. The change in volume is expressed as a percentage of the air-dry volume of the soil material, and the water content is expressed as a percentage of the weight of the soil material when over-dry.

The shrinkage data (volume change) indicate the amount of shrinkage and swelling that is obtained from samples prepared at optimum moisture content and then subjected to drying and wetting. The total change that can occur in a specified soil is the sum of the values given for shrinkage and for swelling.

Tests to determine *liquid limit* and *plasticity index* measure the effect of water on the consistence of soil material, as has been explained for table 5.

Formation and Classification of the Soils

This section discusses the five factors of soil formation and the processes of horizon differentiation. It also classifies the soils by higher categories.

Factors of Soil Formation

The five major factors of soil formation are climate, living organisms, parent material, relief, and time. The soil that forms in one area differs from the soil in another area if there has been a difference in one or more of the major factors.

Climate

The climate of Baylor County is subtropical with dry winters and hot humid summers. It is uniform, but its effects have been modified locally by relief and runoff. Because the amount of rainfall is low and there are long, dry periods, soil formation is slow. The soils are seldom wet below the root zone. As a result, many have accumulated a horizon of calcium carbonate. Leaching has not removed free lime from the upper layers of Vernon, Aspermont, or other weakly formed soils.

Living organisms

Plants, micro-organisms, earthworms, and other forms of animal life are important in the formation of soils. The kinds and amounts of plants are determined partly by the climate and parent material. The vegetation in this county is mostly grass, but there are some brushy plants and small hardwood trees. The grasses are tall or short, depending on the kinds of soil. The

more sandy Grandfield, Hardeman, and Yahola soils support mid and tall grasses, while the more clayey Rotan, Rowena, and Tillman soils support short grasses.

The prairie type of vegetation contributes large amounts of organic matter to the soil. Grass, leaves, and stems fall on the surface, decay, and darken the surface. Roots decompose and distribute organic matter throughout the solum and provide food for earthworms and micro-organisms. Rodents offset the leaching of soluble minerals and destroy soil structure by mixing the soil material.

Man also has influenced soil formation by fencing the land and allowing it to be overgrazed, changing the vegetation, and clearing and plowing the soils for crops. He has clean harvested the crops and has not controlled runoff and soil blowing. Because of this, organic matter has been depleted, and silty and clay particles have been blown from the plow layer. Heavy machinery and untimely tillage have compacted the soils and slowed the infiltration of water and air.

Parent material

The soils of the Rolling Plains formed from six different kinds of parent material: ancient alluvial outwash, shale and clay from the Permian red beds, sandstone from the Permian red beds, and recent deposits of alluvium, limestone, and eolian materials.

Miles and Rotan soils are among those that formed from a mantle of ancient alluvial outwash. Areas of Vernon and Tillman soils are examples of those that formed over Permian shale and clay. Cobb and Cosh soils formed over sandstone. Clairemont and Yahola soils, which are on the flood plains of the major creeks, formed from recent alluvium. Enterprise, Hardeman, and Eufaula soils formed in eolian material. Hensley and Lueders soils formed over limestone.

Relief

Relief influences soil formation through its effects on drainage and runoff. If other factors of soil formation are equal, the degree of profile development depends on the amount of water that enters a soil. For example, Vernon and Aspermont soils, which are on sloping uplands, absorb less moisture and normally have a less well defined profile than Rotan soils, which are on nearly level upland flats. The formation of soils in areas where slope is steep is retarded by continuous erosion.

Relief also affects the kind and amount of vegetation on a soil. Soils that have north-facing slopes receive less sunlight than those that have south-facing slopes and, consequently, lose less moisture through evaporation. As a result, those that face north have denser vegetation and generally are more strongly developed. For the same reason, soils that face east are more fully formed than those that face west.

Time

The characteristics of soil are mainly determined by the length of time the soil-forming factors have been active. A long time generally is required for the formation of well-defined, genetically related horizons. Miles and Chaney soils are examples of soils that have been in place a long time and have approached equilibrium with their environment. They are mature, or "old," soils and show marked horizon differentiation. Examples of less developed soils are the Clairemont soils of the bottom lands.

Processes of Soil Formation

The processes involved in the formation of soil horizons in Baylor County are accumulation of organic matter, leaching of calcium carbonates and bases, and formation and translocation of silicate clay minerals. More than one of these processes have been active in most soils.

The accumulation of organic matter in the upper part of the profile has been important in the formation of an A1 horizon. The soils of Baylor County generally are low in organic-matter content because the matter decomposes rapidly.

Nearly all the soils of this county have been leached, to some degree, of carbonates and bases. Some soil scientists believe that the removal of bases precedes the translocation of silicate clay minerals. This leaching has contributed to the formation of horizons. For example, Miles soils have been leached of most carbonates and show distinct horizons. In contrast, Aspermont soils have not been leached as much and show less distinct horizon formation.

The translocation of clay minerals has contributed to horizon formation in Baylor County. The eluviated A horizon of some soils is lower in clay content than the B horizon, although the horizon generally has an accumulation of clay in pores and on ped surfaces. In the soils of this county, leaching of carbonates and soluble salts and the translocation of silicate clays are among the more important processes in horizon differentiation. Miles soils are examples of those in which silicate clays have accumulated in the B horizon.

Classification of the Soils

Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas such as countries and continents.

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Because this system is under continual study, readers interested in developments of the current system should search the latest literature available.

The current system of classification has six categories. Beginning with the broadest, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that soils of similar genesis, or mode of origin, are grouped together. In table 8, the soil series of Baylor County are placed in five categories of the current system. Classes of the current system are briefly defined in the following paragraphs.

ORDER.—Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are Entisols and Histosols, which occur in many different climates. Each order is named with a word of three or four syllables ending in *sol* (Ent-i-sol).

SUBORDER.—Each order is divided into suborders that are based mainly on those soil characteristics that seem to produce classes that have the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the order. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of waterlogging or soil differences that result from the climate or vegetation. The names of suborders have two syllables. The last syllable indicates the order. An example is *Aquent* (*Aqu,* meaning water or wet, and *ent* from Entisol).

GREAT GROUP.—Each suborder is divided into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark-colored surface horizons. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark-red and dark-brown colors associated with basic rocks, and the like. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is Haplaquents (*Hapl,* meaning simple horizons, *aqu* for wetness or water, and *ent* from Entisols).

SUBGROUP.—Great groups are divided into subgroups, one that represents the central (typic) segment of the group and others, called intergrades, that have properties of the group and also one or more properties of another great group, suborder, or order. Soil groups may also be made in those instances Subgroups may also be made in those instances where soil properties intergrade outside of the range of any great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Ustochrept (a typical Ustochrept).

FAMILY.—Soil families are separated within a subgroup mainly on the basis of properties important to the growth of plants or on the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, mineralogy, and so on that are used as family differentiae (see table 8). An example is the coarse-silty, mixed, thermic family of Typic Ustochrepts.

Additional Facts About the County

The first land survey was made in the southeastern section of the county in 1853. The first settlement was made in 1863 in the Round Timber community. Most of the early settlers in the 1860's and 1870's were ranchers who established large cattle ranches.

The highest population in Baylor County was 8,411 in 1910. The population was 7,027 in 1920, 7,418 in 1930, 7,755 in 1940, 6,875 in 1950, 5,893 in 1960, and 5,221 in 1970. Seymour, the county seat, had a population of 3,469 in 1970.

The county is served by four U.S. highways and three State highways that intersect in Seymour. The county is also served by the Fort Worth and Denver Railroad.

Climate [7]

The climate of Baylor County is subtropical with dry winters and hot humid summers. Tropical Maritime air masses play a dominant role in determining the climate of the area from April through October, while those air masses of polar origin largely control the climate from November through March. The range in annual extremes of temperature is wide. The average annual rainfall at Seymour is 26.21 inches, with approximately three-fourths of this amount falling during the warm season of April through October. Rainfall, which occurs mostly in the form of thundershowers, may vary considerably from month to month and from year to year. Since 1906, the wettest year of record was 1941, with a total of 47.96 inches. Only 13.05 inches fell in 1928, the driest year. The prevailing winds are southerly to southeasterly throughout the year, except in January and February, when northerly winds are more frequent. Seasonal variations in relative humidity are small; however, the diurnal range is significant. The average annual relative humidity is about 78 percent at 6:00 a.m., 49 percent at noon, and 46 percent at 6:00 p.m., Central Standard Time. Baylor County receives about 71 percent of the total possible sunshine annually. In an average year, thunderstorms occur on 46 days. The average annual lake evaporation is estimated at 65 inches.

In winter, surges of polar Canadian air are common but cold spells are brief and not severe. Cold fronts often are accompanied by strong gusty winds and sudden drops in temperature. The cloudiness associated with the frontal passages, however, dissipates quickly, and sunshine and southerly winds bring rapid warm-

[7] By ROBERT B. ORTON, climatologist for Texas, National Weather Service, U.S. Department of Commerce.

TABLE 8.—*Classification of soil series*

Series	Family	Subgroup	Order
Aspermont	Fine-silty, mixed, thermic	Typic Ustochrepts	Inceptisols.
Chaney [1]	Fine, mixed, thermic	Aquic Paleustalfs	Alfisols.
Clairemont	Fine-silty, mixed (calcareous), thermic	Typic Ustifluvents	Entisols.
Cobb [2]	Fine-loamy, mixed, thermic	Udic Haplustalfs	Alfisols.
Cosh	Loamy, mixed, thermic, shallow	Udic Rhodustalfs	Alfisols.
Enterprise	Coarse-silty, mixed, thermic	Typic Ustochrepts	Inceptisols.
Eufaula	Sandy, siliceous, thermic	Psammentic Paleustalfs	Alfisols.
Frio	Fine, mixed, thermic	Cumulic Haplustolls	Mollisols.
Grandfield	Fine-loamy, mixed, thermic	Udic Haplustalfs	Alfisols.
Hardeman	Coarse-loamy, mixed, thermic	Typic Ustochrepts	Inceptisols.
Hensley	Clayey, mixed, thermic	Lithic Rhodustalfs	Alfisols.
Hollister	Fine, mixed, thermic	Pachic Paleustolls	Mollisols.
Kamay	Fine, mixed, thermic	Typic Paleustalfs	Alfisols.
Lincoln	Sandy, mixed, thermic	Typic Ustifluvents	Entisols.
Lindy	Fine, mixed, thermic	Udic Haplustalfs	Alfisols.
Lueders	Loamy-skeletal, carbonatic, thermic	Lithic Calciustolls	Mollisols.
Mangum	Fine, mixed (calcareous), thermic	Vertic Ustifluvents	Entisols.
Mereta	Clayey, mixed, thermic, shallow	Petrocalcic Calciustolls	Mollisols.
Miles	Fine-loamy, mixed, thermic	Udic Paleustalfs	Alfisols.
Owens	Clayey, mixed, thermic, shallow	Typic Ustochrepts	Inceptisols.
Randall	Fine, montmorillonitic, thermic	Udic Pellusterts	Vertisols.
Rotan	Fine, mixed, thermic	Pachic Paleustolls	Mollisols.
Rowena	Fine, mixed, thermic	Vertic Calciustolls	Mollisols.
Sagerton	Fine, mixed, thermic	Typic Paleustolls	Mollisols.
Throck	Fine, mixed, thermic	Typic Ustochrepts	Inceptisols.
Tillman	Fine, mixed, thermic	Typic Paleustolls	Mollisols.
Tobosa	Fine, montmorillonitic, thermic	Typic Chromusterts	Vertisols.
Vernon	Fine, mixed, thermic	Typic Ustochrepts	Inceptisols.
Winters	Fine, mixed, thermic	Udic Paleustalfs	Alfisols.
Yahola	Coarse-loamy, mixed (calcareous), thermic	Typic Ustifluvents	Entisols.

[1] These soils are taxadjuncts to the Chaney series in that the Bt horizon is neutral in the upper part and alkaline in the lower part. Chaney soils range from medium acid to neutral in the Bt horizon. Use, management, and behavior are not affected by this difference.

[2] These soils are taxadjuncts to the Cobb series in that they are slightly redder than normal for the Cobb series. Use, management, and behavior are not affected by this difference.

ing. Sunshine is approximately 61 percent of the total possible during this season. Winter is a relatively dry period, and only about 14 percent of the total annual precipitation falls during the winter season. In places snow falls once or twice a month, but accumulations are rare.

Spring is a pleasant season. Rapid changes in the weather are experienced often in March. Precipitation increases in April, and thunderstorm activity reaches a peak in May. Occasionally, thunderstorms late in spring and early in summer are accompanied by destructive winds and hail. As the spring season progresses, cold fronts become weaker and temperature changes are moderate. March and April are the windiest months of the year.

In summer, daytime temperatures are hot, with only a few days when the maximum does not reach or exceed 90° F. Temperatures above 100° are not uncommon. June may have some very hot days; but thundershowers, occurring on an average of seven days during the month, tend to break the hot spells. Evaporative-type home air-conditioners operate effectively more than 90 percent of the time in July and August. Automotive air-conditioning is recommended for travel.

Fall is a most delightful season. Temperatures are moderate, winds are light, and fair weather persists. Fall is ideally suited for almost all types of outdoor activities except swimming.

The average length of the warm season (freeze-free period) at Seymour is 214 days. The average dates of the last occurrence of 32° or below in spring, and the first occurrence in fall, are April 3 and November 3, respectively. Table 9 gives the climatological summary for Baylor County.

Farming

Farming and ranching are the major agricultural enterprises in the county. About 69 percent of the county is used for range. Cows and calves are raised on most of the large ranches. They graze on native range.

Wheat, cotton, and grain sorghum are the main cash crops. Some alfalfa, peanuts, and guar are grown. Wheat is planted early in the fall and is grazed by stocker cattle during fall and winter and early in spring. The stocker cattle are taken off the wheat in sufficient time to make it a grain crop.

About 6,500 acres of cropland are irrigated in the county. Cotton, grain sorghum, and wheat are the main crops in these areas.

Glossary

ABC soil. A soil that has a complete profile, including an A, B, and C horizon.

AC soil. A soil that has an A and a C horizon but no B horizon. Commonly such soils are immature, as those developing from alluvium or those on steep, rocky slopes.

TABLE 9.—*Temperature*

[Data from Seymour (elevation 1,282 feet);

Month	Temperature				Precipitation			
	Average daily maximum	Average monthly maximum	Average daily minimum	Average monthly minimum	Average total	Probability of receiving—		
						0 or trace	0.5 inch or more	1.0 inch or more
	°F	°F	°F	°F	*Inches*	*Percent*	*Percent*	*Percent*
January	54.3	78.3	26.1	8.2	1.16	1	65	43
February	58.6	80.8	30.8	17.1	1.25	1	70	45
March	67.6	89.0	37.9	20.4	1.32	5	73	52
April	77.8	95.0	48.9	32.4	2.40	(1)	94	80
May	85.2	100.0	58.5	44.0	3.95	(1)	99	95
June	93.3	103.3	67.5	56.4	3.49	(1)	92	81
July	98.4	106.7	70.8	62.8	2.63	1	81	67
August	99.3	109.1	69.7	59.9	2.16	10	70	55
September	90.9	103.5	61.5	46.9	2.77	5	78	65
October	80.6	95.1	50.4	33.3	2.50	4	82	82
November	66.8	84.3	35.5	22.0	1.37	11	62	45
December	56.8	78.2	29.4	15.1	1.21	5	65	44
Year	77.5		48.7		26.21			

[1] Less than 1 percent.
[2] Less than ½ day.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Badlands. Areas of rough, irregular land where most of the surface is occupied by ridges, gullies, and deep channels. Land hard to traverse.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in many soils of warm-temperate areas, as in the Southwestern States. The material may consist of soft, thin layers in the soil or of hard, thick beds just beneath the solum, or it may be exposed at the surface by erosion.

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 clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

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

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

Complex, soil. A mapping unit consisting of different kinds of soils that occur in such small individual areas or in such an intricate pattern that they cannot be shown separately on a publishable soil map.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are —

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Decreaser. Any of the climax range plants most heavily grazed. Because they are the most palatable, they are first to be destroyed by overgrazing.

Deferred grazing. The practice of delaying grazing until range plants have reached a definite stage of growth, in order to increase the vigor of the forage and to allow the desirable plants to produce seed. Contrasts with continuous grazing and rotation grazing.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sud-

and precipitation data

based on records for the period 1939–68]

Precipitation—Continued									
Probability of receiving—Continued					Average number of days receiving—			Snow and sleet	
2.0 inches or more	3.0 inches or more	4.0 inches or more	5.0 inches or more	6.0 inches or more	0.1 inch or more	0.5 inch or more	1.0 inch or more	Average total	Maximum monthly
Percent	*Percent*	*Percent*	*Percent*	*Percent*				*Inches*	*Inches*
13	5	2	(1)	(1)	3	1	(2)	0.6	7.0
22	10	3	1	(1)	3	(2)	(2)	0.3	3.3
22	11	5	1	(1)	3	1	(2)	0.3	6.5
50	29	10	8	4	4	2	(2)	0	0
80	60	49	30	20	6	3	1	0	0
61	41	26	16	14	5	2	1	0	0
40	25	15	10	6	4	2	1	0	0
40	18	10	7	4	4	1	(2)	0	0
42	28	20	12	6	4	2	3	0	0
50	30	20	13	10	3	2	1	0	0
22	11	5	2	(1)	3	1	(2)	0	0
24	11	6	3	2	3	1	(2)	0.3	7.0
					45	18	7	1.5	7.0

den deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Flood plain. Nearly level land consisting of stream sediment that borders a stream and is subject to flooding unless protected artificially.

Genesis, soil. The manner in which a soil originates. Refers especially to the processes initiated by climate and organisms that are responsible for the development of the solum, or true soil, from the unconsolidated parent material, as conditioned by relief and age of landform.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rains. The distinction between gully and rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by normal tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage. V-shaped gullies result if the material is more difficult to erode with depth; whereas U-shaped gullies result if the lower material is more easily eroded than that above it.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Increasers. Species in the climax vegetation that increase in relative amount as the more desirable plants are reduced by close grazing; increasers commonly are shorter than decreasers, and some are less palatable to livestock.

Invaders. On range, plants that come in and grow after the climax vegetation has been reduced by grazing. Generally, in-

vader plants are those that follow disturbance of the surface. (Most weeds are "invaders.")

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state. In engineering, a high liquid limit indicates that the soil has a high content of clay and a low capacity for supporting loads.

Miscellaneous land type. A mapping unit for areas of land that have little or no natural soil; or that are too nearly inaccessible for orderly examination; or that occur where, for other reasons, it is not feasible to classify the soil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineralogical, and biological properties of the various horizons, and their thickness and arrangement in the soil profile.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Phase, soil. A subdivision of a soil, series, or other unit in the soil classification system made because of differences in the soil that affect its management but do not affect its classification in the natural landscape. A soil series, for example, may be divided into phases because of differences in slope, stoniness, thickness, or some other characteristic that affects its management but not its behavior in the natural landscape.

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

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

Range condition. The state of health or productivity of both soil and forage in a given range in terms of what productivity could or should be under normal climate and the best practical management. Condition classes generally recognized are—*excellent, good, fair,* and *poor.* The classification is based on the percentage of original, or climax, vegetation on the site as compared to what ought to grow on it if management were good.

Range site. An area of range where climate, soil, and relief are sufficiently uniform to produce a distinct kind of climax vegetation.

Reaction, soil. The degree of acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Only the upper part of this, modified by organisms and other soil-building forces, is regarded by soil scientists as soil. Most American engineers speak of the whole regolith, even to great depths, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on relatively steep slopes and in swelling clays, where there is marked change in moisture content.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that 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 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than .002 millimeter).

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to

flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil. A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which plants (specifically sunflower) wilt so much that they do not recover when placed in a dark, humid atmosphere.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and the soil series to which the mapping unit belongs. An explanation of capability classification begins on page 29. Other information is given in tables as follows:

Acreage and extent, table 1, page 7.
Predicted yields, table 2, page 36.
Wildlife suitability, table 3, page 42.
Recreational uses of soils, table 4, page 45.
Engineering uses of the soils, tables 5, 6, and 7, pages 46 through 59.

Map symbol	Mapping unit	Page	Capability unit: Dryland Symbol	Dryland Page	Capability unit: Irrigated Symbol	Irrigated Page	Range site: Name	Range site Page
AsB	Aspermont silty clay loam, 1 to 3 percent slopes	8	IIIe-5	32	------	--	Deep Hardland	38
AsC	Aspermont silty clay loam, 3 to 5 percent slopes	8	IVe-1	33	------	--	Deep Hardland	38
BoC	Badland and Owens soils, undulating	8	VIIs-1	34	------	--	----------	--
ChA	Chaney loamy fine sand, 0 to 1 percent slopes	10	IIe-2	30	IIe-1	34	Sandyland	40
Cm	Clairemont silt loam	10	IIc-2	30	I-2	34	Bottomland	38
CoB	Cobb fine sandy loam, 1 to 3 percent slopes	10	IIIe-4	32	------	--	Sandy Loam	40
CsB	Cosh fine sandy loam, 1 to 3 percent slopes	11	IIIe-7	33	------	--	Sandy Loam	40
EnA	Enterprise very fine sandy loam, 0 to 1 percent slopes	11	IIc-2	30	I-2	34	Mixedland	39
EnB	Enterprise very fine sandy loam, 1 to 3 percent slopes	11	IIe-3	31	IIe-2	34	Mixedland	39
EuD	Eufaula fine sand, 3 to 8 percent slopes	12	VIe-4	34	------	--	Sandyland Savannah	40
Fr	Frio silty clay loam	12	IIc-1	30	------	--	Valley	41
Fs	Frio silty clay loam, channeled	12	Vw-1	33	------	--	Bottomland	38
GrB	Grandfield loamy fine sand, 0 to 3 percent slopes	13	IIIe-6	33	IIIe-1	35	Sandyland	40
GsC	Grandfield fine sandy loam, 3 to 5 percent slopes	13	IIIe-8	33	------	--	Sandy Loam	40
HaC	Hardeman fine sandy loam, 3 to 5 percent slopes	13	IIIe-3	32	------	--	Sandy Loam	40
HaE	Hardeman fine sandy loam, 5 to 12 percent slopes	14	VIe-3	33	------	--	Sandy Loam	40
HeB	Hensley clay loam, 1 to 3 percent slopes	14	IIIe-2	32	------	--	Rolling Hills	39
HoA	Hollister clay loam, 0 to 1 percent slopes	15	IIc-1	30	I-1	34	Deep Hardland	38
KaA	Kamay silt loam, 0 to 1 percent slopes	15	IIIs-1	33	------	--	Tightland	41
KaB	Kamay silt loam, 1 to 3 percent slopes	15	IIIe-1	32	------	--	Tightland	41
Lc	Lincoln and Yahola soils, frequently flooded	16	Vw-2	33	------	--	Sandy Bottomland	39
LdA	Lindy clay loam, 0 to 1 percent slopes	16	IIs-2	32	------	--	Deep Upland	38
LdB	Lindy clay loam, 1 to 3 percent slopes	16	IIe-1	30	------	--	Deep Upland	38
LtD	Lueders-Throck complex, 1 to 8 percent slopes	17	VIe-2	33	------	--	Rolling Hills	39
Ma	Mangum clay	18	IIs-1	32	------	--	Clay Flat	38
MeB	Mereta clay loam, 1 to 3 percent slopes	19	IIIe-5	32	------	--	Rolling Hills	39
MeC	Mereta clay loam, 3 to 5 percent slopes	19	IVe-1	33	------	--	Rolling Hills	39

Map symbol	Mapping unit	Page	Capability unit: Dryland Symbol	Dryland Page	Irrigated Symbol	Irrigated Page	Range site: Name	Range site Page
MfA	Miles fine sandy loam, 0 to 1 percent slopes	20	IIe-4	31	IIe-3	34	Sandy Loam	40
MfB	Miles fine sandy loam, 1 to 3 percent slopes	20	IIIe-4	32	IIe-4	34	Sandy Loam	40
OsF	Owens stony clay, 5 to 30 percent slopes	21	VIe-1	33	------	--	Rocky Hills	39
OvD	Owens-Vernon association, rolling	21	VIe-1	33	------	--	Shallow Clay	41
Ra	Randall clay	22	VIw-1	34	------	--	----------	--
RoA	Rotan clay loam, 0 to 1 percent slopes	23	IIc-1	30	I-1	34	Deep Hardland	38
RwA	Rowena clay loam, 0 to 1 percent slopes	24	IIc-1	30	I-1	34	Deep Upland	38
RwB	Rowena clay loam, 1 to 3 percent slopes	24	IIe-1	30	------	--	Deep Upland	38
SaA	Sagerton clay loam, 0 to 1 percent slopes	25	IIc-1	30	I-1	34	Deep Hardland	38
SaB	Sagerton clay loam, 1 to 3 percent slopes	25	IIe-1	30	------	--	Deep Hardland	38
TlA	Tillman clay loam, 0 to 1 percent slopes	26	IIs-1	32	------	--	Deep Hardland	38
TlB	Tillman clay loam, 1 to 3 percent slopes	26	IIe-1	30	------	--	Deep Hardland	38
ToA	Tobosa clay, 0 to 1 percent slopes	27	IIs-1	32	------	--	Deep Upland	38
ToB	Tobosa clay, 1 to 3 percent slopes	27	IIe-1	30	------	--	Deep Upland	38
VeB	Vernon clay, 1 to 3 percent slopes	27	IVe-1	33	------	--	Shallow Clay	41
VeD	Vernon clay, 3 to 8 percent slopes	28	VIe-1	33	------	--	Shallow Clay	41
WnA	Winters loam, 0 to 1 percent slopes	29	IIc-1	30	I-1	34	Deep Hardland	38
WnB	Winters loam, 1 to 3 percent slopes	29	IIe-1	30	------	--	Deep Hardland	38
Ya	Yahola fine sandy loam	29	IIw-1	32	IIw-1	35	Sandy Bottomland	39

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