United States Department of Agriculture

Natural Resources Conservation Service

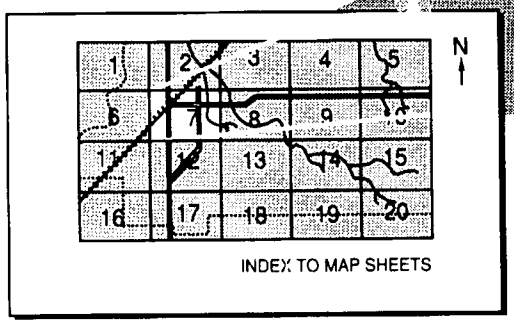
In cooperation with Missouri Department of Natural Resources, Missouri Agricultural Experiment Station, and Polk County Soil and Water Conservation District

Soil Survey of Polk County, Missouri

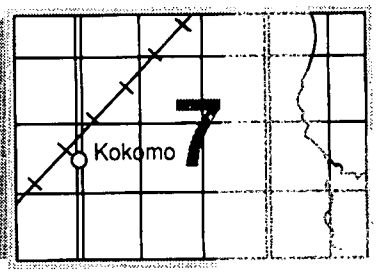
How to Use This Soil Survey

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

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet and turn to that sheet.



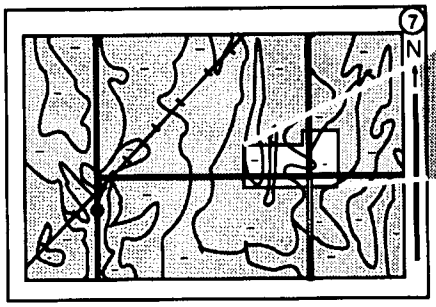
INDEX TO MAP SHEETS



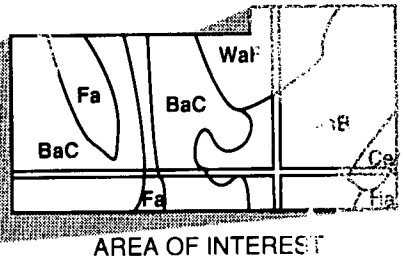
MAP SHEET

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

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly 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 1992. Soil names and descriptions were approved in 1993. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1993. This survey was made cooperatively by the Natural Resources Conservation Service, the Missouri Agricultural Experiment Station, and the Missouri Department of Natural Resources. The survey is part of the technical assistance furnished to the Polk County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Forage production is a major industry in Polk County as shown in an area of Bona soils.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

Issued 2000

Contents

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

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

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Roger A. Hansen
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Polk County, Missouri

By Larry E. Kichler, Natural Resources Conservation Service, and Richard L. Henderson, Missouri Department of Natural Resources

Fieldwork by Larry E. Kichler and Richard E. McBee, Natural Resources Conservation Service; and Richard L. Henderson and John E. Bowers, Missouri Department of Natural Resources

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the Missouri Department of Natural Resources, the Missouri Agricultural Experiment Station, and the Polk County Soil and Water Conservation District

POLK COUNTY is in the southwestern part of Missouri (fig. 1). It is bordered on the north by St. Clair and Hickory Counties, on the east by Dallas County, on the south by Greene County, and on the west by Dade and Cedar Counties. It has a total area of 411,296 acres, or about 642 square miles, including 4,199 acres of water in areas over 40 acres in size. Bolivar, the county seat, is in the central part of the county. In 1990, Bolivar had a population of 6,845, and the population of Polk County was 21,826 *(13)*.

Polk County is mostly in the Ozark Border area. However, small areas of the northwest corner and northeast part of the county are in the Ozark Highland area of the east and central Farming and Forest Region of the United States *(21)*.

This survey updates the soil survey of Polk County published in 1926. It defines the soil boundaries more clearly and provides more detailed information about the soils.

Figure 1.—Location of Polk County in Missouri

General Nature of the County

This section describes climate, history and development, and relief and drainage in Polk County.

Climate

Prepared by the Natural Resources Conservation Service, Climatic Data Access Facility, Portland, Oregon

Table 1 gives data on temperature and precipitation for the survey area as recorded at Bolivar in the period 1960 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 34 degrees F and the average daily minimum temperature is 23 degrees. The lowest temperature on record, which occurred at Bolivar on February 9, 1979, is -19 degrees. In summer, the average temperature is 77

degrees and the average daily maximum temperature is 90 degrees. The highest recorded temperature, which occurred at Bolivar on July 14, 1946, is 116 degrees.

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

The total annual precipitation is 39 inches. Of this, 25 inches, or 65 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 9.10 inches at Bolivar on October 3, 1986. Thunderstorms occur on about 49 days each year, and most occur in summer.

The average seasonal snowfall is 19.5 inches. The greatest snow depth at any one time during the period of record was 14 inches. On the average, 16 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 75 percent. Humidity is higher at night, and the average at dawn is about 75 percent. The sun shines 70 percent of the time possible in summer and 75 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 12 miles per hour, in spring.

History and Development

Prepared by Richard E. McBee, soil scientist, Natural Resources Conservation Service

The area of southwest Missouri that is now Polk County, which was inhabited by the Osage and Delaware Indians, was founded in the beginning of the nineteenth century *(8)*.

There are indications that the area was visited by settlers as early as 1820; however, there is little trace and no authentic records *(12)*. In 1832-33, Ezekiel Campbell and his brother, W. C. Campbell, along with several neighbors from Tennessee, settled in the Sac River basin southwest of the present site of Bolivar *(8)*.

In 1835, Polk County was created out of northern portions of Greene County. In 1845, it was reduced to its present size, giving up area to the counties of Dade, Cedar, St. Clair, Hickory, Dallas, and Webster *(8)*.

The area's natural resources, its many springs and clear streams, and its abundance of wild game, consisting of buffalo, deer, bear, wild turkey, and the many smaller species, all made the area attractive to early settlers, who at first lived mostly off of the abundance of the land *(8)*.

Prior to the Civil War, wheat and corn were the chief crops. The raising of livestock, including beef cattle, horses, milk cows, poultry, and sheep were major contributors to earning a living. The nearest markets were to be found in Springfield, which served as the major provider for the frontier towns of southwest Missouri, northern Arkansas, and eastern Kansas and Oklahoma *(6)*.

Through the early 1900's, the typical farms remained very diversified. Income was derived from the sale of cream, beef, hogs, mules, sheep, eggs, fruit, firewood, and other products. In addition, farmers produced a significant amount of grain, mainly for their own livestock. In the 1930's, after the farmers started to sell whole milk instead of only cream, dairying became the most significant enterprise. Dairy cattle numbers reached a peak in the period from 1930 through 1940. In 1990, the county ranked fourth in the state in numbers of dairy cows *(13)*.

Beef cattle production has remained significant throughout the history of the county. It is dependent upon the quality of forage production. After 1950, the number of beef cattle began to increase. In 1990, the county ranked fifth in the state in number of beef cattle *(13)*.

During the early 1900's, grain production, corn, oats, and wheat, successively, were the dominant crops. By 1960, acreage devoted to grain cropping began to give way more and more to hay (fig. 2) and pasture. Harvested acreage dropped from 17,000 in 1960 to 250 in 1980 *(12)*.

After the native grasses disappeared, redtop and timothy were the dominant grasses until tall fescue became well established in the 1960's. After 1940, orchardgrass, small grain cut for hay, red clover, and sorghum were significant forage crops. Lespedeza production started in the 1930's and was extremely important until the 1950's. Alfalfa was popular by 1950 and very productive until the early 1970's when the alfalfa weevil cut production. During the past 20 years or more, tall fescue has dominated the countryside. In recent years, alfalfa, red clover, ladino clover, small grain for silage, orchardgrass, and sorghum-sudan hybrids have all played a significant role in hay and pasture production.

During the period 1925 to 1987, the number of

Figure 2.—An area of Creldon silt loam, 1 to 3 percent slopes. Polk County is ranked second in the state in hay production.

farms decreased from 3,375 to 1,613. The average size of the farms increased from 112 acres to 210 acres *(12)*.

Relief and Drainage

Polk County consists of a rolling plain, which slopes gently to the northwest. A broad, smooth upland divide between the two major rivers in the county, the Pomme de Terre and the Little Sac, extends from the northwest part of the county near the city of Humansville southeastward into Greene County. Other similar areas of very gently sloping upland are the areas south and east of the town of Halfway and small areas around the communities of Polk, Huron, and Sentinel. The steeply sloping more dissected parts of the county are in belts along the streams, especially along the two major rivers.

The smooth upland areas of the county contain many low mounds. Blue Mound, near the Dallas County line southeast of the town of Halfway, has the highest elevation at 1,328 feet. Several other mounds approach this elevation. Most notable of these are Goodnight, Henley, and Lucas Knobs in the southeast corner of the county. The lowest point in Polk County is in the north central area. This point is the normal pool elevation of Pomme de Terre Lake at 839 feet. The normal pool elevation of Stockton Lake in the southwest part of the county is 869 feet.

The Pomme de Terre River enters the county in the

southeast corner. It traverses across the county and drains most of the eastern and northern areas before forming the headwaters of Pomme de Terre Lake in the north. The northeast portion of the county is drained by Lindley Creek. It enters in the northeast from Dallas County and exits to the north. The Little Sac River is the other major river system in the county. It enters from the south central area and provides drainage for the southwest quarter before merging into Stockton Lake. The west central and northwest part of the county are drained by Bear Creek and several smaller creeks that originate in Polk County.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

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

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

1. Viraton-Ocie-Gatewood Association

(fig. 3)

Setting

Landform: Ridge and hill
Slope range: 2 to 35 percent

Composition

Extent of the association:
42 percent of the survey area
Extent of the soils in the association:
Viraton and similar soils—29 percent
Ocie and similar soils—24 percent
Gatewood and similar soils—10 percent

Minor soils

- Plato soils on broad summits
- Pomme soils on strath terraces
- Hartville soils on footslopes
- Moko soils on steep back slopes
- Racket and Cedargap soils on narrow drainageways

Landscape

Viraton

Position on landform: Summits and shoulder slopes
Parent material: Loess over local colluvium over residuum from cherty dolostone
Slope: Gently sloping and moderately sloping

Ocie

Position on landform: Summits, shoulder slopes and back slopes
Parent material: Local colluvium over residuum from dolostone
Slope: Moderately sloping to steep

Gatewood

Position on landform: Shoulder slopes and back slopes
Parent material: Local colluvium over residuum from dolostone
Slope: Moderately sloping to steep

2. Goss-Alsup-Pomme Association

Setting

Landform: Ridge and hill
Slope range: 3 to 35 percent

Composition

Extent of the association:
35 percent of the survey area
Extent of the soils in the association:
Goss and similar soils—32 percent
Alsup and similar soils—15 percent
Pomme and similar soils—12 percent

Minor soils

- Pembroke soils on summits
- Peridge soils on strath terraces
- Hartville soils on footslopes
- Sacville soils on back slopes
- Racket and Cedargap soils on narrow drainageways

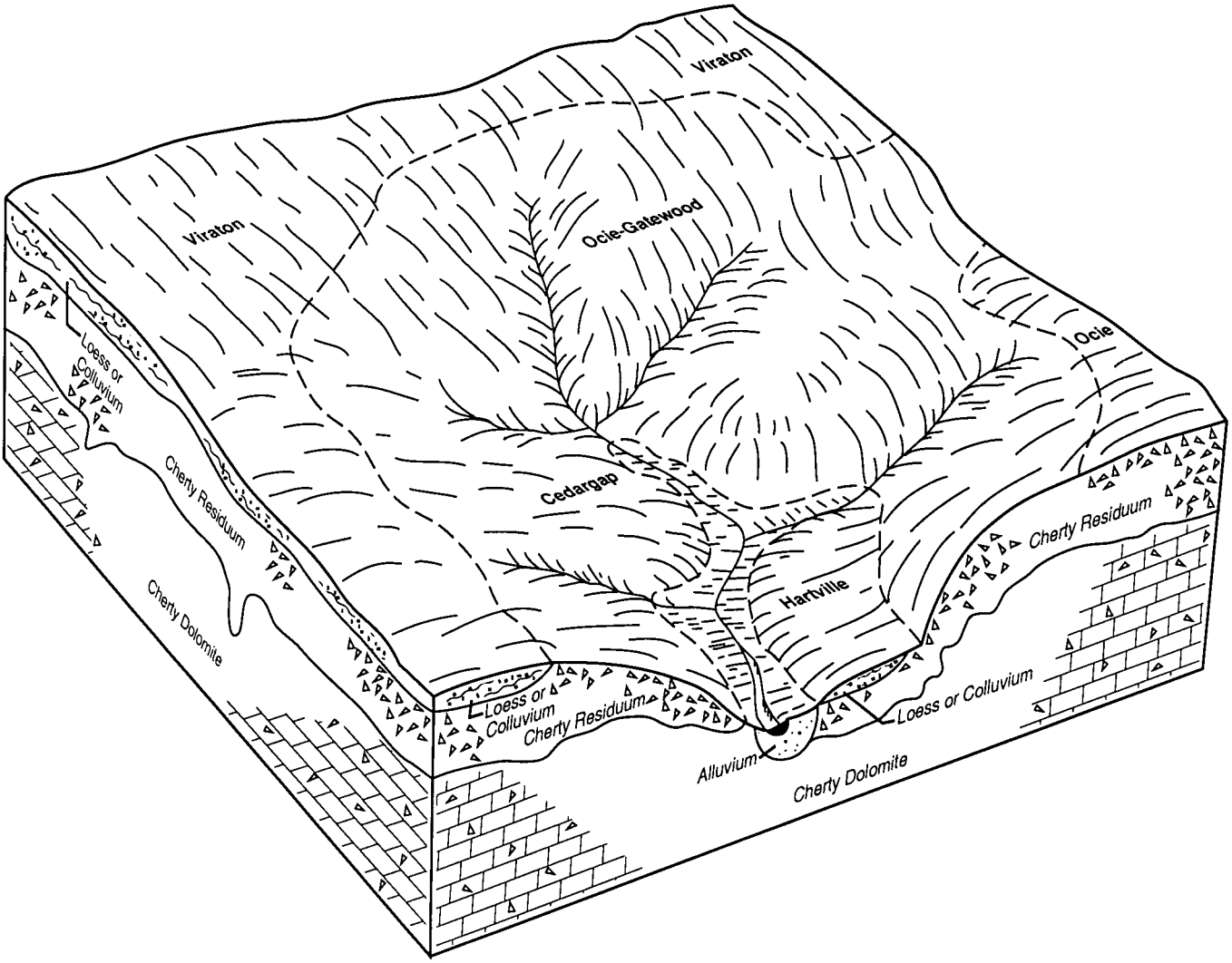


Figure 3.—Typical pattern of soils and parent material in the Viraton-Ocie-Gatewood association.

Landscape

Goss

Position on landform: Summits, shoulder slopes and back slopes
Parent material: Local colluvium over residuum from cherty limestone
Slope: Gently sloping to steep

Alsup

Position on landform: Shoulder slopes, back slopes and foot slopes
Parent material: Local colluvium over residuum from shale and siltstone
Slope: Gently sloping to steep

Pomme

Position on landform: Shoulder slopes and back slopes
Parent material: Loess over local colluvium over residuum from cherty limestone
Slope: Gently sloping and moderately sloping

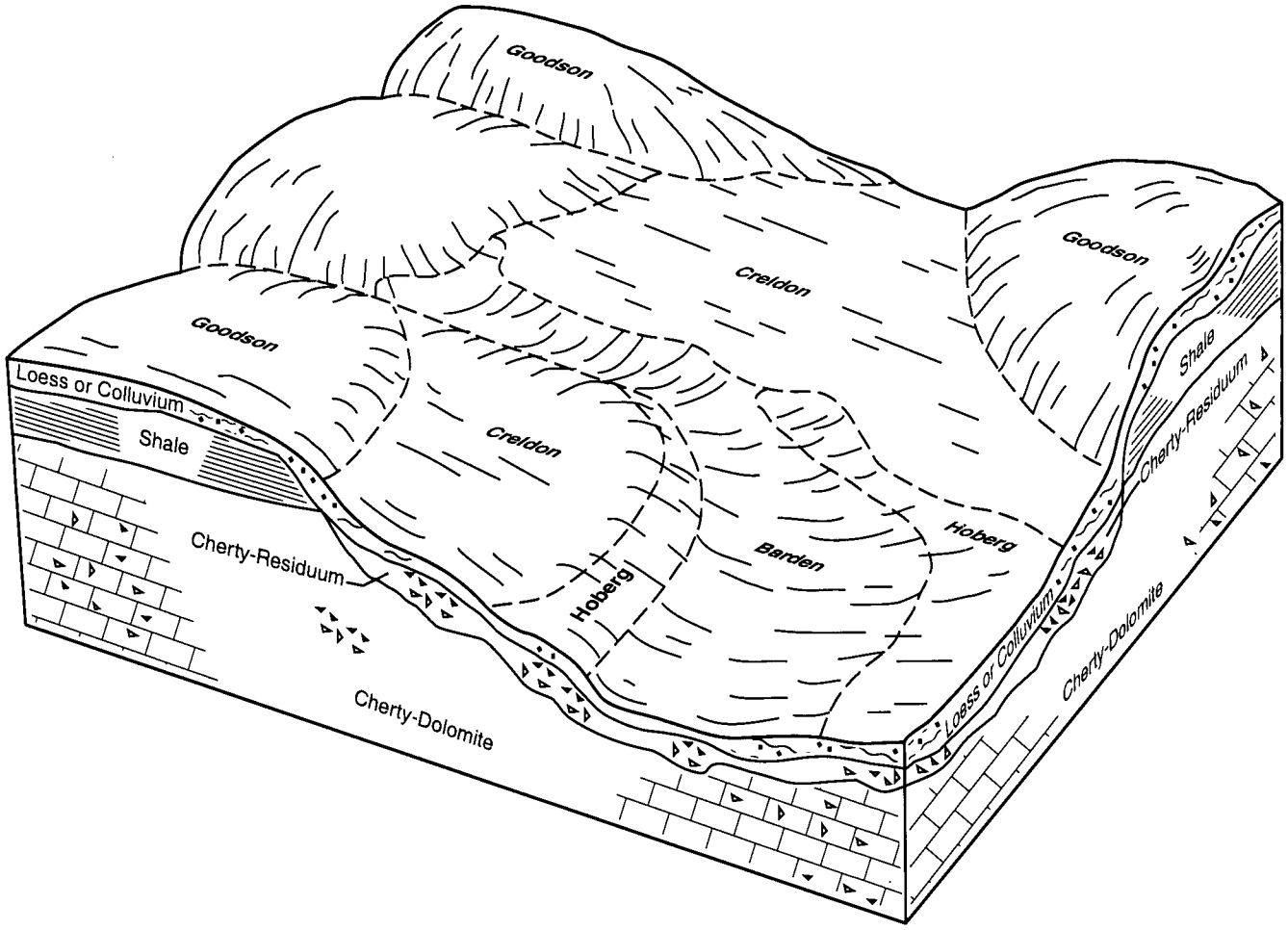


Figure 4.—Typical pattern of soils and parent material in the Goodson-Creldon-Barden association.

3. Goodson-Creldon-Barden Association

(fig. 4)

Setting

Landform: Ridge and hill
Slope range: 1 to 15 percent

Composition

Extent of the association:
11 percent of the survey area
Extent of the soils in the association:
Goodson and similar soils—30 percent
Creldon and similar soils—18 percent
Barden and similar soils—10 percent

Minor soils

- Bona soils on summits and backslopes
- Pomme soils on strath terraces
- Hoberg soils on summits and shoulders
- Liberal soils on back slopes
- Bolivar soils on summits and backslopes
- Humansville soils on flood plains

Landscape

Goodson

Position on landform: Summits, shoulder slopes and back slopes
Parent material: Loess over local colluvium over residuum from shale
Slope: Gently sloping and moderately sloping

Creldon

Position on landform: Summits
Parent material: Loess over residuum
Slope: Nearly level

Barden

Position on landform: Summits and shoulder slopes
Parent material: Loess
Slope: Gently sloping

4. Hoberg-Bona-Creldon Association

(fig. 5)

Setting

Landform: Ridge and hill
Slope range: 1 to 15 percent

Composition

Extent of the association:
9 percent of the survey area
Extent of the soils in the association:
Hoberg and similar soils—35 percent
Bona and similar soils—30 percent
Creldon and similar soils—15 percent

Minor soils

- Barden soils on broad summits
- Goodson soils on back slopes
- Pembroke soils on summits and shoulder slopes
- Humansville soils on flood plains
- Racket soils on narrow drainageways

Landscape

Hoberg

Position on landform: Summits and shoulder slopes

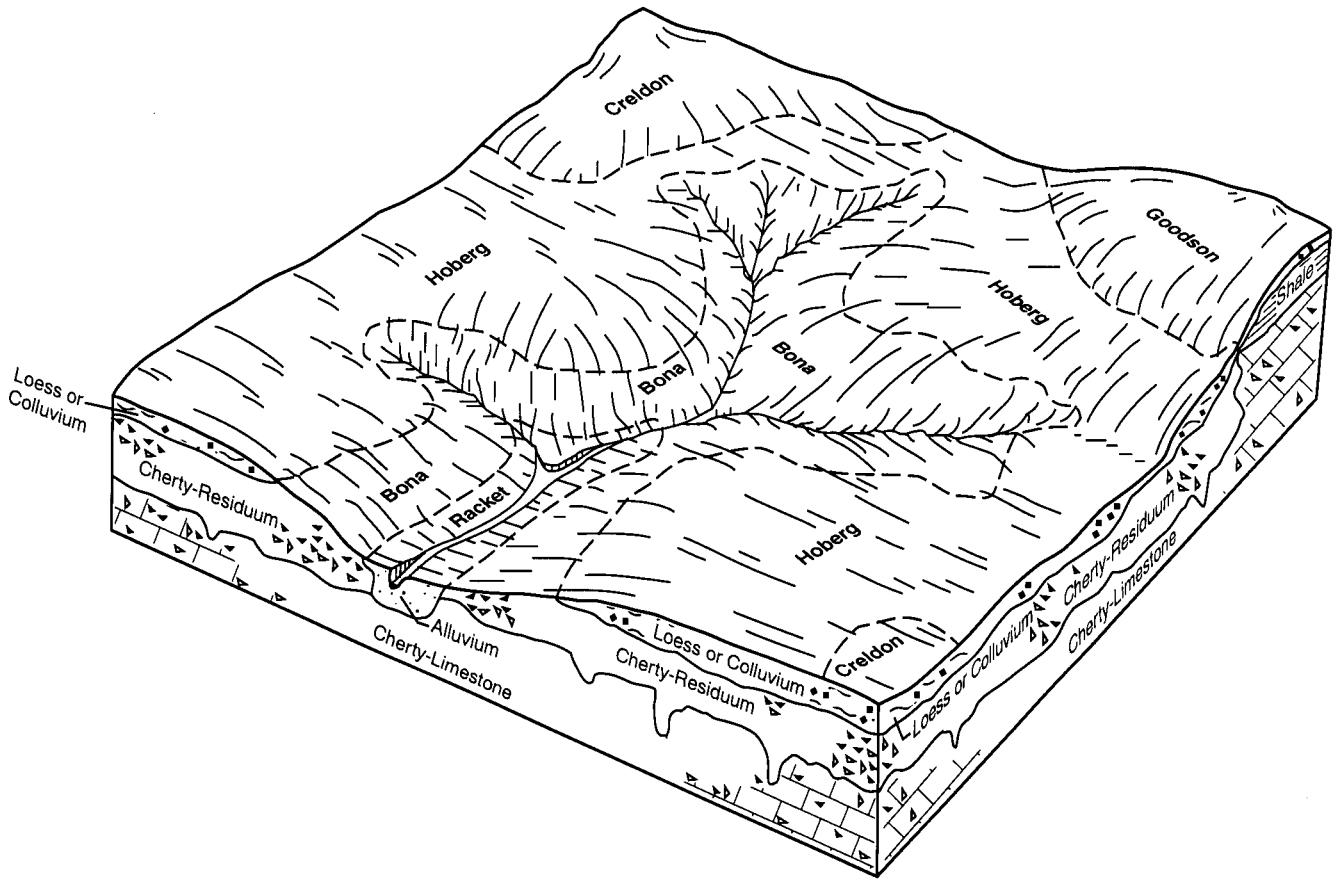


Figure 5.—Typical pattern of soils and parent material in the Hoberg-Bona-Creldon association.

Parent material: Loess over residuum from cherty limestone
Slope: Gently sloping

Bona

Position on landform: Summits, shoulder slopes and back slopes
Parent material: Local colluvium over residuum from Limestone
Slope: Gently sloping to strongly sloping

Creldon

Position on landform: Summits
Parent material: Loess over residuum
Slope: Nearly level

5. Sturkie-Moniteau-Horsecreek Association (fig. 6)

Setting

Landform: Flood plain and stream terrace
Slope range: 0 to 2 percent

Composition

Extent of the association:
2 percent of the survey area
Extent of the soils in the association:
Sturkie and similar soils—60 percent
Moniteau and similar soils—17 percent
Horsecreek and similar soils—12 percent

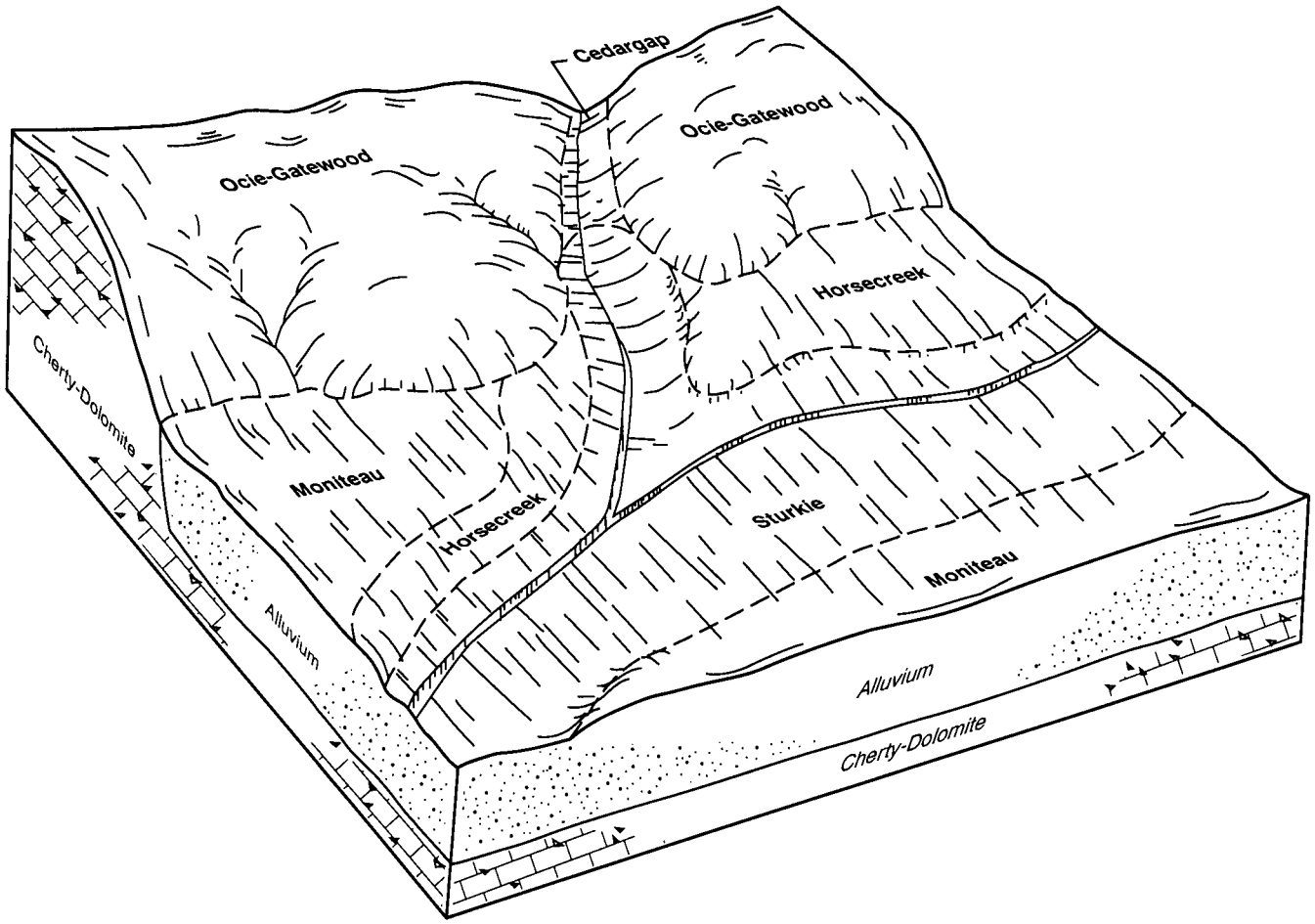


Figure 6.—Typical pattern of soils and parent material in the Sturkie-Moniteau-Horsecreek association.

Minor soils

- Humansville soils old stream channels
- Racket and Cedargap soils on narrow drainageways

Landscape

Sturkie

Position on landform: Flood Plain
Parent material: Alluvium
Slope: Level and nearly level

Moniteau

Position on landform: Stream terrace
Parent material: Alluvium
Slope: level to nearly level

Horsecreek

Position on landform: Stream terrace
Parent material: Alluvium
Slope: Level to nearly level

6. Bolivar-Cliquot Association

Setting

Landform: Ridge and hill
Slope range: 3 to 15 percent

Composition

Extent of the association:
1 percent of the survey area
Extent of the soils in the association:
Bolivar and similar soils—40 percent
Cliquot and similar soils—30 percent

Minor soils

- Goss soils on back slopes
- Hartville soils on footslopes
- Basehor soils on shoulder and back slopes

Landscape

Bolivar

Position on landform: Summit and shoulder slopes
Parent material: Local colluvium over residuum from sandstone
Slope: Gently sloping and moderately sloping

Cliquot

Position on landform: Shoulder slopes and back slopes
Parent material: Local colluvium over residuum from shale and sandstone
Slope: Gently sloping to moderately sloping

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under the heading "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Bolivar loam, 3 to 8 percent slopes, is a phase of the Bolivar series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Ocie-Gatewood complex, 8 to 15 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarries, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

The descriptions, names, and delineations of the soils identified on the detailed soil maps of this survey do not fully agree with those in the surveys of adjacent counties published at a different date. Differences are the result of additional soil data, variations in the intensity of mapping, and correlation decisions that reflect local conditions. In some areas, combining small acreages of similar soils that respond to use and management in much the same way was more practical than mapping these soils separately.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

15000—Basehor fine sandy loam, 3 to 15 percent slopes

Setting

Landform: Ridge and hill on plateau
Position on the landform: Summit, shoulder, and backslope
Parent material: Residuum from sandstone over solid rock from sandstone

Composition

Basehor and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Very deep Cedargap soils on drainageways below Basehor soils
- Moderately well drained, moderately deep Gatewood soils which have more gravel and clay in the subsoil and are in landscape positions similar to those of the Basehor soils
- Soils that have more gravel or channers in the surface layer
- Moderately deep Bolivar soils that are deeper than 20 inches to bedrock and in landscape positions similar to those of the Basehor soils

Typical Profile

Surface layer:
0 to 6 inches—brown, very friable fine sandy loam

Subsurface layer:
6 to 11 inches—brown, very friable fine sandy loam
11 to 15 inches—yellowish brown, friable fine sandy loam
15 to 80 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Very shallow and shallow (4 to 20 inches)
Drainage class: Well drained
Permeability: Moderately rapid (2.0-6.0 inches/hour)
Available water capacity: Very low (0 to 3 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Low (0 to 3 percent)
Flooding: None
Water table: None

Interpretive Groups

Land capability class: VIs
Pasture and hayland suitability group: ShU
Woodland ordination symbol: 2D

15001—Basehor fine sandy loam, rocky, 15 to 35 percent slopes, very stony

Setting

Landform: Hill on plateau
Position on the landform: Backslope
Parent material: Residuum from sandstone over solid rock from sandstone

Composition

Basehor and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Very deep Cedargap soils on drainageways below Basehor soils
- Moderately well drained, moderately deep Gatewood soils which have more gravel and clay in the subsoil and are in landscape positions similar to those of the Basehor soils
- Soils that have more gravel or channers in the surface layer
- Moderately deep Bolivar soils that are deeper than 20 inches to bedrock and in landscape positions similar to those of the Basehor soils

Typical Profile

Surface layer:
0 to 2 inches—very dark grayish brown, friable fine sandy loam

Subsoil:
2 to 10 inches—dark grayish brown, friable fine sandy loam
10 to 16 inches—brown, friable gravelly fine sandy loam
16 to 80 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Very shallow and shallow (4 to 20 inches)
Drainage class: Well drained
Permeability: Moderately rapid (2.0-6.0 inches/hour)
Available water capacity: Very low (0 to 3 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Low (0 to 3 percent)
Flooding: None
Water table: None

Interpretive Groups

Land capability class: VIIs
Pasture and hayland suitability group: ShU
Woodland ordination symbol: 2R

15002—McGirk silt loam, 1 to 3 percent slopes

Setting

Landform: Hill on plateau
Position on the landform: Footslope
Parent material: Local colluvium

Composition

McGirk and similar soils—85 percent
Contrasting components of minor extent—15 percent

Minor Components

- Well drained Horsecreek soils which have less clay in the subsoil and are on low terraces in the flood plain
- Well drained Pomme soils which have more gravel in the subsoil and are on strath terraces above McGirk soils
- Sacville soils which have a deeper dark surface and are in landscape positions similar to those of the McGirk soils

Typical Profile

Surface layer:
0 to 4 inches—dark grayish brown, friable silt loam

Subsurface layer:
4 to 9 inches—grayish brown and dark grayish brown, friable silty clay loam

Subsoil:
9 to 60 inches—dark gray, mottled, firm silty clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Slow (0.06-0.2 inch/hour)
Available water capacity: High (9 to 12 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 6 to 18 inches

Interpretive Groups

Land capability class: IIe
Pasture and hayland suitability group: WCU
Woodland ordination symbol: 3W

40000—Barden silt loam, 1 to 3 percent slopes

Setting

Landform: Interfluve on plateau
Position on the landform: Footslope
Parent material: Loess over residuum from sandstone-shale

Composition

Barden and similar soils—80 percent
Contrasting components of minor extent—20 percent

Minor Components

- Creldon soils which have a fragipan and are in landscape positions similar to those of the Barden soils
- Poorly drained Sacville soils on shoulders and footslopes below Barden soils

Typical Profile

Surface layer:
0 to 8 inches—very dark grayish brown, friable silt loam

Subsoil:
8 to 16 inches—brown, mottled, firm silty clay
16 to 76 inches—grayish brown and light brownish gray, mottled, firm silty clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Slow (0.06-0.2 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 24 to 36 inches

Interpretive Groups

Land capability class: IIe
Pasture and hayland suitability group: CyU
Woodland ordination symbol: None assigned

40001—Bolivar loam, 3 to 8 percent slopes (fig. 7)

Setting

Landform: Ridge on plateau
Position on the landform: Summit and shoulder
Parent material: Residuum from sandstone over solid rock from sandstone

Composition

Bolivar and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Basehor soils that are less than 20 inches to bedrock and in landscape positions similar to those of the Bolivar soils
- Moderately well drained Ocie soils which have more gravel and clay in the subsoil and are on backslopes below Bolivar soils
- Moderately well drained Viraton soils which have a fragipan and are on summits above Bolivar soils

Figure 7.—Dairy cattle grazing in an area of Bolivar loam, 3 to 8 percent slopes.

Typical Profile

Surface layer:
0 to 9 inches—brown, friable loam

Subsoil:
9 to 25 inches—brown and reddish brown, friable loam
25 to 38 inches—yellowish red, firm sandy clay loam and channery sandy clay loam
38 to 42 inches—weathered bedrock
42 to 80 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: None

Interpretive Groups

Land capability class: IIIe
Pasture and hayland suitability group: MDU
Woodland ordination symbol: 3D

40002—Liberal silt loam, 3 to 8 percent slopes

Setting

Landform: Hill on plateau
Position on the landform: Backslope and footslope
Parent material: Local colluvium over residuum from shale-siltstone over solid rock from shale-siltstone

Composition

Liberal and similar soils—85 percent
Contrasting components of minor extent—15 percent

Minor Components

- Soils that are deeper than 60 inches to shale bedrock
- Poorly drained Sacville soils in areas below Liberal soils
- Goodson soils which have more gravel in the upper layers and are on backslopes above Liberal soils

Typical Profile

Surface layer:
0 to 4 inches—very dark grayish brown, friable silt loam

Subsurface layer:
4 to 9 inches—very dark gray, friable silt loam

Subsoil:
9 to 50 inches—brown, yellowish brown, and brownish yellow, mottled, firm silty clay loam and silty clay
50 to 55 inches—weathered bedrock
55 to 60 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Slow (0.06-0.2 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 24 to 36 inches

Interpretive Groups

Land capability class: IIIe
Pasture and hayland suitability group: CyU
Woodland ordination symbol: None assigned

46000—Humansville silt loam, 0 to 2 percent slopes, frequently flooded

Setting

Landform: Flood plain on river valley
Position on the landform: Former drainageways and depressions
Parent material: Alluvium

Composition

Humansville and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Well drained Horsecreek soils which have less clay in the subsoil and are on stream terraces above Humansville soils
- Well drained Sturkie soils which have less clay and more course material in the subsoil and are next to stream channels
- Moniteau soils which have lighter colored upper layers and are on stream terraces above Humansville soils

Typical Profile

Surface layer:
0 to 7 inches—very dark grayish brown, friable silt loam

Subsurface layer:
7 to 24 inches—very dark gray, firm silty clay loam

Subsoil:
24 to 60 inches—dark grayish brown and grayish brown, mottled, firm silty clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Moderately slow (0.2-0.6 inch/hour)
Available water capacity: High (9 to 12 inches)
Organic matter content: High (4 to 8 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: Frequent (more than a 50 percent chance in any year)
Water table: 6 to 18 inches

Interpretive Groups

Land capability class: IIIw
Pasture and hayland suitability group: WLO
Woodland ordination symbol: 9W

66000—Moniteau silt loam, 0 to 2 percent slopes, occasionally flooded

Setting

Landform: Stream terrace on river valley
Parent material: Alluvium

Composition

Moniteau and similar soils—85 percent
Contrasting components of minor extent—15 percent

Minor Components

- Well drained Sturkie soils which have a dark surface and are on flood plains below Moniteau soils
- Well drained Horsecreek soils in similar positions
- Humansville soils which have a dark surface and are in depressional areas below Moniteau soils

Typical Profile

Surface layer:
0 to 6 inches—dark grayish brown, friable silt loam

Subsurface layer:
6 to 18 inches—grayish brown, very friable silt loam

Subsoil:
18 to 27 inches—dark grayish brown, mottled, very friable silt loam
27 to 60 inches—grayish brown and gray, mottled, firm silty clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Moderately slow (0.2-0.6 inch/hour)
Available water capacity: Very high (more than 12 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: Occasional (5 to 50 percent chance in any year)
Water table: 0 to 12 inches

Interpretive Groups

Land capability class: IIIw
Pasture and hayland suitability group: WLB
Woodland ordination symbol: 4W

66001—Dameron silt loam, 0 to 3 percent slopes, frequently flooded

Setting

Landform: Flood plain on river valley
Parent material: Alluvium

Composition

Dameron and similar soils—100 percent
Contrasting components of minor extent—0 percent

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown, friable silt loam

Subsurface layer:
9 to 15 inches—very dark grayish brown, friable silty clay loam

Subsoil:
15 to 24 inches—dark brown, firm very gravelly clay loam
24 to 72 inches—very dark brown, firm silty clay loam and gravelly silty clay loam
72 to 80 inches—very dark brown, firm extremely gravelly clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: High (9 to 12 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: Frequent (more than a 50 percent chance in any year)
Water table: None

Interpretive Groups

Land capability class: IIIw
Pasture and hayland suitability group: LyO
Woodland ordination symbol: 5A

70000—Bona gravelly silt loam, 3 to 8 percent slopes

Setting

Landform: Ridge
Position on the landform: Summit and shoulder
Parent material: Local colluvium over residuum from cherty limestone over solid rock from limestone or dolostone

Composition

Bona and similar soils—85 percent
Contrasting components of minor extent—15 percent

Minor Components

- Moderately well drained Hoberg soils which have a fragipan and are on broader summits above Bona soils
- Poorly drained Sacville soils which have less gravel in the subsoil and are on backslopes below Bona soils
- Soils that have stones on the surface
- Soils that are less than 60 inches to bedrock

Typical Profile

Surface layer:
0 to 6 inches—very dark gray, friable gravelly silt loam

Subsurface layer:
6 to 18 inches—very dark grayish brown, friable very gravelly silt loam

Subsoil:
18 to 24 inches—dark brown, friable extremely gravelly silt loam
24 to 30 inches—yellowish red, firm very gravelly clay
30 to 72 inches—red, mottled lower part, firm clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow (0.2-0.6 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: None

Interpretive Groups

Land capability class: IIIe
Pasture and hayland suitability group: GrU
Woodland ordination symbol: None assigned

70001—Bona gravelly silt loam, 8 to 15 percent slopes

Setting

Landform: Hill on plateau
Position on the landform: Backslope
Parent material: Local colluvium over residuum from cherty limestone over solid rock from limestone or dolostone

Composition

Bona and similar soils—85 percent
Contrasting components of minor extent—15 percent

Minor Components

- Moderately well drained Hoberg soils which have a fragipan and are on broader summits above Bona soils
- Poorly drained Sacville soils which have less gravel in the subsoil and are on backslopes below Bona soils
- Soils that have stones on the surface
- Soils that are less than 60 inches to bedrock

Typical Profile

Surface layer:
0 to 7 inches—very dark gray, friable gravelly silt loam

Subsurface layer:
7 to 19 inches—very dark gray and brown, friable very gravelly silt loam

Subsoil:
19 to 24 inches—brown, firm very gravelly silty clay
24 to 45 inches—red and brown, very firm very gravelly clay
45 to 62 inches—red and strong brown, very firm clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow (0.2-0.6 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: None

Interpretive Groups

Land capability class: IVe
Pasture and hayland suitability group: GrU
Woodland ordination symbol: None assigned

70002—Alsup gravelly silt loam, 3 to 8 percent slopes

Setting

Landform: Ridge on plateau
Position on the landform: Summit and shoulder
Parent material: Local colluvium over residuum from shale-siltstone over solid rock from shale-siltstone

Composition

Alsup and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Well drained Pomme soils which have less clay in the subsoil and are on backslopes below Alsup soils
- Poorly drained Sacville soils on backslopes below Alsup soils
- Well drained Cedargap soils which have more chert gravel and less clay in the subsoil and are on adjacent flood plains
- Soils that are less than 40 inches to bedrock

Typical Profile

Surface layer:
0 to 4 inches—very dark grayish brown, friable gravelly silt loam

Subsurface layer:
4 to 13 inches—dark grayish brown and brown, friable gravelly silt loam

Subsoil:
13 to 30 inches—yellowish brown and brown, mottled, firm silty clay loam and very firm clay
30 to 44 inches—light brownish gray, mottled, firm silty clay and channery clay
44 to 54 inches—weathered bedrock

Soil Properties and Qualities

Depth to bedrock: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Moderately slow (0.2-0.6 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: 30 to 48 inches

Interpretive Groups

Land capability class: IIIe
Pasture and hayland suitability group: GrU
Woodland ordination symbol: 2A

70003—Alsup gravelly silt loam, 8 to 15 percent slopes

Setting

Landform: Hill on plateau
Position on the landform: Backslope
Parent material: Local colluvium over residuum from shale-siltstone over solid rock from shale-siltstone

Composition

Alsup and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Well drained Cedargap soils which have more chert gravel and less clay in the subsoil and are on adjacent flood plains
- Well drained Goss soils which have more chert gravel in the subsoil and are on backslopes above Alsup soils
- Well drained Moko soils which are shallow to bedrock and are on backslopes below Alsup soils

Typical Profile

Surface layer:
0 to 7 inches—dark grayish brown, very friable gravelly silt loam

Subsurface layer:
7 to 12 inches—light gray, very friable very gravelly silt loam

Subsoil:
12 to 40 inches—light yellowish brown and pale olive, mottled, very firm silty clay and clay
40 to 56 inches—yellow, very firm very gravelly and extremely gravelly silty clay loam
56 to 66 inches—weathered bedrock

Soil Properties and Qualities

Depth to bedrock: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Moderately slow (0.2-0.6 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: 30 to 48 inches

Interpretive Groups

Land capability class: VIe
Pasture and hayland suitability group: GrU
Woodland ordination symbol: 2A

70004—Alsup silt loam, 15 to 35 percent slopes, very stony

Setting

Landform: Hill on plateau
Position on the landform: Backslope
Parent material: Local colluvium over residuum from shale-siltstone over solid rock from shale-siltstone

Composition

Alsup and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Well drained Cedargap soils which have more chert gravel and less clay in the subsoil and are on adjacent flood plains
- Well drained Goss soils which have more chert gravel in the subsoil and are on backslopes above Alsup soils
- Well drained Moko soils which are shallow to bedrock and are on backslopes below Alsup soils
- Soils that have a gravelly or cobbly silt loam surface

Typical Profile

Surface layer:
0 to 4 inches—very dark brown, friable silt loam

Subsurface layer:
4 to 9 inches—light brownish gray, friable silt loam

Subsoil:
9 to 20 inches—strong brown, firm silty clay
20 to 41 inches—yellow and light yellowish brown, firm channery silty clay
41 to 46 inches—weathered bedrock

Soil Properties and Qualities

Depth to bedrock: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Moderately slow (0.2-0.6 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: 30 to 48 inches

Interpretive Groups

Land capability class: VIIe
Pasture and hayland suitability group: GrU
Woodland ordination symbol: 2R

70005—Blueye-Moko complex, 3 to 15 percent slopes

Setting

Landform: Ridge and hill on plateau
Position on the landform: Summit, shoulder, and backslope
Parent material: Local colluvium over clayey residuum over solid rock from dolomite

Composition

Blueye and similar soils—50 percent
Moko and similar soils—35 percent
Contrasting components of minor extent—15 percent

Minor Components

- Well drained Cedargap soils which have less clay in the subsoil, are very deep, and are on adjacent narrow flood plains
- Moderately well drained Viraton soils which have a fragipan and are on summits above Blueye and Moko soils
- Areas of rock outcrop on steeper slopes adjacent to Blueye and Moko soils

Typical Profile

Blueye

Surface layer:
0 to 9 inches—black, friable gravelly silt loam

Subsurface layer:
9 to 15 inches—very dark grayish brown, friable gravelly silty clay loam

Subsoil:
15 to 35 inches—yellowish brown, mottled lower part, firm gravelly clay and clay
35 to 80 inches—unweathered bedrock

Moko

Surface layer:
0 to 8 inches—very dark gray, friable gravelly silty clay loam

Subsurface layer:
8 to 15 inches—black, friable very channery clay loam
15 to 80 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Blueye—moderately deep (20 to 40 inches); Moko—very shallow and shallow (4 to 20 inches)
Drainage class: Well drained
Permeability: Blueye—slow (0.06-0.2 inch/hour); Moko—moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Blueye—low (3 to 6 inches); Moko—very low (0 to 3 inches)
Organic matter content: Blueye—moderate (2 to 4 percent); Moko—high (4 to 8 percent)
Shrink-swell potential: Blueye—high (6 to 9 percent); Moko—low (0 to 3 percent)
Flooding: None
Water table: None

Interpretive Groups

Land capability class: Blueye—VIe; Moko—VIs
Pasture and hayland suitability group: Blueye—MDU; Moko—ShU
Woodland ordination symbol: Blueye—2A; Moko—2X

70006—Creldon silt loam, 1 to 3 percent slopes (fig. 8)

Setting

Landform: Interfluve on plateau
Position on the landform: Summit
Parent material: Loess over local colluvium over residuum from cherty limestone

Composition

Creldon and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Poorly drained Sacville soils which do not have a fragipan and are on lower headslope positions
- Barden soils which do not have a fragipan and are in landscape positions similar to those of the Creldon soils

Figure 8.—An area of Creldon silt loam, 1 to 3 percent slopes, is used for hay production.

Typical Profile

Surface layer:
0 to 10 inches—very dark grayish brown, friable silt loam

Subsoil:
10 to 24 inches—brown, mottled, firm silty clay loam

24 to 51 inches—light brownish gray, yellowish red, strong brown, and brown, very firm, brittle gravelly silt loam and extremely cobbly silty loam fragipan
51 to 60 inches—strong brown and red, very firm clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Moderately slow above the fragipan (0.2-0.6 inch/hour); very slow in the fragipan (less than 0.06 inch/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 18 to 36 inches

Interpretive Groups

Land capability class: IIe
Pasture and hayland suitability group: LyP
Woodland ordination symbol: None assigned

70007—Cliquot gravelly loam, 8 to 15 percent slopes

Setting

Landform: Hill on plateau
Position on the landform: Backslope
Parent material: Local colluvium over residuum from sandstone-shale over solid rock from sandstone-shale

Composition

Cliquot and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Well drained Bolivar soils which have less clay in the subsoil, are less than 40 inches to bedrock, and are on summits above Cliquot soils
- Well drained Racket soils on adjacent flood plains
- Well drained Basehor soils that are less than 20 inches to bedrock and in landscape positions similar to those of the Cliquot soils
- Viraton soils which have a fragipan and are on summits above Cliquot soils

Typical Profile

Surface layer:
0 to 2 inches—brown, friable gravelly loam

Subsurface layer:
2 to 13 inches—yellowish brown, friable very gravelly and very channery fine sandy loam

Subsoil:
13 to 41 inches—strong brown, mottled, firm clay loam
41 to 60 inches—weathered bedrock

Soil Properties and Qualities

Depth to bedrock: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Slow (0.06-0.2 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 42 to 54 inches

Interpretive Groups

Land capability class: IVe
Pasture and hayland suitability group: GrU
Woodland ordination symbol: 3F

70008—Goss gravelly silt loam, 3 to 8 percent slopes

Setting

Landform: Ridge on plateau
Position on the landform: Summit and shoulder
Parent material: Local colluvium over residuum from cherty limestone or dolostone

Composition

Goss and similar soils—85 percent
Contrasting components of minor extent—15 percent

Minor Components

- Moderately well drained Viraton and Wilderness soils which have fragipans and are on summits above Goss soils
- Moko soils that are less than 20 inches to bedrock and are on backslopes below Goss soils
- Soils that have stones on the surface
- Pomme soils which have less gravel and clay in the subsoil and are in similar positions

Typical Profile

Surface layer:
0 to 6 inches—dark yellowish brown, friable gravelly silt loam

Subsurface layer:
6 to 10 inches—brown, friable very gravelly silt loam

Subsoil:
10 to 14 inches—brown, firm very gravelly silty clay loam
14 to 68 inches—red and dark red, very firm very gravelly clay
68 to 80 inches—strong brown, very firm clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: None

Interpretive Groups

Land capability class: IVe
Pasture and hayland suitability group: GrU
Woodland ordination symbol: 3F

70009—Goss gravelly silt loam, 8 to 15 percent slopes

Setting

Landform: Hill on plateau
Position on the landform: Backslope
Parent material: Local colluvium over residuum from cherty limestone or dolostone

Composition

Goss and similar soils—80 percent
Contrasting components of minor extent—20 percent

Minor Components

- Moderately well drained Alsup soils which have less gravel in the subsoil, are less than 60 inches to bedrock, and are on backslopes below Goss soils
- Moderately well drained Viraton and Wilderness soils which have fragipans and are on summits above Goss soils
- Poorly drained Sacville soils which have less gravel and are on backslopes below Goss soils
- Soils that have stones on the surface
- Pomme soils which have less gravel and clay in the subsoil and are on footslopes below Goss soils

Typical Profile

Surface layer:
0 to 4 inches—very dark grayish brown, very friable gravelly silt loam

Subsurface layer:
4 to 10 inches—light yellowish brown, very friable very gravelly silt loam

Subsoil:
10 to 16 inches—light brown, very friable very gravelly silt loam
16 to 60 inches—brown, yellowish red, and red, very firm very cobbly clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: None

Interpretive Groups

Land capability class: VIe
Pasture and hayland suitability group: GrU
Woodland ordination symbol: 3F

70010—Goss very cobbly silt loam, 15 to 35 percent slopes

Setting

Landform: Hill on plateau
Position on the landform: Backslope
Parent material: Local colluvium over residuum from cherty limestone or dolostone

Composition

Goss and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Pomme soils which have less gravel and clay in the subsoil and are on footslopes below Goss soils
- Moderately well drained Alsup soils which have less gravel in the subsoil, are less than 60 inches to bedrock, and are on backslopes below Goss soils

- Moko soils that are less than 20 inches to bedrock and are on backslopes below Goss soils
- Soils that have stones on the surface

Typical Profile

Surface layer:
0 to 3 inches—very dark brown, friable very cobbly silt loam

Subsurface layer:
3 to 15 inches—dark brown and brown, friable very cobbly silt loam

Subsoil:
15 to 21 inches—brown, firm very gravelly silty clay loam
21 to 60 inches—red and dark red, very firm very cobbly and very gravelly clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: None

Interpretive Groups

Land capability class: VIIe
Pasture and hayland suitability group: GrU
Woodland ordination symbol: 3R

70011—Goss-Moko complex, 8 to 35 percent slopes

Setting

Landform: Hill on plateau
Position on the landform: Backslope
Parent material: Local colluvium over residuum from cherty limestone or dolostone

Composition

Goss and similar soils—50 percent
Moko and similar soils—35 percent
Contrasting components of minor extent—15 percent

Minor Components

- Pomme soils which have less gravel and clay in the subsoil and are on footslopes below Goss soils
- Moderately well drained Viraton and Wilderness soils which have fragipans and are on summits above Goss and Moko soils
- Cedargap soils which have less clay in the subsoil and are on adjacent flood plains
- Soils that have areas of rock outcrop
- Soils that have stones on the surface

Typical Profile

Goss

Surface layer:
0 to 9 inches—very dark grayish brown, friable very gravelly silt loam

Subsurface layer:
9 to 21 inches—yellowish brown, friable very gravelly silt loam

Subsoil:
21 to 36 inches—strong brown, firm extremely gravelly silty clay loam and very gravelly clay
36 to 60 inches—red and yellowish red, very firm very gravelly clay

Moko

Surface layer:
0 to 2 inches—very dark brown, friable gravelly silt loam

Subsurface layer:
2 to 10 inches—very dark grayish brown, friable very cobbly silty clay loam
10 to 80 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Goss—very deep (more than 60 inches); Moko—very shallow and shallow (4 to 20 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Goss—low (3 to 6 inches); Moko—very low (0 to 3 inches)
Organic matter content: Goss—moderate (2 to 4 percent); Moko—high (4 to 8 percent)
Shrink-swell potential: Goss—moderate (3 to 6 percent); Moko—low (0 to 3 percent)
Flooding: None
Water table: None

Interpretive Groups

Land capability class: Goss—VIIe; Moko—VIIs
Pasture and hayland suitability group: Goss—GrU; Moko—ShU
Woodland ordination symbol: Goss—3R; Moko—2R

70012—Hoberg silt loam, 2 to 5 percent slopes (fig. 9)

Setting

Landform: Ridge on plateau
Position on the landform: Summit and shoulder
Parent material: Loess over local colluvium over residuum from cherty limestone

Composition

Hoberg and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Well drained Bona soils which do not have a fragipan and are on backslopes below Hoberg soils
- Creldon soils which have more clay in the subsoil and are on broader summits above Hoberg soils

Typical Profile

Surface layer:
0 to 7 inches—very dark grayish brown, friable silt loam

Subsurface layer:
7 to 17 inches—very dark grayish brown, friable silt loam

Figure 9.—Corn stubble in an area of Hoberg silt loam, 2 to 5 percent slopes.

Subsoil:
17 to 21 inches—brown, mottled, firm silt loam
21 to 27 inches—brown, mottled, firm silty clay loam
27 to 40 inches—light brown and reddish brown, mottled, very firm, brittle gravelly silt loam fragipan
40 to 60 inches—red and yellowish red, very firm gravelly clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan (0.6 inch-2.0 inches); slow in the fragipan (0.06-0.2 inch/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: 18 to 36 inches

Interpretive Groups

Land capability class: IIIe
Pasture and hayland suitability group: LyP
Woodland ordination symbol: 3D

70013—Moko very gravelly silt loam, 3 to 15 percent slopes

Setting

Landform: Ridge and hill on plateau
Position on the landform: Summit, shoulder, and backslope
Parent material: Residuum from dolostone or limestone over solid rock from dolostone or limestone

Composition

Moko and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Goss soils which are very deep and adjacent to Moko soils on the landscape
- Moderately well drained Gatewood soils which are moderately deep and adjacent to Moko soils on the landscape
- Areas of rock outcrop on steeper slopes adjacent to Moko soils
- Cedargap soils which are very deep and on narrow flood plains below Moko soils

Typical Profile

Surface layer:
0 to 7 inches—very dark gray, very friable very gravelly silt loam

Subsurface layer:
7 to 12 inches—very dark gray, friable very flaggy silt loam
12 to 80 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Very shallow and shallow (4 to 20 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Very low (0 to 3 inches)
Organic matter content: High (4 to 8 percent)
Shrink-swell potential: Low (0 to 3 percent)
Flooding: None
Water table: None

Interpretive Groups

Land capability class: VIs
Pasture and hayland suitability group: ShU
Woodland ordination symbol: 2X

70014—Moko-Rock outcrop complex, 15 to 35 percent slopes, very stony

Setting

Landform: Hill on plateau
Position on the landform: Backslope
Parent material: Residuum from dolostone or limestone over solid rock from dolostone or limestone

Composition

Moko and similar soils—55 percent
Rock outcrop—35
Contrasting components of minor extent—10 percent

Minor Components

- Goss soils which are very deep and adjacent to Moko soils on the landscape
- Moderately well drained Gatewood soils which are moderately deep and adjacent to Moko soils on the landscape
- Cedargap soils which are very deep and on narrow flood plains below Moko soils

Typical Profile

Moko

Surface layer:
0 to 5 inches—very dark gray, friable very gravelly clay loam

Subsurface layer:
5 to 13 inches—very dark grayish brown, friable extremely channery clay loam
13 to 80 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Moko—very shallow and shallow (4 to 20 inches); Rock outcrop—no data
Drainage class: Moko—well drained; Rock outcrop—no data
Permeability: Moko—moderate (0.6 inch-2.0 inches/hour); Rock outcrop—no data
Available water capacity: Moko—very low (0 to 3 inches); Rock outcrop—no data
Organic matter content: Moko—high (4 to 8 percent); Rock outcrop—no data
Shrink-swell potential: Moko—low (0 to 3 percent); Rock outcrop—no data
Flooding: None
Water table: None

Interpretive Groups

Land capability class: Moko—VIIs; Rock outcrop—none assigned
Pasture and hayland suitability group: Moko—ShU; Rock outcrop—none assigned
Woodland ordination symbol: Moko—2R; Rock outcrop—none assigned

70015—Pembroke silt loam, 2 to 5 percent slopes

Setting

Landform: Ridge or strath terrace on plateau
Position on the landform: Summit, shoulder, and footslope
Parent material: Loess over local colluvium over residuum from cherty limestone

Composition

Pembroke and similar soils—85 percent
Contrasting components of minor extent—15 percent

Minor Components

- Moderately well drained Hoberg soils which have a fragipan and are on summits above Pembroke soils
- Bona soils which have more clay and gravel in the subsoil and are on shoulders above Pembroke soils
- Soils that have bedrock within 60 inches of the surface

Typical Profile

Surface layer:
0 to 9 inches—dark brown, friable silt loam

Subsoil:
9 to 60 inches—yellowish red, dark red, and red firm silty clay loam and very gravelly clay lower part

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: High (9 to 12 inches)
Organic matter content: High (4 to 8 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: None

Interpretive Groups

Land capability class: IIe
Pasture and hayland suitability group: LyU
Woodland ordination symbol: 3A

70016—Goodson silt loam, 1 to 3 percent slopes

Setting

Landform: Ridge on plateau
Position on the landform: Summit and shoulder
Parent material: Loess over local colluvium over residuum from shale-siltstone

Composition

Goodson and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Poorly drained Sacville soils which are very deep and on drainageways below Goodson soils
- Some soils that have a firm, brittle subsoil
- Some soils that have gray colors in the upper subsoil
- Some soils that have more gravel in the surface layer

Typical Profile

Surface layer:
0 to 8 inches—very dark grayish brown, friable silt loam

Subsoil:
8 to 13 inches—brown, gravelly silt loam
13 to 43 inches—yellowish brown, mottled lower part, very firm silty clay
43 to 45 inches—weathered bedrock
45 to 80 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Moderately slow (0.2-0.6 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: High (4 to 8 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 30 to 48 inches

Interpretive Groups

Land capability class: IIe
Pasture and hayland suitability group: GrU
Woodland ordination symbol: None assigned

70017—Goodson gravelly silt loam, 3 to 8 percent slopes

Setting

Landform: Ridge on plateau
Position on the landform: Summit and shoulder
Parent material: Loess over local colluvium over residuum from shale-siltstone

Composition

Goodson and similar soils—95 percent
Contrasting components of minor extent—5 percent

Minor Components

- Poorly drained Sacville soils which are very deep and on drainageways below Goodson soils
- Soils that have a firm, brittle subsoil
- Soils that have gray colors in the upper subsoil
- Soils that have depth to bedrock less than 40 inches

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown, friable gravelly silt loam

Subsoil:
9 to 15 inches—brown, mottled, firm silty clay loam
15 to 22 inches—brown, mottled, firm clay
22 to 44 inches—brownish yellow, gray, and light olive gray, mottled, firm and very firm silty clay and silty clay loam
44 to 54 inches—weathered bedrock
54 to 80 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Moderately slow (0.2-0.6 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: High (4 to 8 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 30 to 48 inches

Interpretive Groups

Land capability class: IIIe
Pasture and hayland suitability group: GrU
Woodland ordination symbol: None assigned

70018—Goodson gravelly silt loam, 8 to 15 percent slopes

Setting

Landform: Hill on plateau
Position on the landform: Backslope
Parent material: Local colluvium over residuum from shale-siltstone

Composition

Goodson and similar soils—95 percent
Contrasting components of minor extent—5 percent

Minor Components

- Poorly drained Sacville soils which are very deep and on drainageways below Goodson soils
- Soils that have flagstones on the surface
- Soils that have gray colors in the upper subsoil
- Soils that have depth to bedrock less than 40 inches

Typical Profile

Surface layer:
0 to 7 inches—very dark gray, friable gravelly silt loam

Subsoil:
7 to 12 inches—brown, friable silty clay loam
12 to 23 inches—brown, mottled, very firm clay
23 to 31 inches—pale yellow, mottled, very firm silty clay
31 to 43 inches—light brownish gray, mottled, very firm silty clay loam
43 to 52 inches—weathered bedrock
52 to 80 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Moderately slow (0.2-0.6 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: High (4 to 8 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 30 to 48 inches

Interpretive Groups

Land capability class: IVe
Pasture and hayland suitability group: GrU
Woodland ordination symbol: None assigned

70039—Sacville silty clay loam, 1 to 3 percent slopes

Setting

Landform: Hill on plateau
Position on the landform: Backslope, footslope, and head of drainageway
Parent material: Local colluvium over residuum from limestone-shale

Composition

Sacville and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Moderately well drained Hoberg and Creldon soils which have fragipans and are on summits above Sacville soils
- Moderately well drained Goodson soils which are moderately deep and on backslopes above Sacville soils

Typical Profile

Surface layer:
0 to 7 inches—very dark gray, friable silty clay loam

Subsoil:
7 to 46 inches—very dark gray, dark grayish brown, grayish brown, and yellowish brown, mottled, firm and very firm silty clay and clay
46 to 80 inches—light brownish gray very gravelly and very cobbly mottled clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Slow (0.06-0.2 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: High (4 to 8 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 6 to 18 inches

Interpretive Groups

Land capability class: IIw
Pasture and hayland suitability group: WCU
Woodland ordination symbol: None assigned

73000—Pomme silt loam, 3 to 8 percent slopes

Setting

Landform: Strath terrace on plateau
Position on the landform: Summit, shoulder, and toeslope
Parent material: Loess over local colluvium over residuum from cherty limestone

Composition

Pomme and similar soils—85 percent
Contrasting components of minor extent—15 percent

Minor Components

- Poorly drained McGirk and Sacville soils which have more clay in the subsoil and are in similar concave landscape positions
- Somewhat poorly drained Hartville soils which have more clay in the subsoil and are in landscape positions similar to those of the Pomme soils
- Well drained Goss soils which have more gravel and clay in the subsoil and are on knobs above or backslopes below Pomme soils
- Ocie soils which have more clay and gravel in the subsoil and are on backslopes below Pomme soils

Typical Profile

Surface layer:
0 to 7 inches—brown, friable silt loam

Subsoil:
7 to 19 inches—yellowish red, firm clay loam
19 to 57 inches—red, mottled, firm very gravelly silty clay loam
57 to 86 inches—yellowish red and reddish yellow, firm extremely gravelly clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Moderate (6 to 9 inches)

Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: None

Interpretive Groups

Land capability class: IIIe
Pasture and hayland suitability group: LyU
Woodland ordination symbol: 3A

73001—Glensted silt loam, 0 to 2 percent slopes

Setting

Landform: Interfluve on plateau
Position on the landform: Summit
Parent material: Loess over local colluvium over residuum from limestone-shale

Composition

Glensted and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Moderately well drained Barden soils on mounds above and shoulders below Glensted soils
- Soils that have a weak, brittle layer in the subsoil

Typical Profile

Surface layer:
0 to 8 inches—very dark grayish brown, friable silt loam

Subsurface layer:
8 to 17 inches—grayish brown, mottled, very friable silt loam

Subsoil:
17 to 60 inches—dark grayish brown and dark gray, mottled, very firm clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Slow (0.06-0.2 inch/hour)
Available water capacity: High (9 to 12 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 6 to 18 inches

Interpretive Groups

Land capability class: IIIe
Pasture and hayland suitability group: WCU
Woodland ordination symbol: None assigned

73002—Ocie-Gatewood complex, 8 to 15 percent slopes (fig. 10)

Setting

Landform: Hill on plateau
Position on the landform: Backslope
Parent material: Local colluvium over residuum from dolostone over solid rock from dolostone

Composition

Ocie and similar soils—45 percent
Gatewood and similar soils—40 percent
Contrasting components of minor extent—15 percent

Minor Components

- Moderately well drained Viraton soils which have a fragipan and are on summits above Ocie and Gatewood soils
- Areas of rock outcrop on steeper slopes adjacent to Ocie and Gatewood soils
- Well drained Moko soils which have less clay, are shallow, and are in adjacent landscape positions

Typical Profile

Ocie

Surface layer:
0 to 3 inches—very dark grayish brown, friable gravelly silt loam

Subsurface layer:
3 to 15 inches—brown, friable very gravelly silt loam

Subsoil:
15 to 19 inches—brown, firm very gravelly silt loam
19 to 42 inches—red, yellowish red, and brown, firm clay
42 to 44 inches—weathered bedrock
44 to 80 inches—unweathered bedrock

Gatewood

Surface layer:
0 to 2 inches—black, friable gravelly silt loam

Subsurface layer:
2 to 13 inches—yellowish brown, friable very gravelly silt loam

Subsoil:
13 to 27 inches—dark yellowish brown, mottled, very firm clay and gravelly clay
27 to 80 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Ocie—deep (40 to 60 inches); Gatewood—moderately deep (20 to 40 inches)

Figure 10.—Most areas of the Ocie-Gatewood complex, 8 to 15 percent slopes, are used for woodland.

Drainage class: Moderately well drained
Permeability: Slow (0.06-0.2 inch/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Ocie—moderate (2 to 4 percent); Gatewood—moderately low (1 to 2 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 18 to 36 inches

Interpretive Groups

Land capability class: VIe
Pasture and hayland suitability group: Ocie—GrU; Gatewood—MDU
Woodland ordination symbol: Ocie—3F; Gatewood—2A

73003—Ocie-Gatewood complex, 15 to 35 percent slopes

Setting

Landform: Hill on plateau
Position on the landform: Backslope
Parent material: Local colluvium over residuum from dolostone over solid rock from dolostone

Composition

Ocie and similar soils—45 percent
Gatewood and similar soils—35 percent
Contrasting components of minor extent—20 percent

Minor Components

- Well drained Cedargap soils which have less clay in the subsoil, are very deep, and are on adjacent narrow flood plains
- Moderately well drained Viraton soils which have a fragipan and are on summits above Ocie and Gatewood soils
- Areas of rock outcrop on steeper slopes adjacent to Ocie and Gatewood soils
- Well drained Moko soils which have less clay, are shallow, and are in adjacent landscape positions

Typical Profile

Ocie

Surface layer:
0 to 2 inches—very dark grayish brown, friable very gravelly silt loam

Subsurface layer:
2 to 14 inches—brown, friable very gravelly silt loam

Subsoil:
14 to 19 inches—dark yellowish brown, friable very gravelly silty clay loam
19 to 44 inches—red and yellowish red, mottled lower part, very firm clay
44 to 80 inches—unweathered bedrock

Gatewood

Surface layer:
0 to 4 inches—dark grayish brown, friable very gravelly silt loam

Subsurface layer:
4 to 7 inches—brown, friable very gravelly silt loam

Subsoil:
7 to 13 inches—dark yellowish brown, mottled, firm gravelly clay
13 to 28 inches—yellowish brown, mottled, very firm clay
28 to 80 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Ocie—deep (40 to 60 inches); Gatewood—moderately deep (20 to 40 inches)
Drainage class: Moderately well drained
Permeability: Slow (0.06-0.2 inch/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Ocie—high (4 to 8 percent); Gatewood—moderately low (1 to 2 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 18 to 36 inches

Interpretive Groups

Land capability class: VIIe
Pasture and hayland suitability group: Ocie—GrU; Gatewood—MDU
Woodland ordination symbol: Ocie—3R; Gatewood—2R

73004—Ocie very gravelly silt loam, 8 to 25 percent slopes, very stony (fig. 11)

Setting

Landform: Hill on plateau
Position on the landform: Backslope
Parent material: Local colluvium over residuum from dolostone over solid rock from dolostone

Composition

Ocie and similar soils—85 percent
Contrasting components of minor extent—15 percent

Figure 11.—Large stones in an area of Ocie very gravelly silt loam, 8 to 25 percent slopes, very stony.

Minor Components

- Well drained Cedargap soils which have less clay in the subsoil, are very deep, and are on adjacent narrow flood plains
- Moderately well drained Viraton soils which have a fragipan and are on summits above Ocie soils
- Areas of rock outcrop on steeper slopes adjacent to Ocie soils
- Well drained Moko soils which have less clay, are shallow, and are in adjacent landscape positions
- Soils that have less clay in the subsoil

Typical Profile

Surface layer:
0 to 3 inches—very dark grayish brown and brown, friable very gravelly silt loam

Subsurface layer:
3 to 10 inches—brown, friable very gravelly silt loam

Subsoil:
10 to 20 inches—yellowish brown and strong brown, friable very gravelly silt loam
20 to 25 inches—strong brown and yellowish red, mottled, friable gravelly clay
25 to 45 inches—red and yellowish brown, mottled, firm and very firm clay
45 to 80 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Slow (0.06-0.2 inch/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: High (4 to 8 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 24 to 60 inches

Interpretive Groups

Land capability class: VIIe
Pasture and hayland suitability group: GrU
Woodland ordination symbol: 3R

73005—Ocie gravelly silt loam, 3 to 15 percent slopes

Setting

Landform: Ridge and hill on plateau
Position on the landform: Summit and backslope
Parent material: Local colluvium over residuum from dolostone over solid rock from dolostone

Composition

Ocie and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Well drained Cedargap soils which have less clay in the subsoil, are very deep, and are on adjacent narrow flood plains
- Moderately well drained Viraton soils which have a fragipan and are on summits above Ocie soils

Typical Profile

Surface layer:
0 to 4 inches—very dark grayish brown, friable gravelly silt loam

Subsurface layer:
4 to 10 inches—brown, friable very gravelly silt loam

Subsoil:
10 to 19 inches—yellowish brown, firm very gravelly silt loam
19 to 33 inches—brown and yellowish brown, very firm clay
33 to 52 inches—yellowish brown, dark yellowish brown, and brownish yellow, mottled, very firm gravelly and very gravelly clay
52 to 60 inches—unweathered bedrock

Soil Properties and Qualities

Depth to bedrock: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Slow (0.06-0.2 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: High (4 to 8 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 24 to 60 inches

Interpretive Groups

Land capability class: VIe
Pasture and hayland suitability group: GrU
Woodland ordination symbol: 3F

73006—Peridge silt loam, 2 to 5 percent slopes

Setting

Landform: Ridge or strath terrace on plateau
Position on the landform: Summit, shoulder, backslope, and footslope
Parent material: Loess over local colluvium over residuum from cherty limestone

Composition

Peridge and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Moderately well drained Viraton soils which have a fragipan and are on broader summits above Peridge soils
- Goss soils which have more clay and rock fragments in the subsoil and are on backslopes below Peridge soils

Typical Profile

Surface layer:
0 to 8 inches—brown, friable silt loam

Subsoil:
8 to 19 inches—reddish brown, firm silt loam
19 to 60 inches—yellowish red and red, firm silty clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: High (9 to 12 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: None

Interpretive Groups

Land capability class: IIe
Pasture and hayland suitability group: LyU
Woodland ordination symbol: 4A

73007—Plato silt loam, 1 to 3 percent slopes

Setting

Landform: Interfluve on plateau
Position on the landform: Summit
Parent material: Loess over local colluvium over residuum from cherty limestone

Composition

Plato and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Moderately well drained Barden soils which do not have a fragipan and are in landscape positions similar to those of the Barden soils
- Hartville soils which do not have a fragipan and are in heads of drains
- Soils that are poorly drained

Typical Profile

Surface layer:
0 to 5 inches—dark grayish brown, friable silt loam

Subsurface layer:
5 to 9 inches—pale brown and light brownish gray, friable silt loam

Subsoil:
9 to 29 inches—yellowish brown, brown, and grayish brown, mottled, firm silty clay
29 to 65 inches—light brownish gray and light gray, mottled, very firm, brittle silt loam and silty clay loam fragipan

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Permeability: Moderately slow above the fragipan (0.2-0.6 inch/hour); very slow in the fragipan (less than 0.06 inch/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 12 to 24 inches

Interpretive Groups

Land capability class: IIe
Pasture and hayland suitability group: WtP
Woodland ordination symbol: 3D

73008—Viraton silt loam, 2 to 5 percent slopes (fig. 12)

Setting

Landform: Ridge on plateau
Position on the landform: Summit and toeslope
Parent material: Loess over local colluvium over residuum from cherty dolostone

Composition

Viraton and similar soils—95 percent
Contrasting components of minor extent—5 percent

Minor Components

- Somewhat poorly drained Plato soils which have more clay and less gravel in the subsoil and are on broader summits above Viraton soils
- Well drained Goss soils which do not have a fragipan, have more gravel and clay in the subsoil, and are on knobs above Viraton soils
- Ocie soils which have more clay and gravel in the subsoil and are on backslopes below Viraton soils

Typical Profile

Surface layer:
0 to 6 inches—brown, friable silt loam

Subsoil:
6 to 24 inches—brown and strong brown, firm silt loam

Figure 12.—An area of Viraton silt loam, 2 to 5 percent slopes, is used for hay production.

24 to 40 inches—strong brown and brown, very firm, brittle gravelly silt loam fragipan
40 to 60 inches—red, very firm extremely gravelly silty clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan (0.6 inch-2.0 inches/hour); very slow in the fragipan (less than 0.06 inch/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: 18 to 30 inches

Interpretive Groups

Land capability class: IIe
Pasture and hayland suitability group: LyP
Woodland ordination symbol: 3D

73009—Viraton silt loam, 5 to 9 percent slopes

Setting

Landform: Ridge on plateau
Position on the landform: Shoulder
Parent material: Loess over local colluvium over residuum from cherty dolostone

Composition

Viraton and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Somewhat poorly drained Plato soils which have more clay and less gravel in the subsoil and are on broader summits above Viraton soils
- Well drained Goss soils which do not have a fragipan, have more gravel and clay in the subsoil, and are on knobs above Viraton soils
- Ocie soils which have more clay and gravel in the subsoil and are on backslopes below Viraton soils

Typical Profile

Surface layer:
0 to 3 inches—dark grayish brown, friable silt loam

Subsurface layer:
3 to 9 inches—yellowish brown, friable silt loam

Subsoil:
9 to 24 inches—strong brown and light yellowish brown, firm silt loam and silty clay loam
24 to 35 inches—gray, mottled, firm, brittle very gravelly silt loam fragipan
35 to 60 inches—strong brown, firm very gravelly silty clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan (0.6 inch-2.0 inches/hour); very slow in the fragipan (less than 0.06 inch/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: 18 to 30 inches

Interpretive Groups

Land capability class: IIIe
Pasture and hayland suitability group: LyP
Woodland ordination symbol: 3D

73010—Wilderness gravelly silt loam, 3 to 8 percent slopes

Setting

Landform: Ridge on plateau
Position on the landform: Summit and shoulder
Parent material: Local colluvium over residuum from cherty limestone

Composition

Wilderness and similar soils—95 percent
Contrasting components of minor extent—5 percent

Minor Components

- Well drained Goss soils which do not have a fragipan, have more clay in the subsoil, and are in similar positions on backslopes below Wilderness soils
- Viraton soils which have less gravel in the subsoil and are on broader summits above Wilderness soils

Typical Profile

Surface layer:
0 to 6 inches—brown, friable gravelly silt loam

Subsurface layer:
6 to 11 inches—yellowish brown, friable gravelly silt loam

Subsoil:
11 to 25 inches—brown and strong brown, mottled lower part, firm very gravelly silt loam and extremely gravelly silty clay loam
25 to 32 inches—yellowish red, strong brown, and dark grayish brown, very firm, brittle very gravelly silt loam fragipan
32 to 60 inches—red and reddish yellow, very firm gravelly clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan (0.6 inch-2.0 inches/hour); slow in the fragipan (0.06-0.2 inch/hour)
Available water capacity: Very low (0 to 3 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: None
Water table: 12 to 24 inches

Interpretive Groups

Land capability class: IVs
Pasture and hayland suitability group: GrP
Woodland ordination symbol: 3D

74625—Hartville silt loam, 3 to 8 percent slopes

Setting

Landform: Hill on plateau
Position on the landform: Footslope and toeslope
Parent material: Local colluvium

Composition

Hartville and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Poorly drained Sacville soils which have dark surface layers and are on backslopes above Hartville soils
- Poorly drained Moniteau soils which have less clay in the subsoil and are on stream terraces below Hartville soils
- Well drained Pomme soils which have less clay and more chert fragments in the subsoil and are on backslopes above Hartville soils

Typical Profile

Surface layer:
0 to 7 inches—dark grayish brown, friable silt loam

Subsoil:
7 to 12 inches—yellowish brown, friable silty clay loam
12 to 57 inches—grayish brown, yellowish brown, and light brownish gray, firm silty clay
57 to 60 inches—yellowish brown and light brownish gray, firm silty clay

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Permeability: Slow (0.06-0.2 inch/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: High (6 to 9 percent)
Flooding: None
Water table: 18 to 36 inches

Interpretive Groups

Land capability class: IIIe
Pasture and hayland suitability group: WCU
Woodland ordination symbol: 3C

75375—Horsecreek silt loam, 0 to 2 percent slopes, occasionally flooded

Setting

Landform: Stream terrace on river valley
Parent material: Alluvium

Composition

Horsecreek and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Poorly drained Moniteau soils which have less clay in the subsoil and are on stream terraces above Horsecreek soils
- Well drained Pomme soils which have less clay and more chert fragments in the subsoil and are on strath terraces above Horsecreek soils
- Sturkie soils which have thicker dark surface layers and are on flood plains below Horsecreek soils

Typical Profile

Surface layer:
0 to 9 inches—dark brown, friable silt loam

Subsoil:
9 to 53 inches—dark yellowish brown and brown, friable silt loam
53 to 60 inches—dark brown, firm silty clay loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: High (9 to 12 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Low (0 to 3 percent)
Flooding: Occasional (5 to 50 percent chance in any year)
Water table: None

Interpretive Groups

Land capability class: IIw
Pasture and hayland suitability group: LyO
Woodland ordination symbol: 5A

75376—Cedargap gravelly silt loam, 0 to 3 percent slopes, frequently flooded

Setting

Landform: Flood plain on river valley
Parent material: Alluvium

Composition

Cedargap and similar soils—95 percent
Contrasting components of minor extent—5 percent

Minor Components

- Moderately well drained Ocie soils which have more clay in the subsoil and are on hill backslopes above Cedargap soils
- Moko soils that are less than 20 inches to bedrock and on hill backslopes above Cedargap soils

Typical Profile

Surface layer:
0 to 7 inches—very dark grayish brown, friable gravelly silt loam

Subsurface layer:
7 to 11 inches—very dark gray, friable gravelly silt loam

Substratum:
11 to 20 inches—black, friable very gravelly clay loam
20 to 60 inches—very dark gray and very dark grayish brown, mottled lower part, friable very gravelly loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Low (3 to 6 inches)
Organic matter content: High (4 to 8 percent)
Shrink-swell potential: Low (0 to 3 percent)
Flooding: Frequent (more than a 50 percent chance in any year)
Water table: None

Interpretive Groups

Land capability class: IIIw
Pasture and hayland suitability group: GrO
Woodland ordination symbol: 3F

75377—Racket silt loam, 0 to 3 percent slopes, frequently flooded

Setting

Landform: Flood plain
Parent material: Alluvium

Composition

Racket and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Poorly drained Humansville soils which have less chert fragments and are on old channels and depressions below Racket soils
- Moderately well drained Ocie soils which have more clay in the subsoil and are on hill backslopes above Racket soils
- Moko soils that are less than 20 inches to bedrock and are on hill backslopes above Racket soils
- Horsecreek soils on terrace positions above Racket soils

Typical Profile

Surface layer:
0 to 10 inches—very dark grayish brown, friable silt loam

Subsurface layer:
10 to 38 inches—dark brown and very dark grayish brown, friable loam and silt loam

Substratum:
38 to 51 inches—dark grayish brown, mottled, very friable gravelly sandy loam
51 to 60 inches—brown, very friable very gravelly sandy loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Moderate (6 to 9 inches)
Organic matter content: Moderately low (1 to 2 percent)
Shrink-swell potential: Moderate (3 to 6 percent)
Flooding: Frequent (more than a 50 percent chance in any year)
Water table: None

Interpretive Groups

Land capability class: IIw
Pasture and hayland suitability group: LyO
Woodland ordination symbol: 5A

75378—Sturkie silt loam, 0 to 2 percent slopes, frequently flooded

Setting

Landform: Flood plain on river valley
Parent material: Alluvium

Composition

Sturkie and similar soils—90 percent
Contrasting components of minor extent—10 percent

Minor Components

- Poorly drained Moniteau soils which have less clay in the subsoil and are on stream terraces above Sturkie soils
- Cedargap soils which have more chert fragments and are in similar positions
- Soils that have more sand and gravel in the substratum
- Horsecreek soils on stream terraces above Sturkie soils

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown, friable silt loam

Subsurface layer:
9 to 19 inches—very dark grayish brown, friable silt loam

Substratum:
19 to 60 inches—very dark grayish brown, friable and very friable silt loam

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate (0.6 inch-2.0 inches/hour)
Available water capacity: Very high (more than 12 inches)
Organic matter content: Moderate (2 to 4 percent)
Shrink-swell potential: Low (0 to 3 percent)
Flooding: Frequent (more than a 50 percent chance in any year)
Water table: None

Interpretive Groups

Land capability class: IIw
Pasture and hayland suitability group: LyO
Woodland ordination symbol: 6W

99000—Pits, quarries

Setting

Landform: None assigned
Parent material: No data

Composition

Pits, quarries—95
Contrasting components of minor extent—5 percent

Soil Properties and Qualities

This map unit occurs as areas from which limestone, dolomite, and sandstone have been quarried. The areas typically are 4 to 10 acres in size. The quarries include the areas that are being excavated and the surrounding areas used for stockpiling, quarrying activities, and equipment.

Interpretive Groups

Land capability class: None assigned
Pasture and hayland suitability group: None assigned
Woodland ordination symbol: None assigned

99001—Water

Setting

Landform: None assigned
Parent material: No data

Composition

Water—100
Contrasting components of minor extent—0 percent

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: No data
Permeability: No data
Available water capacity: No data
Organic matter content: No data
Shrink-swell potential: No data
Flooding: None
Water table: None

Interpretive Groups

Land capability class: None assigned
Pasture and hayland suitability group: None assigned
Woodland ordination symbol: None assigned

99003—Miscellaneous water

Setting

Landform: None assigned
Parent material: No data

Composition

Miscellaneous water—100
Contrasting components of minor extent—0 percent

Soil Properties and Qualities

Depth to bedrock: Very deep (more than 60 inches)
Drainage class: No data
Permeability: No data
Available water capacity: No data
Organic matter content: No data
Shrink-swell potential: No data
Flooding: None
Water table: None

Interpretive Groups

Land capability class: None assigned
Pasture and hayland suitability group: None assigned
Woodland ordination symbol: None assigned

Prime Farmland

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

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 5 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 105,438 acres in the survey area, or nearly 25 percent of the total acreage, meets the soil requirements for prime farmland.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed below. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify as prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name below. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

The soils identified as prime farmland in Polk County are:

15002 McGirk silt loam, 1 to 3 percent slopes (where drained)
40000 Barden silt loam, 1 to 3 percent slopes
46000 Humansville silt loam, 0 to 2 percent slopes, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
66000 Moniteau silt loam, 0 to 2 percent slopes, occasionally flooded (where drained)
66001 Dameron silt loam, 0 to 3 percent slopes, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
70006 Creldon silt loam, 1 to 3 percent slopes
70012 Hoberg silt loam, 2 to 5 percent slopes
70015 Pembroke silt loam, 2 to 5 percent slopes
70016 Goodson silt loam, 1 to 3 percent slopes
70039 Sacville silty clay loam, 1 to 3 percent slopes (where drained)
73001 Glensted silt loam, 0 to 2 percent slopes (where drained)
73006 Peridge silt loam, 2 to 5 percent slopes
73007 Plato silt loam, 1 to 3 percent slopes

75375 Horsecreek silt loam, 0 to 2 percent slopes, occasionally flooded

75377 Racket silt loam, 0 to 3 percent slopes, frequently flooded (where protected from flooding or not frequently flooded during the growing season)

75378 Sturkie silt loam, 0 to 2 percent slopes, frequently flooded (where protected from flooding or not frequently flooded during the growing season)

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

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

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

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

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Robert Howe, district conservationist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

In 1991, approximately 272,400 acres in Polk County was used for pastureland, hayland, and cropland. Approximately 179,900 acres of pasture dominantly supports cool-season grasses, which occasionally are used for hay and tall fescue seed production. A few acres are also being converted to warm-season grasses as a result of a recent promotion of these grasses. Approximately 84,000 acres is used for hay production. The primary hay crops grown are tall fescue and alfalfa-orchardgrass. The alfalfa-orchardgrass hay is normally grown in rotation with one to two years of annual crops, usually corn and wheat. Tall fescue hay is commonly cut after seed harvest. The remaining 8,500 acres is used for row crops and close-grown crops, mainly wheat.

The potential of the soils in Polk County for sustained production of food is good. About 13 percent of the county is prime farmland. An additional 10 percent can be considered prime farmland if it is drained or protected against flooding. Cropland is mainly on uplands that are farmed in a manner that can cause excessive erosion, which prevents sustained production over a long period. Some of the marginal cropland used for row crops should be converted to pasture or hayland, or used in rotation with grasses and/or legumes.

Water erosion is the major problem on nearly all of the sloping cropland and overgrazed pasture in Polk County. All soils having slopes in excess of 2 percent are susceptible to erosion damage. Even soils such as Glensted, which have slopes of 2 percent or less, will

erode severely during intense spring rains if tillage is excessive and crop residue is removed.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as Glensted and Goodson soils. Erosion also reduces the productivity of soils that tend to be droughty because they contain a fragipan or are shallow over bedrock. Examples are Viraton and Moko soils. Second, soil erosion on farmland results in sedimentation in streams, lakes, and ponds. Control of erosion minimizes this pollution and improves the quality of water for municipal use, recreation, and for fish and wildlife.

Soil fertility is naturally lower in most of the eroded or shallow soils than in other soils. On all soils, however, additional plant nutrients are needed before maximum production can be achieved. Most of the soils in the county are naturally acid in the upper part of the root zone. As a result, applications of ground limestone or ground dolomite are needed to raise the pH, calcium, and magnesium levels sufficiently for optimum growth of legumes. Additions of lime and fertilizer should be based on the results of current soil tests, on the needs of the crop, and on the desired yield level. The Natural Resources Conservation Service or Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to be applied.

Soil tilth is affected by the texture and organic matter content of the surface layer. Most of the uneroded upland soils used for crops in the county have a silt loam surface layer that is dark, and the content of organic matter is moderate. Generally, the structure of these silt loams is weakened by tillage and compaction. Under these conditions, intense rainfall causes the formation of a crust on the surface. Because it is hard when dry, the crust reduces water infiltration and increases the amount of runoff. Regular additions of crop residue, manure, or other organic material improve soil structure and tilth.

Erosion-control measures provide a protective cover, reduce the runoff rate, and increase the rate of water infiltration. A cropping system that keeps vegetation or crop residue on the surface can hold soil losses to an amount that will not reduce the long-term productive capacity of the soil. Growing grasses and legumes for pasture and hay is very effective in controlling erosion, especially when used in crop rotations. Legumes, such as clover and alfalfa, also improve tilth and provide nitrogen for the following crop.

Terraces reduce the length of slope, thus reducing the hazards of runoff and erosion. Conventional terraces are most practical on uneroded upland soils with slopes of less than 8 percent. Minimizing tillage on sloping soils and leaving large quantities of crop residue on the surface increase water infiltration and can be adapted to many of the soils in the county, but they are less successful on eroded soils that have a clayey surface layer. On Creldon and Barden soils, special management techniques may be needed if terracing exposes the clayey subsoil.

If the soil is not suitable for terracing, or if the farmer does not prefer terraces, other alternatives can be used. Contour strip cropping, for example, helps to control erosion by alternating contoured strips of close-growing crops with row crops. The strips of grasses or grasses and legumes are usually used for hay. The areas between the strips are cultivated and planted to row crops, which are grown on the contour. Conservation tillage is effective in controlling erosion on sloping land. This is becoming more common in the county, and it can be used on many of the soils. No-till systems are also being used more in the county, as no-till reduces surface disturbance and the hazard of erosion.

Soil drainage and flood control are management concerns on about 5 percent of the acreage used for crops and pasture in the county. Sacville soils are naturally so wet that crop production is reduced during some parts of the year. Frequent flooding can prevent crop production on Sturkie, Racket, and Moniteau soils. The flooding on these soils commonly occurs during the period November through May.

Pasture and hayland forages suited to the soils and climate in Polk County include legumes, cool-season grasses, and warm-season grasses. Alfalfa and red clover are the most common legumes grown for hay. Deep, well drained soils with a high available water capacity and a high content of calcium, magnesium, and potassium are well suited to alfalfa for long-term hay or silage. Most alfalfa stand losses are caused by failure to maintain adequate levels of calcium and potassium in the soil. Soils with a fragipan, limited depth to bedrock, or seasonal wetness are better suited to clover for hay or pasture. If proper lime and fertility levels are maintained, most soils in the county will support red, ladino, and other clovers. Most soils are suited to tall fescue, orchardgrass and other cool-season grasses. These grasses grow best in the spring, early summer, and fall. Where additional midsummer pasture or hay is needed, warm-season grasses and legumes can be grown.

Warm-season grasses, such as big bluestem, Indiangrass, switchgrass, Caucasian bluestem, and

eastern gamagrass, are suited to a wide range of soil conditions. These grasses grow best from late spring to early fall and, thus, fill the "summer slump" period, left by the cool-season grasses, with green actively growing forage. Both cool- and warm-season grasses require proper management in order to produce at their highest potential.

Hayland management varies with each forage type, but some general rules apply to all grasses and legumes. Fertility levels should be maintained based on forage type, production, and soil testing. Cutting heights, cutting intervals, and stage of growth when cut will vary by forage type. As forages become more mature, the quantity will increase but the quality will decrease. Hayland management decisions should be made based on these considerations.

Proper pasture management eliminates overgrazing and maintains a healthy stand of forages. By dividing pastures into smaller units and rotating livestock, forages are allowed to rest and recover from grazing pressure. Smaller pastures will also reduce selective or "spot grazing," which will allow legumes the opportunity to maintain themselves in the grass stand. The Natural Resources Conservation Service and the Cooperative Extension Service has information available on both hayland and pasture management based on forage type.

Specialty crops, such as apples, peaches, Christmas tree plantings and melons, are grown on a small acreage in the county. Special equipment, management, and propagation techniques are needed where these crops are grown. Onsite investigations and feasibility information are needed for specialty crops.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in tables 5 and 6. In any given year, yields may be higher or lower than those indicated in the tables because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

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

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

Crops other than those shown in the tables are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit *(22)*. Only class and subclass are used in this survey.

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

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

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

The capability classification of the map units in this survey area is given in the section "Detailed Soil Map Units" and in the yields tables.

Pasture and Hayland Suitability Groups

The soils in Polk County are assigned to a pasture and hayland group according to their suitability for pasture management.

Many different pasture and hayland suitability groups are in the survey area. Over time, the combination of plants best suited to a particular soil and climate have or will become dominant. Plant communities are not static but vary slightly from year to year and place to place.

The relationship between soils and vegetation was ascertained during this survey. Thus, pasture and hayland suitability groups generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of each plant species. Soil reaction, salt content, and a seasonal high water table are also important. The "Field Office Technical Guide," which is available at local offices of the Natural Resources Conservation Service, can provide specific information about pasture and hayland suitability groups.

Table 7 shows, for each soil, the assigned pasture and hayland suitability group. Specific concerns and recommendations for pasture and hayland management for each group are discussed below.

Group WLB—Wet Loamy Bottom. A seasonal high water table and flooding are the main management problems. Plants should be selected accordingly. A seedbed can be easily prepared. A drainage system can improve the growth of deep-rooted species. The hazard of flooding should be considered when a grazing system is designed.

Group WCB—Wet Clayey Bottom. Wetness and flooding are the main management problems. This group is poorly suited to hay. The hazard of flooding should be considered when a grazing system is designed. Maintaining stands of desirable species is difficult in depressional areas. A drainage system can improve the growth of deep-rooted species.

Group WCU—Wet Clayey Upland. Wetness is the main management concern. Maintaining stands of desirable species is difficult in depressional areas. A drainage system can improve the growth of deep-rooted species.

Group WLO—Wet Loamy Overflow. Wetness and flooding are the main management problems. A seedbed can be easily prepared. A drainage system can improve the growth of deep-rooted species. The hazard of flooding should be considered when a grazing system is designed.

Group LyO—Loamy Overflow. Flooding is the main management problem. The hazard of flooding should be considered when a grazing system is designed.

Group LyU—Loamy Upland. No serious problems affect pasture and hayland management. Erosion is a hazard in newly seeded areas. Timely seedbed preparation is needed to ensure a good ground cover.

Group CyU—Clayey Upland. Pasture and hay crops are effective in controlling erosion. Erosion during seedbed preparation is the main problem. Timely tillage and a quickly established ground cover reduce the hazard of erosion. The forage species that are tolerant of wetness grow best. The production of deep-rooted legumes is limited because of wetness and a restricted rooting depth.

Group GrU—Gravelly Upland. The soils in this group generally are not suited to cultivated crops.

Droughtiness and erosion are the main management problems. Seedbeds should be prepared on the contour. Timely seedbed preparation helps to ensure rapid plant growth and a protective ground cover.

Group MDU—Moderately Deep Upland. Shallow-rooted species that are tolerant of droughtiness should be selected for planting. Erosion is a serious hazard in newly seeded areas. Timely tillage and a quickly established ground cover reduce the hazard of erosion.

Group WtP—Wet Pan. The species that are tolerant of wetness grow best. A dense layer in the subsoil can restrict the rooting depth and result in insufficient soil moisture in dry years. Erosion during seedbed preparation is the main problem. Timely tillage and a quickly established ground cover reduce the hazard of erosion.

Group LyP—Loamy Pan. A few small areas of this group are used for cultivated crops, and some areas are wooded. A dense layer in the subsoil can restrict the rooting depth and result in insufficient soil moisture in dry years. Erosion during seedbed preparation is a hazard. Seedbeds should be prepared on the contour. Timely tillage and a quickly established ground cover reduce the hazard of erosion.

Group GrO—Gravelly Overflow. Most areas of this group have been cleared of trees and are used for pasture and hay. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during periods of flooding help to keep the pasture in good condition.

Group GrP—Gravelly Pan. If the soils in this group are used for improved pasture, chert on the surface hinders tillage. Because of seasonal droughtiness, timely planting is needed to ensure an adequate stand. Erosion is a hazard in newly seeded areas. Timely seedbed preparation helps to ensure a protective ground cover.

Group ShU—Shallow Upland. In most areas this group is used for native pasture. It is best suited to shallow-rooted species. In some areas tillage is nearly impossible. Broadcast seeding may be necessary. The slope and rock outcrop can hinder mowing in places.

Woodland Management and Productivity

Douglas C. Wallace, forester, Natural Resources Conservation Service, helped prepare this section.

Approximately 28 percent (116,457 acres) of Polk County is forested, according to 1986 Missouri Department of Conservation woodland survey estimates *(7)*. Woodland tracts in the county are primarily small, private holdings of less than 100 acres and are essentially unmanaged. In the flood plains, forests are restricted to long, narrow bands bordering streams and rivers. Tree species and growth rates in the county vary, depending on site conditions, soil types, and past management.

Soil properties that affect the growth of trees include reaction (pH), fertility, drainage, texture, structure, and soil depth. The soil also serves as a reservoir for moisture, provides an anchor for roots, and supplies essential plant nutrients. Soils in which these properties are not extreme and that have effective rooting depth greater than 40 inches provide the best medium for tree growth.

Other site characteristics that affect tree growth include aspect and topographic position. These site characteristics influence the amount of available sunlight, air drainage, soil temperature, soil moisture, and relative humidity. Generally, north and east aspects and lower slope positions, which are cooler and have better moisture conditions, are the best upland sites for tree growth.

Management activities can influence woodland productivity and should be aimed at eliminating factors causing tree stress. Generally, this involves thinning overstocked young stands; harvesting old, mature trees; and eliminating destructive fire and grazing. Fire and grazing have very negative impacts on forest growth and quality. Although forest fires are no longer a major problem in the county, about 70 percent of the woodland is still subject to grazing. Grazing destroys the leaf layer on the surface, compacts the soil, and kills or damages tree seedlings. Woodland sites that have not been grazed or burned have the highest potential for optimum timber production and tree growth.

Alsup, Bolivar, Ocie, Gatewood, and Goss soils are predominant on forested upland positions in Polk County. Post/blackjack oak and black/scarlet oak forest types are typical on these soils. Other significant forest types include white oak and eastern redcedar.

Along the major watercourses, Humansville and Moniteau soils support bottomland hardwoods adapted to saturated soil conditions. Many of these sites have been leveled and cleared for crop

production. The remaining wooded areas typically contain silver maple, hackberry, American elm, sycamore, cottonwood, and pin oak. Bur oak, shellbark hickory, and walnut are common along the smaller stream bottoms and higher terraces of the major streams. A high potential for excellent forest growth exists on these sites.

Upland soils, such as Sacville, Pembroke, Glensted, and Creldon, formed under mixed prairie and transitional open forest vegetation. Successful establishment of woodland trees on these soils may require extra care and maintenance. Specialty tree plantings, such as Christmas trees, nut trees, and fuelwood trees, can be very successful if adapted tree species are used. Christmas tree plantings can be established on any soil that is not poorly drained or very poorly drained. Species of trees best suited to the soils in Polk County are scotch, Virginia, red, and white pines. Nut trees, such as black walnut and pecan, are best suited to deep, medium textured, moderately well drained to well drained soils, such as Cedargap, Racket, and Sturkie. Other soils are also suited but may be less productive. Tree plantations for fuelwood utilizing fast-growing trees have potential for use in Polk County. The species most adaptable for this purpose include green ash, black locust, sycamore, and silver maple.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

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

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

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

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

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

Windthrow hazard is the likelihood that trees will be

uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

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

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic meters per hectare per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

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

Trees to plant are those that are suitable for commercial wood production.

Windbreaks and Environmental Plantings

Douglas C. Wallace, forester, Natural Resources Conservation Service, helped prepare this section.

Living plants play an important role in supporting our life and improving its condition. Properly used and maintained, plants help provide positive solutions to many problems existing in our contemporary environment. In Polk County, windbreaks and environmental plantings can be utilized throughout the landscape for a variety of engineering, climatological, and aesthetic needs.

Windbreaks can be grown successfully in most areas of Polk County. Some important considerations affecting the management of farmstead and field windbreaks are design and layout; species selection; site preparation; seedling handling; weed management; irrigation; and protection from diseases, insects, and livestock.

Farmstead windbreaks make the farmstead more comfortable, reduce energy costs, increase yields from garden and fruit trees, enhance wildlife populations, buffer noises, and increase property values *(18)*.

Feedlot windbreaks can be used to protect livestock from wind and snow. Windbreaks significantly minimize calf losses, make feeding easier, and enable livestock to maintain optimum weight with less feed.

Farmstead and feedlot windbreaks are generally three or more rows deep and include at least two rows of coniferous trees. The windbreaks should be located on the windward side of the area to be protected and should be at right angles to the prevailing winds. Well designed farmstead and feedlot windbreaks are needed throughout Polk County, especially in the former open prairie areas of the Hoberg-Bona-Creldon and Goodson-Creldon-Barden soil associations.

Field windbreaks or shelterbelts are designed to protect field crops and areas of bare soil from the effects of strong winds. Field windbreaks reduce soil losses, increase crop yields, help to prevent the spread of weeds between fields, and enhance wildlife populations *(4)*. Careful planning is needed. Field boundaries, irrigation systems, power lines, and roads should be considered in determining the location of field windbreaks. Windbreaks should be oriented at right angles to the prevailing winds. A typical field windbreak system consists of a series of single rows of trees or shrubs. As with farmstead windbreaks, field windbreaks are adaptable to many locations throughout Polk County but are most beneficial in the Hoberg-Bona-Creldon and Goodson-Creldon-Barden soil associations.

Environmental plantings can be used for beautification, as visual screens, and for control of acoustical, pollution, and climatological problems around buildings and other living spaces. Plants whose height, shape, color, and texture are compatible with the surrounding area, structures, and desired use should be selected *(17)*. Trees and shrubs can be easily established on most sites and soil types in Polk county if adequate site preparation methods are applied prior to planting and weeds and other competition are controlled after planting.

Table 9 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in the table are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Windbreak Suitability Groups

Windbreak suitability groups consist of soils in which the kinds and degrees of hazards and limitations that affect the survival and growth of trees and shrubs are about the same. Table 10 indicates the windbreak suitability groups of the soils in Polk County.

Group 1. The soils in this group are deep and are well drained to somewhat poorly drained. They receive additional moisture because of favorable landscape positions, flooding, or runoff from adjacent land, or they have a seasonal high water table during the spring.

Management concerns.—No major soil-related limitations affect windbreaks. Competition from grasses and weeds is the principal concern in establishing and managing trees and shrubs. Occasionally, the somewhat poorly drained soils are excessively wet for brief periods.

Group 2. The soils in this group are deep and are poorly drained or very poorly drained. They are excessively wet or ponded during the spring or during overflow periods.

Management concerns.—Wetness limits the selection of species on the soils in this group and may reduce the growth rate. Competition from grasses and weeds is the principal concern in establishing and managing trees and shrubs. Spring planting may be delayed because of the wetness.

Group 3. The soils in this group are deep, well drained, loamy, and moderately permeable or moderately slowly permeable. They are on uplands. Available water capacity is moderate (5 to 10 inches).

Management concerns.—Competition from grasses and weeds is the principal concern in establishing and managing trees and shrubs. Water erosion is a hazard in gently sloping to moderately steep areas.

Group 4. The soils in this group are moderately deep or deep, have a loamy surface layer and a clayey subsoil, and are slowly permeable or very slowly permeable. They are on uplands.

Management concerns.—A high content of clay and restricted water availability limit the selection of species on these soils. Competition from grasses and weeds is the principal concern in establishing and managing trees and shrubs. Water erosion is a hazard in the gently sloping to moderately steep areas.

Group 6D. The soils in this group are moderately well drained or well drained, generally are loamy, and are moderately deep to bedrock or other layers that can severely restrict root growth. They have a low or moderate available water capacity.

Management concerns.—Droughtiness limits the selection of species on these soils. Competition from grasses and weeds is the principal concern in establishing and managing trees and shrubs. Water erosion is a hazard in gently sloping to moderately steep areas. Supplemental water may be needed to establish trees and shrubs during dry periods.

Group 10. The soils in this group have one or more characteristics that severely limit the planting, survival, or growth of trees.

Management concerns.—The slope, soil depth, texture, or wetness severely limits the selection of species and the use of equipment. All soils that have slopes of more than 15 percent, that are frequently flooded for long periods, that are less than 20 inches deep over bedrock, or that have severely restrictive textures are in this group. If onsite investigation indicates that a planting can be made where special treatment, such as a drainage or irrigation system, is applied, species should be selected from the windbreak suitability group that the map unit most closely resembles.

Recreation

The diversity of the landscapes and vegetation cover from rolling grassland hills to prairies to forest-covered stream valleys provide Polk County with many recreational opportunities.

The county is adjacent to two major reservoirs—Pomme de Terre and Stockton Lakes (fig. 13). The land surrounding these lakes are managed by the Army Crops of Engineers and the Missouri Department of Conservation. These areas provide most of the recreational opportunities in the county, including access to boating and other water sports, camping, hiking, and nature studies. The Missouri Department of Conservation also manages several areas in all parts of the county that provide a wide diversity of landscapes and vegetation for most outdoor activities.

Recreation facilities in the urban areas of the county include sports areas, parks, and golf courses.

The soils of the survey area are rated in table 11 according to limitations that affect their suitability for

Figure 13.—The rivers and lakes in Polk County provide wildlife habitat and recreation opportunities.

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

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

The information in the table can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 14 and interpretations for dwellings without basements and for local roads and streets in table 13.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

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

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

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

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Bob Schroeppel, wildlife biologist, Missouri Department of Conservation, helped prepare this section.

Polk County is located in the western border area of the Ozarks, along a line running from central Missouri to the southwest corner of the state. Early records indicate that the county included nearly 160 square miles, or 25 percent of the county's land base, in pre-settlement tall grass prairie. This transitional area between the extensive prairies to the west and the stream valleys of the Ozarks to the east creates a landscape unlike anywhere else in the state. The timbered stream valleys and wide gently rolling prairies joined at distinct boundaries is what encouraged early settlers to use the word "prairie" in many of their early place names. The Polk County Soil Survey of 1926 cited the names of eight prairies known in the county at that time *(10)*.

The Twenty-Five Mile Prairie running through Polk and Hickory Counties is representative of the elongated prairies sometimes found in this region *(27)*.

C.F. Marbut reported in 1910 that the prairies in Polk County contained numerous "oak openings" (grass-covered areas with a few large post oak). Each spring oak sprouts emerged from the root-filled ground only to be killed back each fall by fires *(19)*. With the arrival of early settlers, these areas took on a different appearance. "Close grazing killed out the bluestem grasses and the suppression of fire caused the grasses to be replaced with weeds, sassafras sprouts, and post-oak runners" *(11)*.

Polk County falls within the Springfield Plateau

Section of the Ozark National Division. This section is less highly dissected than the other sections of the Ozarks. The Springfield Plateau Section is characterized by higher elevations, numerous karst features, Ozark border soils, and Mississippian and Ordovician bedrock *(20)*. In 1989, the Missouri Department of Conservation identified high-quality natural communities in Polk County. Twenty prairies qualified in addition to La Petite Gemme Prairie, a dry-mesic limestone/dolomite prairie, which was designated as a Missouri Natural Area in 1977. Eudora Glade was identified as the best example of a sandstone glade in this part of the state. Eudora Glade also includes a sandstone glade/savanna and a sandstone ravine *(5)*. Glades in the county are usually associated with the Moko-Rock outcrop complex and Basehor soil types.

Lands around Stockton and Pomme de Terre Lakes account for much of the public lands in the county. In addition to managing this federal land around the lakes, the Missouri Department of Conservation manages numerous state-owned areas in Polk County. Some of these include the Pleasant Hope Wildlife Area (1,106 acres) near Brighton, Brush Creek Tract (185 acres), Sentinel Tract (160 acres), Sunset Park Access (21 acres) along the Pomme de Terre River, and La Petite Gemme Prairie (37 acres) south of Bolivar.

There are published and/or documented accounts of 234 fish and wildlife species known to occur in Polk County, with another 146,000 species listed as "likely to occur," according to the Missouri Fish and Wildlife Information System (Missouri Department of Conservation, 1987). Typical nongame species include golden shiner, southern leopard frog, prairie king snake, turkey vulture, yellow-billed cuckoo, eastern bluebird, hispid cotton rat, and southern flying squirrel. The most common game species include white-tailed deer, wild turkey, northern bobwhite quail, eastern cottontail rabbit, white crappie, and white bass.

Furbearer populations in Polk County are similar to other western Ozark border counties. The species harvested for fur in 1988-89 were opossum, muskrat, raccoon, mink, red and gray fox, coyote, bobcat, beaver, and badger *(15)*. Sightings compiled from the Missouri Department of Conservation cooperative archery hunter survey show that Polk County has a slightly lower occurrence of coyote, red fox, opossum, and deer, but higher numbers of gray fox and bobcat when compared to the state average. This survey is based on sightings per 1,000 hours of hunter trips *(14)*.

Openland wildlife species, such as bobwhite quail and rabbits, suffer from lack of hard winter cover, poor grassland management and limited winter food *(23)*. The shortage of small grains in the county limits the winter food supply for many birds and animals. The use of food plots or leaving a few rows of unharvested crops in crop fields could help with this problem. The croplands found in the county are usually on the Pembroke, Creldon, Hoberg, and Peridge soils. Nearly 65 percent of the county's land area is in grassland, with tall fescue as the dominant grass. Much of this conversion to tall fescue resulted from the chemical spraying of timber and the plowing of native prairies. This limits small game numbers because of tall fescue's growth characteristics and common management practices (i.e., early haying and overgrazing). Increasing the acreage and improving the management of native warm-season grasses would help improve the quality and diversity of the county's grasslands for wildlife. In addition, the use of planned grazing systems would protect critical areas needed for nesting and escape cover.

Polk County has 31 percent of its land area in forest land, which includes approximately 412,000 acres. Typically, the major woodlands are found on the Alsup, Basehor, Goss, and Ocie soils and the Ocie-Gatewood soil complex. The primary game species found here are white-tailed deer and wild turkey. Both local and non-county hunter interest is high for these species. Polk County harvested 1,005 deer during the 1991 fall season. In turkey hunting, 262 birds were taken during the 1991 fall season and 322 birds in the 1992 spring firearm season. There are several factors that affect the quality of woodland habitat in Polk County. All woodland species suffer greatly from misuse of the timber resource, most notably the grazing of timber. Grazing of woodlands can lead to tree damage, destruction of wildlife habitat, increased soil erosion, and soil compaction. Wildlife species that suffer from woodland grazing include everything from the eastern bluebird to the American woodcock to the great horned owl.

Aside from the U.S. Corps of Engineers reservoirs, wetland habitat in Polk County is very limited. Wetland habitat types occur on or along Stockton and Pomme de Terre Lakes; Pomme de Terre and Little Sac Rivers; and Bear, Lindley, Slagle, Branch, Hominy, Turkey, and Ingalls Creeks.

Several waterfowl species, such as Canada goose, northern pintail, wood duck, and mallard, are residents of the county. Cedargap soils would be the predominant soils found along the smaller creek bottoms, while Humansville, Sturkie, Horsecreek, and Moniteau soils are associated with the larger Pomme de Terre and Little Sac River bottoms. Five active heron rookeries can be found along these major

river bottoms. The largest is along the Pomme de Terre River, with 42 individual birds and 33 active nests recorded in 1990. Polk County was the site of a river otter release in 1990 by the Missouri Department of Conservation. This native Missouri mammal is being reintroduced in many of the major rivers and streams across the state. Sport-fishing species include largemouth bass, spotted bass, white and black crappie, bluegill, and channel catfish.

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

In table 12, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

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

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

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

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

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. An example of a fruit-producing shrub that is suitable for planting on soils rated *good* is crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are gray dogwood, hazelnut, and wild plums.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples

of shallow water areas are marshes, waterfowl feeding areas, and ponds.

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

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

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

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

Building Site Development

Table 13 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special

feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

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

Sanitary Facilities

Table 14 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

The table also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly

level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

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

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

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

Construction Materials

Table 15 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

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

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the

engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

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

Water Management

Table 16 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

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

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land

against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

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

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

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

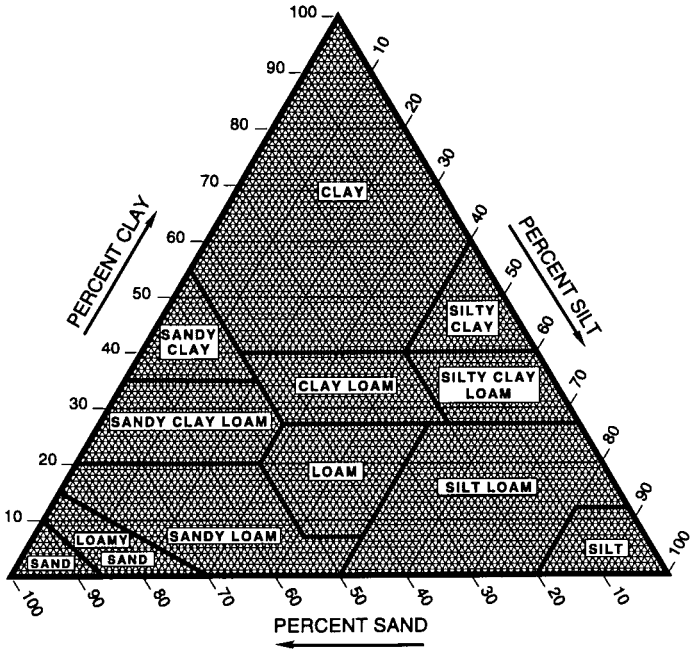


Figure 14.—Percentages of clay, silt, and sand in the basic USDA soil textural classes

Engineering Index Properties

Table 17 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 14). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms and abbreviations are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

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

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 18 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity (Ksat) refers to the amount of water that would move vertically through a unit time under unit hydraulic gradient. The estimates are in micrometers per second and indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of

irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Cation-exchange capacity is the total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. Soils having a high cation-exchange capacity can retain cations. The ability to retain cations helps to prevent the pollution of ground water.

Effective cation-exchange capacity is the sum of ammonium acetate extractable bases plus potassium chloride extractable aluminum used for soils that have pH value less than 5.5. Effective cation-exchange capacity is expressed in terms of milliequivalents per 100 grams.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on the basis of measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, more than 6 percent; and *very high*, greater than 9 percent.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Erosion factor Kw (formerly K factor) indicates the susceptibility of a soil to sheet and rill erosion by water. Factor Kw is one of six factors used in the Universal Soil Loss Equation (USLE), and may be used in the Revised Universal Soil Loss Equation (RUSLE), to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Factor Kw is adjusted for the effect of rock fragments. Values of Kw range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size. Factor Kf is one of the factors that may be used in the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion.

Soil Features

Table 19 gives estimates of several important soil features. The estimates are used in land use planning that involves engineering considerations.

Depth to bedrock is given if bedrock is within a depth of 60 inches. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

A *cemented pan* is a nearly continuous layer of indurated or strongly cemented material that is hard and brittle. The particles are held together by cementing substances, such as calcium carbonate and oxides of silicon, iron, or aluminum. Pans are identified when they are within a depth of 60 inches. They are classified as thin or thick. A thin pan can be excavated by trenching machines, backhoes, small rippers, and other equipment commonly used to dig excavations for pipelines, sewer lines, and graves. A thick pan is so thick or massive that blasting or special equipment is needed when excavations are made.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

A *low* potential for frost action indicates that the soil is rarely susceptible to the formation of ice lenses; a *moderate* potential indicates that the soil is susceptible to the formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength; and a *high* potential indicates that the soil is highly susceptible to the formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Water Features

Table 20 gives estimates of several important water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of

moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in the table, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

The table gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). *Common* is used when the occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in the table are the depth to the seasonal high water table; the kind of water table—that is, perched, apparent, or artesian; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (24). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 21 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, nonacid, mesic Typic Hapludalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (25). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (24) and in "Keys to Soil Taxonomy" (26). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alsup Series

Root restrictive depth: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Ridge or hill on plateau
Position on the landform: Backslope, summit, or shoulder
Parent material: Colluvium over residuum from shale-siltstone

Slope range: Moderately sloping to steep (3 to 35 percent)
Elevation: 1,100 feet
Taxonomic class: Fine, mixed, active, mesic Oxyaquic Hapludalfs

Typical Pedon

Alsup gravelly silt loam, 8 to 15 percent slopes (fig. 15), in a pasture, 1,000 feet south and 700 feet west of the northeast corner of sec. 1, T. 33 N., R. 22 W.; USGS Cedar Vista topographic quadrangle; latitude 37 degrees 37 minutes 15 seconds N.; longitude 93 degrees 17 minutes 14 seconds E.; UTM coordinates 4,163,560 meters N. and 474,640 meters E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) gravelly silt loam, gray (10YR 5/1) dry; weak very fine granular structure; very friable; many very fine roots; 30 percent chert gravel and 5 percent siltstone cobbles; very strongly acid; clear wavy boundary.
E—7 to 12 inches; light gray (10YR 7/2) very gravelly silt; weak very fine granular structure; very friable; many very fine and many medium roots; 25 percent chert gravel and 25 percent siltstone gravel; strongly acid; clear wavy boundary.
2Bt1—12 to 17 inches; light yellowish brown (10YR 6/4) silty clay; moderate very fine subangular blocky structure; very firm; common very fine roots; many distinct continuous clay films on faces of peds; few fine red (2.5YR 4/6) masses of iron accumulation; 3 percent chert gravel and 2 percent siltstone gravel; strongly acid; clear wavy boundary.
2Bt2—17 to 24 inches; light yellowish brown (2.5Y 6/4) clay; strong medium subangular blocky structure; very firm; few fine roots; few distinct continuous clay films on faces of peds; common fine yellowish red (5YR 5/6) masses of iron accumulation; 3 percent chert gravel and 2 percent siltstone gravel; very strongly acid; clear wavy boundary.
2Bt3—24 to 40 inches; pale olive (5Y 6/4) clay; strong coarse subangular blocky structure; very firm; few fine roots; few distinct continuous clay films on faces of peds; common nonintersecting slickensides; few manganese or iron-manganese stains; 5 percent siltstone gravel; moderately acid; gradual smooth boundary.
3Bt4—40 to 46 inches; yellow (2.5Y 7/6) very gravelly silty clay loam; moderate coarse subangular blocky structure; very firm; few fine roots; few faint continuous clay films on faces of peds; few manganese or iron-manganese stains; 30 percent siltstone gravel; slightly alkaline; clear wavy boundary.
3BC—46 to 56 inches; yellow (2.5Y 7/6) extremely gravelly silty clay loam; weak coarse subangular blocky structure; very firm; few fine roots; few distinct continuous clay films on faces of peds; few medium masses of carbonate; 80 percent siltstone gravel; moderately alkaline; gradual smooth boundary.
3Cr—56 to 66 inches; shale-siltstone.

Range in Characteristics

Thickness of the ochric epipedon: 5 to 17 inches
Depth to the argillic horizon: 6 to 17 inches
Depth to the paralithic contact horizon: 40 to 60 inches
Depth to the lithic contact horizon: 46 to 58 inches

Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam
Content of rock fragments—5 to 35 percent
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

A horizon (where present):
Hue—10YR
Value—3 or 4
Chroma—2
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 10 percent
Reaction—moderately acid or slightly acid (pH 5.6 to 6.5)

E horizon:
Hue—10YR
Value—4 to 7
Chroma—2 or 3
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam or silt
Content of rock fragments—0 to 50 percent
Reaction—strongly acid to slightly acid (pH 5.1 to 6.5)

2Bt horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5 or 6
Chroma—2 to 4
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay

Content of rock fragments—0 to 20 percent
Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

2BC horizon:
Hue—2.5Y
Value—7
Chroma—6
Texture of the fine-earth fraction—silty clay loam
Content of rock fragments—0 to 80 percent
Reaction—moderately alkaline (pH 7.9 to 8.4)

Barden Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Slow
Landform: Interfluve on plateau
Position on the landform: Footslope
Parent material: Loess over residuum from sandstone-shale
Slope range: Very gently sloping (1 to 3 percent)
Elevation: 1,060 feet
Taxonomic class: Fine, mixed, active, thermic Aquollic Hapludalfs

Typical Pedon

Barden silt loam, 1 to 3 percent slopes, in cropland, 1,600 feet east and 6,500 feet north of the southwest corner of sec. 3, T. 34 N., R. 22 W.; USGS Polk topographic quadrangle; latitude 37 degrees 42 minutes 53 seconds N.; longitude 93 degrees 19 minutes 50 seconds E.; UTM coordinates 4,174,020 meters N. and 470,870 meters E.

A—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; few fine roots; slightly acid; clear smooth boundary.
Bt1—8 to 16 inches; brown (10YR 5/3) silty clay; moderate fine subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; many fine strong brown (7.5YR 4/6) masses of iron accumulation; moderately acid; clear smooth boundary.
Bt2—16 to 28 inches; grayish brown (10YR 5/2) silty clay loam; weak fine subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; common fine yellowish brown (10YR 5/6) masses of iron accumulation and few fine iron-manganese concretions; neutral; clear smooth boundary.
Bt3—28 to 54 inches; grayish brown (10YR 5/2) silty clay loam; moderate fine subangular blocky structure; firm; common distinct clay films on faces of peds; many fine dark yellowish brown (10YR 4/6) masses of iron accumulation and few fine iron-manganese concretions; 3 percent chert gravel; slightly alkaline; clear smooth boundary.
Bt4—54 to 76 inches; light brownish gray (10YR 6/2) silty clay loam; moderate fine subangular blocky structure; firm; common distinct clay films on faces of peds; many fine yellowish brown (10YR 5/6) masses of iron accumulation and few fine iron-manganese concretions; 5 percent chert gravel; neutral.

Range in Characteristics

Thickness of the ochric epipedon: 8 to 9 inches
Depth to the argillic horizon: 8 to 17 inches

A horizon:
Hue—10YR
Value—3
Chroma—2
Texture of the fine-earth fraction—silt loam
Reaction—slightly acid or neutral (pH 6.1 to 7.3)

AB horizon (where present):
Hue—10YR
Value—4
Chroma—2 or 3
Texture of the fine-earth fraction—silt loam
Reaction—neutral (pH 6.6 to 7.3)

Bt horizon:
Hue—10YR
Value—4 to 6
Chroma—2, 3, 4, or 6
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam or silty clay
Content of rock fragments—0 to 5 percent
Reaction—strongly acid to slightly alkaline (pH 5.1 to 7.8)

Basehor Series

Root restrictive depth: Shallow (4 to 20 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Ridge or hill on plateau
Position on the landform: Backslope, shoulder, or summit
Parent material: Residuum from sandstone over solid rock from sandstone
Slope range: Moderately sloping to steep (3 to 35 percent)

Figure 15.—Profile of Alsup gravelly silt loam. This light colored soil has shale at depths of 40 inches or more.

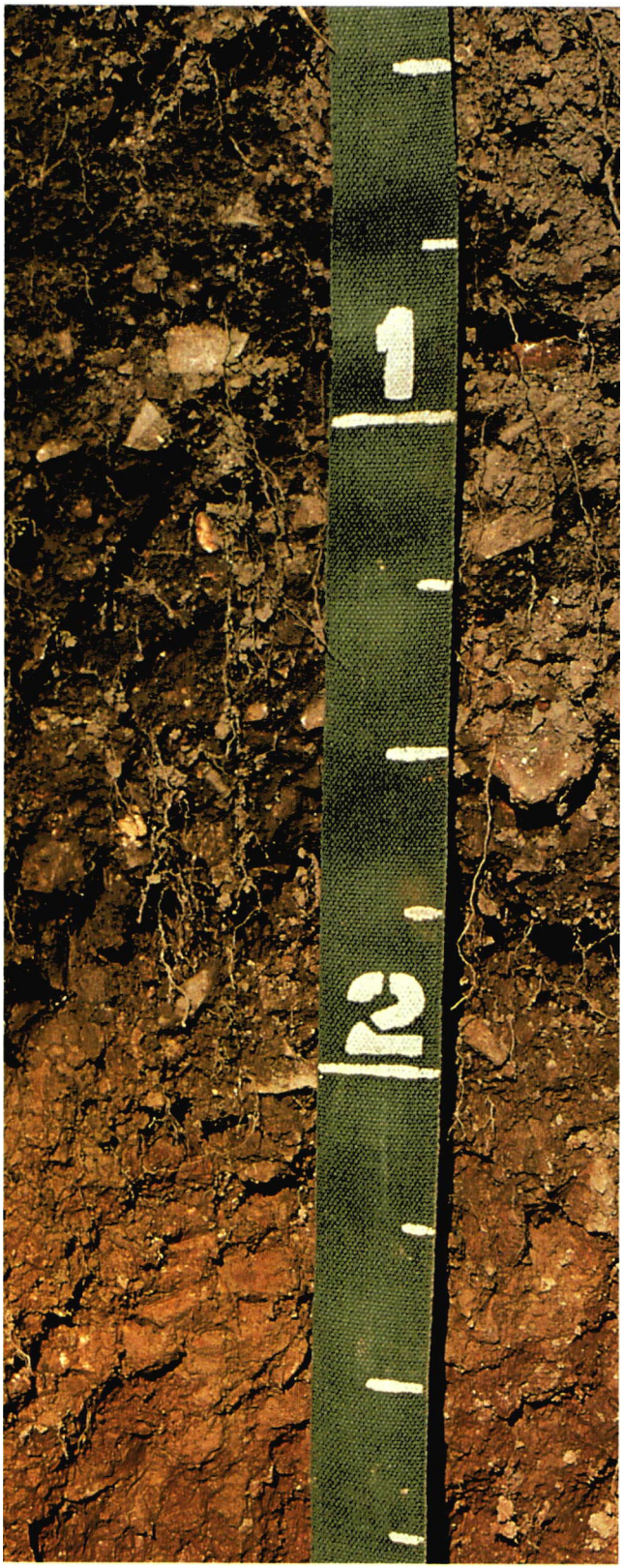


Figure 16.—Profile of Bona gravelly silt loam. This soil contains significant amounts of coarse fragments.

Elevation: 1,175 feet
Taxonomic class: Loamy, siliceous, superactive, mesic Lithic Dystrochrepts

Typical Pedon

Basehor fine sandy loam, 3 to 15 percent slopes, 3,750 feet west and 1,800 feet north of the southeast corner of sec. 21, T. 21 N., R. 33 W.; USGS Halfway topographic quadrangle; latitude 37 degrees 35 minutes 16 seconds N.; longitude 93 degrees 31 minutes 6 seconds E.; UTM coordinates 4,157,810 meters N. and 478,240 meters E.

A—0 to 6 inches; brown (10YR 4/3) fine sandy loam, brown (10YR 5/3) dry; weak very fine granular structure; very friable; many fine, common medium, and few coarse roots; 5 percent sandstone gravel and 3 percent chert gravel; very strongly acid; clear smooth boundary.
Bw1—6 to 11 inches; brown (10YR 5/3) fine sandy loam; weak very fine subangular blocky structure; very friable; many fine, few medium, and few coarse roots; 10 percent sandstone gravel and 5 percent chert gravel; very strongly acid; clear smooth boundary.
Bw2—11 to 15 inches; yellowish brown (10YR 5/4) fine sandy loam; weak very fine subangular blocky structure; friable; few fine and few coarse roots; very strongly acid; abrupt smooth boundary.
R—15 to 80 inches; sandstone.

Range in Characteristics

Thickness of the ochric epipedon: 2 to 6 inches
Depth to the cambic horizon: 2 to 6 inches
Depth to the lithic contact horizon: 4 to 20 inches

A horizon:
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Texture of the fine-earth fraction—fine sandy loam
Content of rock fragments—0 to 8 percent
Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

Bw horizon:
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—3, 4, or 6
Texture of the fine-earth fraction—loamy fine sand or fine sandy loam
Content of rock fragments—0 to 35 percent
Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

Blueye Series

Root restrictive depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Slow
Landform: Ridge or hill on plateau
Position on the landform: Backslope
Parent material: Local colluvium over clayey residuum over solid rock from dolomite
Slope range: Moderately sloping or strongly sloping (3 to 15 percent)
Elevation: 1,080 feet
Taxonomic class: Fine, mixed, active, mesic Typic Argiudolls

Typical Pedon

Blueye in an area of Blueye-Moko complex, 3 to 15 percent slopes, 2,000 feet north and 2,460 feet east of the southwest corner of sec. 27, T. 33 N., R. 22 W.; USGS Cedar Vista topographic quadrangle; latitude 37 degrees 33 minutes 28 seconds N.; longitude 93 degrees 19 minutes 42 seconds E.; UTM coordinates 4,156,560 meters N. and 470,540 meters E.

A1—0 to 9 inches; black (10YR 2/1) gravelly silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; many fine roots; 20 percent chert gravel; slightly acid; clear smooth boundary.
A2—9 to 15 inches; very dark grayish brown (10YR 3/2) gravelly silty clay loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many fine roots; 30 percent chert gravel; slightly acid; clear smooth boundary.
2Bt1—15 to 20 inches; yellowish brown (10YR 5/4) gravelly clay; weak fine subangular blocky structure; firm; common fine roots; prominent continuous clay films and prominent continuous very dark gray (10YR 3/1) organic coats on faces of peds; 30 percent chert gravel; neutral; clear smooth boundary.
2Bt2—20 to 35 inches; yellowish brown (10YR 5/6) clay; weak fine subangular blocky structure; firm; few fine roots; distinct continuous clay films on faces of peds; strong brown (7.5YR 5/8) masses of iron accumulation; slightly alkaline; abrupt wavy boundary.
2R—35 inches; dolostone.

Range in Characteristics

Depth to the lithic contact horizon: 29 to 35 inches

A horizon:
Hue—10YR

Value—2 or 3
Chroma—1 or 2
Texture of the fine-earth fraction—silt loam or silty clay loam
Content of rock fragments—15 to 30 percent
Reaction—slightly acid or neutral (pH 6.1 to 7.3)

2Bt horizon:
Hue—10YR
Value—4 or 5
Chroma—3, 4, or 6
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—clay
Content of rock fragments—0 to 30 percent
Reaction—neutral or slightly alkaline (pH 6.6 to 7.8)

Bolivar Series

Root restrictive depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Ridge on plateau
Position on the landform: Shoulder or summit
Parent material: Residuum from sandstone over solid rock from sandstone
Slope range: Moderately sloping (3 to 8 percent)
Elevation: 1,154 feet
Taxonomic class: Fine-loamy, mixed, active, thermic Ultic Hapludalfs

Typical Pedon

Bolivar loam, 3 to 8 percent slopes, 700 feet east and 100 feet south of the northwest corner of sec. 29, T. 33 N., R. 24 W.; USGS Aldrich topographic quadrangle; latitude 37 degrees 37 minutes 13 seconds N.; longitude 93 degrees 23 minutes 8 seconds E.; UTM coordinates 4,158,250 meters N. and meters 447,490 E.

Ap—0 to 9 inches; brown (10YR 4/3) loam; weak very fine granular structure; friable; many fine roots; slightly acid; clear smooth boundary.
Bt1—9 to 16 inches; brown (7.5YR 4/4) loam; weak very fine subangular blocky structure; friable; many fine roots; common distinct discontinuous clay films on faces of peds and common distinct continuous organic coats in root channels and/or pores; 3 percent sandstone gravel; slightly acid; gradual smooth boundary.
Bt2—16 to 25 inches; reddish brown (5YR 4/4) loam; moderate very fine subangular blocky structure; friable; common fine roots; common distinct continuous clay films on faces of peds; 3 percent sandstone gravel; moderately acid; gradual smooth boundary.
Bt3—25 to 32 inches; yellowish red (5YR 5/6) sandy clay loam; moderate very fine subangular blocky structure; firm; few fine roots; many distinct continuous clay films on faces of peds; 3 percent sandstone gravel; moderately acid; clear smooth boundary.
Bt4—32 to 38 inches; yellowish red (5YR 5/6) channery sandy loam; moderate very fine subangular blocky structure; firm; few fine roots; many distinct continuous clay films on faces of peds; 30 percent sandstone channers; moderately acid; clear wavy boundary.
Cr—38 to 42 inches; weathered sandstone.
R—42 to 52 inches; sandstone.

Range in Characteristics

Thickness of the ochric epipedon: 6 to 12 inches
Depth to the argillic horizon: 6 to 12 inches
Depth to the paralithic contact horizon: 20 to 40 inches

A horizon:
Hue—10YR
Value—3 or 4
Chroma—3
Texture of the fine-earth fraction—loam
Content of rock fragments—0 to 5 percent
Reaction—moderately acid to slightly acid (pH 5.6 to 6.5)

Bt horizon:
Hue—5YR, 7.5YR, or 10YR
Value—4 or 5
Chroma—4 or 6
Texture of the fine-earth fraction—sandy loam, loam, or clay loam
Content of rock fragments—3 to 30 percent
Reaction—strongly acid to slightly acid (pH 5.1 to 6.5)

Bona Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow
Landform: Ridge or hill on plateau
Position on the landform: Backslope, shoulder, or summit
Parent material: Local colluvium over residuum from cherty limestone over solid rock from limestone or dolostone

Slope range: Moderately sloping or strongly sloping (3 to 15 percent)
Elevation: 1,090 feet
Taxonomic class: Clayey-skeletal, mixed, semiactive, mesic Typic Paleudolls

Typical Pedon

Bona gravelly silt loam, 3 to 8 percent slopes (fig. 16), in a pasture, 1,425 feet west and 800 feet south of the northeast corner of sec. 21, T. 33 N., R. 23 W.; USGS Bolivar topographic quadrangle; latitude 27 degrees 32 minutes 24 seconds N.; longitude 93 degrees 27 minutes 17 seconds E.; UTM coordinates 4,159,290 meters N. and 459,800 meters E.

Ap—0 to 6 inches; very dark gray (10YR 3/1) gravelly silt loam, dark grayish brown (10YR 4/2) dry; weak medium granular structure; friable; many fine roots; 25 percent chert gravel; moderately acid; clear smooth boundary.
A—6 to 18 inches; very dark grayish brown (10YR 3/2) very gravelly silt loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; many fine roots; 55 percent chert gravel; slightly acid; gradual wavy boundary.
Bt1—18 to 24 inches; dark brown (7.5YR 3/4) extremely gravelly silt loam; weak fine subangular blocky structure; friable; common fine roots; many distinct continuous clay films on faces of peds; 65 percent chert gravel and 3 percent chert cobbles; slightly acid; gradual wavy boundary.
2Bt2—24 to 30 inches; yellowish red (5YR 4/6) very gravelly clay; moderate fine subangular blocky structure; firm; common fine roots; very few distinct continuous clay films on faces of peds; 45 percent chert gravel; moderately acid; gradual wavy boundary.
3Bt3—30 to 40 inches; red (2.5YR 4/6) clay; moderate fine angular blocky structure; firm; few fine roots; very few distinct continuous clay films on faces of peds; 10 percent chert gravel; very strongly acid; gradual wavy boundary.
3Bt4—40 to 72 inches; red (2.5YR 4/6) clay; moderate fine angular blocky structure; firm; few fine roots; very few distinct continuous clay films on faces of peds; common yellowish red (5YR 5/8) masses of iron accumulation; 10 percent chert gravel; very strongly acid; abrupt wavy boundary.
3R—72 to 80 inches; dolostone.

Range in Characteristics

Thickness of the mollic epipedon: 12 to 20 inches
Depth to the argillic horizon: 18 to 20 inches
Depth to the lithic contact horizon: 62 to 72 inches

Ap and A horizons:
Hue—10YR
Value—3
Chroma—1 or 2
Texture of the fine-earth fraction—silt loam
Content of rock fragments—15 to 60 percent
Reaction—moderately acid to neutral (pH 5.6 to 7.3)

Bt horizon:
Hue—2.5YR, 5YR, or 7.5YR
Value—3 or 4
Chroma—3, 4, or 6
Texture of the fine-earth fraction—silt loam or silty clay loam
Content of rock fragments—45 to 85 percent
Reaction—slightly acid or neutral (pH 6.1 to 7.3)

2Bt and 3Bt horizons:
Hue—2.5YR, 5YR, or 7.5YR
Value—4 or 5
Chroma—4 or 6
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—clay
Content of rock fragments—10 to 60 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

Cedargap Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plain on river valley
Parent material: Alluvium
Slope range: Nearly level or very gently sloping (0 to 3 percent)
Elevation: 915 feet
Taxonomic class: Loamy-skeletal, mixed, superactive, mesic Cumulic Hapludolls

Typical Pedon

Cedargap gravelly silt loam, 0 to 3 percent slopes, frequently flooded, in a pasture, 970 feet east and 2,500 feet north of the southwest corner of sec. 13, T. 35 N., R. 23 W.; USGS Elkton topographic quadrangle; latitude 37 degrees 47 minutes 13 seconds N.; longitude 93 degrees 25 minutes 25 seconds E.; UTM coordinates 4,182,050 meters N. and 462,580 meters E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) gravelly silt loam, dark grayish brown (10YR 4/2)

dry; weak fine granular structure; friable; many fine roots; 20 percent chert gravel; slightly alkaline; clear smooth boundary.

A1—7 to 11 inches; very dark gray (10YR 3/1) gravelly silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; many fine roots; 25 percent chert gravel; slightly alkaline; abrupt smooth boundary.

A3—11 to 20 inches; black (10YR 2/1) very gravelly clay loam, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; friable; many fine roots; 40 percent chert gravel; slightly alkaline; gradual wavy boundary.

A4—20 to 36 inches; very dark gray (10YR 3/1) very gravelly loam, dark gray (10YR 4/1) dry; strong fine subangular blocky structure; friable; few fine roots; 55 percent chert gravel; slightly alkaline; clear wavy boundary.

A5—36 to 65 inches; very dark grayish brown (10YR 3/2) very gravelly loam, dark grayish brown (10YR 4/2) dry; moderate fine subangular blocky structure; friable; few fine roots; few fine brown (10YR 4/3) masses of iron accumulation; 40 percent chert gravel, 10 percent chert cobbles, and 10 percent dolomite flagstones; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 51 to 65 inches

Ap and A horizons:
- Hue—10YR
- Value—2 or 3
- Chroma—1 or 2
- Redoximorphic features—masses of iron accumulation
- Texture of the fine-earth fraction—loam or silt loam
- Content of rock fragments—0 to 60 percent
- Reaction—slightly acid to slightly alkaline (pH 6.1 to 7.8)

Bw horizon (where present):
- Hue—10YR
- Value—3 or 4
- Chroma—1 to 4
- Redoximorphic features—masses of iron accumulation
- Texture of the fine-earth fraction—fine sandy loam
- Content of rock fragments—15 to 75 percent
- Reaction—neutral (pH 6.6 to 7.3)

C horizon (where present):
- Hue—10YR
- Value—2 to 4
- Chroma—1 to 4
- Texture of the fine-earth fraction—loam, sandy clay loam, clay loam, or clay
- Content of rock fragments—45 to 80 percent
- Reaction—slightly acid or neutral (pH 6.1 to 7.3)

Cliquot Series

Root restrictive depth: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Slow
Landform: Hill on plateau
Position on the landform: Backslope
Parent material: Local colluvium over residuum from sandstone-shale over solid rock from sandstone-shale
Slope range: Strongly sloping (8 to 15 percent)
Elevation: 950 feet
Taxonomic class: Fine, mixed, semiactive, mesic Oxyaquic Hapludults

Typical Pedon

Cliquot gravelly loam, 8 to 15 percent slopes, in forest land, 3,000 feet east and 2,700 feet south of the northwest corner of sec. 19, T. 34 N., R. 24 N.; USGS Fair Play topographic quadrangle; latitude 37 degrees 35 minutes 40 seconds N.; longitude 93 degrees 40 minutes 49 seconds W.; UTM coordinates 4,168,800 meters N. and 446,900 meters E.

A—0 to 2 inches; brown (10YR 4/3) gravelly loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; 20 percent sandstone gravel; very strongly acid; abrupt smooth boundary.

E1—2 to 6 inches; yellowish brown (10YR 5/4) very gravelly fine sandy loam; weak fine granular structure; friable; common fine roots; 50 percent sandstone gravel; very strongly acid; clear smooth boundary.

E2—6 to 13 inches; yellowish brown (10YR 5/4) very channery fine sandy loam; weak fine granular structure; friable; many fine roots; 50 percent sandstone channers; moderately acid; abrupt smooth boundary.

2Bt1—13 to 20 inches; strong brown (7.5YR 5/6) clay loam; weak fine subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; common fine yellowish red (5YR 4/6) and common fine brown (10YR 5/3) masses of iron accumulation; 5 percent shale channers; very strongly acid; clear smooth boundary.

2Bt2—20 to 41 inches; strong brown (7.5YR 5/6) clay loam; weak fine subangular blocky structure; firm; few fine roots; common distinct clay films on faces

of peds; common fine red (2.5YR 4/6), common fine light yellowish brown (2.5Y 6/4), and few fine yellowish brown (10YR 5/6) masses of iron accumulation; 5 percent shale channers; very strongly acid; abrupt smooth boundary.

2Cr—41 to 60 inches; shale.

Range in Characteristics

Depth to the paralithic contact horizon: 40 to 60 inches

A horizon:
- Hue—10YR
- Value—3 or 4
- Chroma—2 or 3
- Texture of the fine-earth fraction—loam
- Content of rock fragments—20 to 35 percent
- Reaction—very strongly acid (pH 4.5 to 5.0)

E horizon:
- Hue—10YR
- Value—5
- Chroma—4
- Texture of the fine-earth fraction—fine sandy loam
- Content of rock fragments—20 to 50 percent
- Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

2Bt horizon:
- Hue—7.5YR
- Value—5
- Chroma—6
- Redoximorphic features—masses of iron accumulation
- Texture of the fine-earth fraction—clay loam
- Content of rock fragments—0 to 5 percent
- Reaction—very strongly acid (pH 4.5 to 5.0)

Creldon Series

Root restrictive depth: Moderately deep (18 to 35 inches)
Drainage class: Moderately well drained
Permeability: Moderately slow above the fragipan; very slow in the fragipan
Landform: Interfluve on plateau
Position on the landform: Summit
Parent material: Loess over local colluvium over residuum from cherty limestone
Slope range: Very gently sloping (1 to 3 percent)
Elevation: 1,048 feet
Taxonomic class: Fine, mixed, active, mesic Oxyaquic Fragiudalfs

Typical Pedon

Creldon silt loam, 1 to 3 percent slopes (fig. 17), in a pasture, 500 feet east and 2,950 feet south of the northwest corner of sec. 31, T. 35 N., R. 21 W.; USGS Polk topographic quadrangle; latitude 37 degrees 44 minutes 19 seconds N.; longitude 93 degrees 17 minutes 53 seconds W.; UTM coordinates 4,176,670 meters N. and 473,590 meters E.

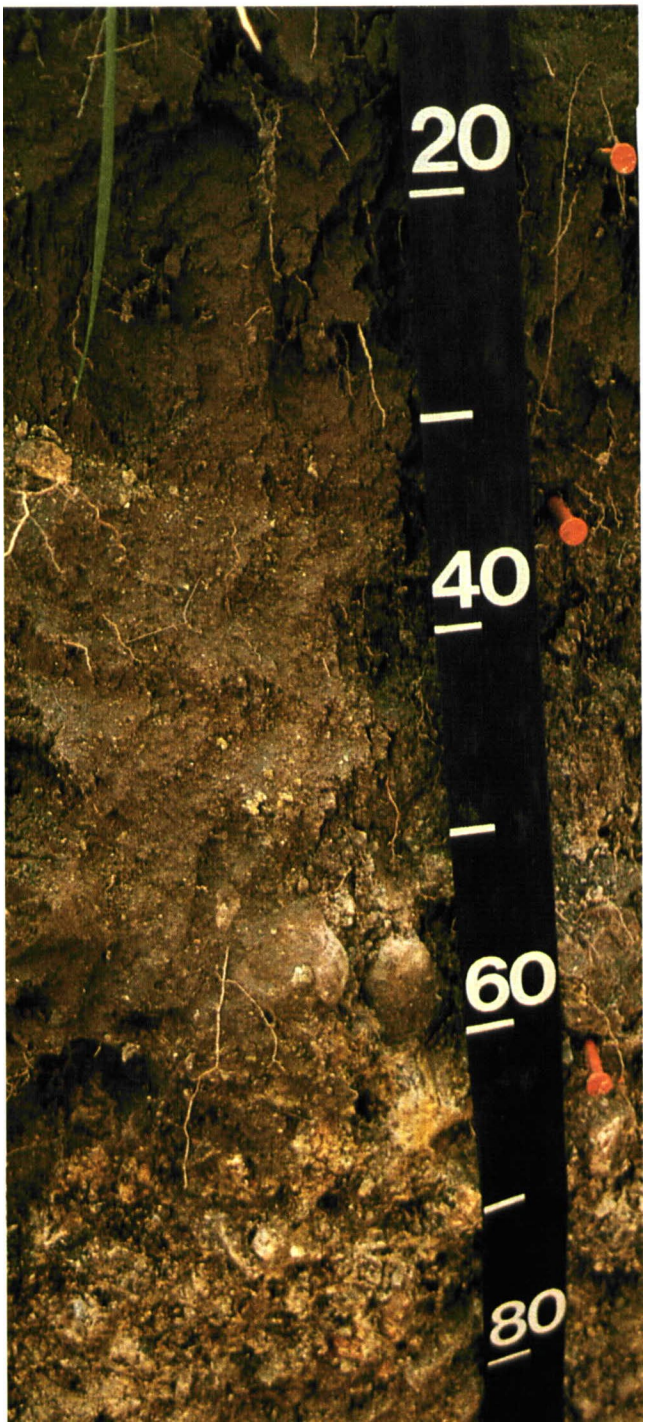


Figure 17.—Profile of Creldon silt loam. This dark surfaced soil has a fragipan at about 60 centimeters.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; many very fine to medium roots; strongly acid; clear smooth boundary.

A—6 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, dark gray (10YR 4/1) dry; moderate very fine subangular blocky structure; friable; many very fine to medium roots; moderately acid; clear smooth boundary.

Bt1—10 to 16 inches; brown (10YR 4/3) silty clay loam; moderate very fine subangular blocky structure; firm; common very fine roots; common distinct clay films on faces of peds; common fine dark red (2.5YR 3/6) masses of iron accumulation; strongly acid; gradual smooth boundary.

Bt2—16 to 24 inches; brown (10YR 5/3) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; many distinct clay films on faces of peds; many fine red (2.5YR 4/6) masses of iron accumulation; strongly acid; clear wavy boundary.

2Btx1—24 to 34 inches; light brownish gray (10YR 6/2), yellowish red (5YR 4/6), and strong brown (7.5YR 4/6) gravelly silt loam; moderate coarse prismatic structure parting to weak thin platy; very firm; few distinct clay films on faces of peds; few fine olive yellow (2.5Y 6/6) masses of iron accumulation and few fine iron-manganese concretions; 25 percent chert gravel; strongly acid; gradual wavy boundary.

3Btx2—34 to 42 inches; light brownish gray (10YR 6/2) and yellowish red (5YR 5/6) extremely cobbly silt loam; moderate coarse prismatic structure; very firm; few distinct clay films on faces of peds; many fine red (2.5YR 4/6) masses of iron accumulation and common fine masses of iron-manganese accumulation; 40 percent chert cobbles and 25 percent chert gravel; moderately acid; gradual smooth boundary.

3Btx3—42 to 51 inches; yellowish red (5YR 5/6) and brown (7.5YR 5/4) extremely cobbly silt loam; moderate coarse prismatic structure; very firm; few distinct clay films on faces of peds; few fine dark concretions; 40 percent chert cobbles and 30 percent chert gravel; slightly acid; gradual wavy boundary.

3Bt4—51 to 60 inches; strong brown (7.5YR 5/8) and red (2.5YR 4/6) clay; moderate coarse subangular blocky structure; very firm; common faint clay films on faces of peds; few fine dark concretions; 12 percent chert gravel; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 17 inches
Depth to the argillic horizon: 9 to 21 inches
Depth to the fragipan horizon: 23 to 30 inches

Ap and A horizons:
- Hue—10YR
- Value—3
- Chroma—2 or 3
- Texture of the fine-earth fraction—silt loam
- Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

BE horizon (where present):
- Hue—10YR
- Value—3
- Chroma—2
- Texture of the fine-earth fraction—silt loam
- Reaction—strongly acid (pH 5.1 to 5.5)

Bt horizon:
- Hue—5YR to 10YR
- Value—4 or 5
- Chroma—2, 3, 4, or 6
- Redoximorphic features—iron depletions or masses of iron accumulation
- Texture of the fine-earth fraction—silty clay loam or silty clay
- Content of rock fragments—0 to 5 percent
- Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

2Btx horizon:
- Hue—5YR, 7.5YR, or 10YR
- Value—4 to 6
- Chroma—2, 3, 4, or 6
- Redoximorphic features—iron depletions or masses of iron accumulation
- Texture of the fine-earth fraction—silt loam or silty clay loam
- Content of rock fragments—3 to 40 percent
- Reaction—strongly acid to slightly acid (pH 5.1 to 6.5)

2Bt horizon (where present):
- Hue—10YR
- Value—6
- Chroma—8
- Texture of the fine-earth fraction—silty clay
- Reaction—neutral (pH 6.6 to 7.3)

3Btx horizon:
- Hue—5YR, 7.5YR, or 10YR
- Value—5 or 6
- Chroma—2, 3, 4, or 6
- Redoximorphic features—masses of iron accumulation

Texture of the fine-earth fraction—silt loam
Content of rock fragments—65 to 70 percent
Reaction—moderately acid or slightly acid (pH 5.6 to 6.5)

3Bt horizon:
Hue—2.5YR or 7.5YR
Value—4 or 5
Chroma—4, 6, or 8
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay or clay
Content of rock fragments—5 to 12 percent
Reaction—slightly acid to slightly alkaline (pH 6.1 to 7.8)

Dameron Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plain on river valley
Parent material: Alluvium
Slope range: Nearly level or very gently sloping (0 to 3 percent)
Elevation: 950 feet
Taxonomic class: Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls

Typical Pedon

Dameron silt loam, 0 to 3 percent slopes, frequently flooded, in a pasture, 3,200 feet north and 2,800 feet west of the southeast corner of sec. 12, T. 31 N., R. 25 W.; USGS Dadeville topographic quadrangle; latitude 37 degrees 26 minutes 5 seconds N.; longitude 93 degrees 37 minutes 37 seconds W.; UTM coordinates 4,143,030 meters N. and 444,570 meters E.

A1—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many fine roots; strongly acid; clear smooth boundary.
A2—9 to 15 inches; very dark grayish brown (10YR 3/2) silty clay loam, brown (10YR 5/3) dry; weak fine granular structure; friable; many fine roots; moderately acid; clear smooth boundary.
Bw1—15 to 24 inches; dark brown (7.5YR 3/2) very gravelly clay loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; firm; common fine roots; 40 percent chert gravel; moderately acid; abrupt smooth boundary.
Bw2—24 to 48 inches; very dark brown (10YR 2/2) gravelly silty clay loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; firm; few fine roots; 20 percent chert gravel; moderately acid; abrupt smooth boundary.
Bw3—48 to 60 inches; very dark brown (10YR 2/2) gravelly silty clay loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; firm; few fine roots; 20 percent chert gravel; moderately acid; clear smooth boundary.
Bw4—60 to 72 inches; very dark brown (10YR 2/2) silty clay loam; weak fine subangular blocky structure; firm; few fine roots; slightly acid; clear smooth boundary.
Bw5—72 to 80 inches; very dark brown (10YR 2/2) extremely gravelly clay loam; weak fine subangular blocky structure; firm; few fine roots; 65 percent chert gravel; slightly acid.

Range in Characteristics

Thickness of the mollic epipedon: 70 to 80 inches

Ap horizon (where present):
Hue—10YR
Value—3
Chroma—2
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 15 percent
Reaction—strongly acid (pH 5.1 to 5.5)

A horizon:
Hue—10YR
Value—2 or 3
Chroma—2
Texture of the fine-earth fraction—loam, silt loam, or silty clay loam
Reaction—strongly acid or moderately acid (pH 5.1 to 6.0)

Bw horizon:
Hue—7.5YR or 10YR
Value—2 or 3
Chroma—2
Texture of the fine-earth fraction—clay loam or silty clay loam
Content of rock fragments—0 to 65 percent
Reaction—moderately acid or slightly acid (pH 5.6 to 6.5)

2Bw horizon (where present):
Hue—7.5YR or 10YR
Value—2 or 3
Chroma—1 or 2
Texture of the fine-earth fraction—loam, clay loam, or silty clay loam
Content of rock fragments—20 to 65 percent
Reaction—moderately acid (pH 5.6 to 6.0)

Gatewood Series

Root restrictive depth: Moderately deep (20 to 40 inches)
Drainage class: Moderately well drained
Permeability: Slow
Landform: Hill on plateau
Position on the landform: Backslope or shoulder
Parent material: Local colluvium over residuum from dolostone over solid rock from dolostone
Slope range: Moderately sloping to steep (3 to 35 percent)
Elevation: 930 feet
Taxonomic class: Very-fine, mixed, active, mesic Oxyaquic Hapludalfs

Typical Pedon

Ocie-Gatewood Complex, 8 to 15 percent slopes, in forest land, 1,500 feet south and 1,400 feet east of the northwest corner of sec. 15, T. 35 N., R. 22 W.; USGS Sentinel topographic quadrangle; latitude 37 degrees 47 minutes 15 seconds N.; longitude 93 degrees 20 minutes 43 seconds W.; UTM coordinates 4,182,120 meters N. and 469,200 meters E.

A—0 to 2 inches; black (10YR 2/1) gravelly silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; many medium roots; 20 percent chert gravel; strongly acid; clear smooth boundary.

E—2 to 13 inches; yellowish brown (10YR 5/4) very gravelly silt loam; weak fine granular structure; friable; many fine and medium roots; 50 percent chert gravel and 5 percent chert cobbles; moderately acid; clear wavy boundary.

2Bt1—13 to 17 inches; dark yellowish brown (10YR 4/4) gravelly clay; weak very fine subangular blocky structure; very firm; few fine roots; common distinct clay films on faces of peds; few fine strong brown (7.5YR 5/8) masses of iron accumulation; 30 percent chert gravel; slightly acid; gradual smooth boundary.

2Bt2—17 to 27 inches; dark yellowish brown (10YR 4/4) clay; weak very fine subangular blocky structure; very firm; few fine roots; common distinct clay films on faces of peds; few fine black (N 2/0) iron-manganese concretions and few fine strong brown (7.5YR 5/6) masses of iron accumulation; 5 percent chert gravel; slightly acid; abrupt smooth boundary.

2R—27 to 80 inches; dolostone.

Range in Characteristics

Thickness of the ochric epipedon: 4 to 13 inches
Depth to the argillic horizon: 7 to 15 inches
Depth to the lithic contact horizon: 20 to 40 inches

A horizon:
Hue—10YR
Value—2 to 4
Chroma—1 to 3
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 35 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

E horizon:
Hue—10YR
Value—5 or 6
Chroma—3 or 4
Texture of the fine-earth fraction—silt loam
Content of rock fragments—8 to 60 percent
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

2Bt horizon:
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—4, 6, or 8
Redoximorphic features—iron depletions, iron-manganese concretions, or masses of iron accumulation
Texture of the fine-earth fraction—clay
Content of rock fragments—3 to 35 percent
Reaction—moderately acid or slightly acid (pH 5.6 to 6.5)

Glensted Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Slow
Landform: Interfluve on plateau
Position on the landform: Summit
Parent material: Loess over local colluvium over residuum from limestone-shale
Slope range: Nearly level (0 to 2 percent)
Elevation: 1,115 feet
Taxonomic class: Fine, smectitic, mesic Vertic Albaqualfs

Typical Pedon

Glensted silt loam, 0 to 2 percent slopes, in a pasture, 150 feet south and 1,320 feet west of the northeast corner of sec. 36, T. 33 N., R. 23 W.; USGS Bolivar topographic quadrangle; latitude 37 degrees 33 minutes 35 seconds N.; longitude 93 degrees 23 minutes 32 seconds W.; UTM coordinates 4,156,160 meters N. and 433,640 meters E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many very fine roots; neutral; clear smooth boundary.
E—8 to 17 inches; grayish brown (10YR 5/2) silt loam; weak very fine subangular blocky structure; very friable; few very fine roots; common coarse dark yellowish brown (10YR 4/4) masses of iron accumulation and few fine iron-manganese concretions; moderately acid; abrupt smooth boundary.
Btg1—17 to 38 inches; dark grayish brown (10YR 4/2) clay; strong medium angular blocky structure; very firm; few very fine roots; many distinct clay films on faces of peds; common coarse dark yellowish brown (10YR 4/6) and common coarse reddish brown (2.5YR 4/4) masses of iron accumulation and few medium iron-manganese concretions; very strongly acid; gradual smooth boundary.
2Btg2—38 to 52 inches; dark gray (10YR 4/1) clay; moderate fine and medium angular blocky structure; very firm; few very fine roots; many distinct clay films on faces of peds; common coarse yellowish brown (10YR 5/4) masses of iron accumulation and few medium iron-manganese concretions; 2 percent chert gravel; slightly acid; gradual smooth boundary.
2Btg3—52 to 60 inches; dark gray (10YR 4/1) silty clay; moderate coarse angular blocky structure; very firm; common distinct clay films on faces of peds; many coarse dark yellowish brown (10YR 4/6) masses of iron accumulation and few medium iron-manganese concretions; 10 percent chert gravel; neutral.

Range in Characteristics

Thickness of the ochric epipedon: 6 to 17 inches
Depth to the argillic horizon: 8 to 17 inches

Ap horizon:
Hue—10YR
Value—3
Chroma—1 or 2
Texture of the fine-earth fraction—silt loam
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

E horizon:
Hue—10YR
Value—4 to 6
Chroma—1 or 2
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam
Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

Btg horizon:
Hue—10YR
Value—4 or 5
Chroma—1 or 2
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
Content of rock fragments—0 to 2 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

2Btg horizon:
Hue—10YR
Value—4 or 5
Chroma—1 or 2
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silty clay or clay
Content of rock fragments—2 to 10 percent
Reaction—slightly acid or neutral (pH 6.1 to 7.3)

Goodson Series

Root restrictive depth: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Ridge or hill on plateau
Position on the landform: Backslope, shoulder, or summit
Parent material: Loess over local colluvium over residuum from shale-siltstone
Slope range: Very gently sloping to strongly sloping (1 to 15 percent)
Elevation: 1,075 feet
Taxonomic class: Fine, mixed, active, mesic Oxyaquic Hapludalfs

Typical Pedon

Goodson gravelly silt loam, 3 to 8 percent slopes (fig. 18), in a pasture, 2,050 feet west and 350 feet north of the southeast corner of sec. 33, T. 35 N., R. 22 W.; USGS Polk topographic quadrangle; latitude 37 degrees 36 minutes 35 seconds N.; longitude 93 degrees 15 minutes 55 seconds W.; UTM coordinates 4,176,280 meters N. and 467,880 meters E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) gravelly silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; 20 percent chert gravel; slightly acid; clear smooth boundary.
Bt1—9 to 15 inches; brown (10YR 4/3) silty clay loam; moderate very fine subangular blocky structure;

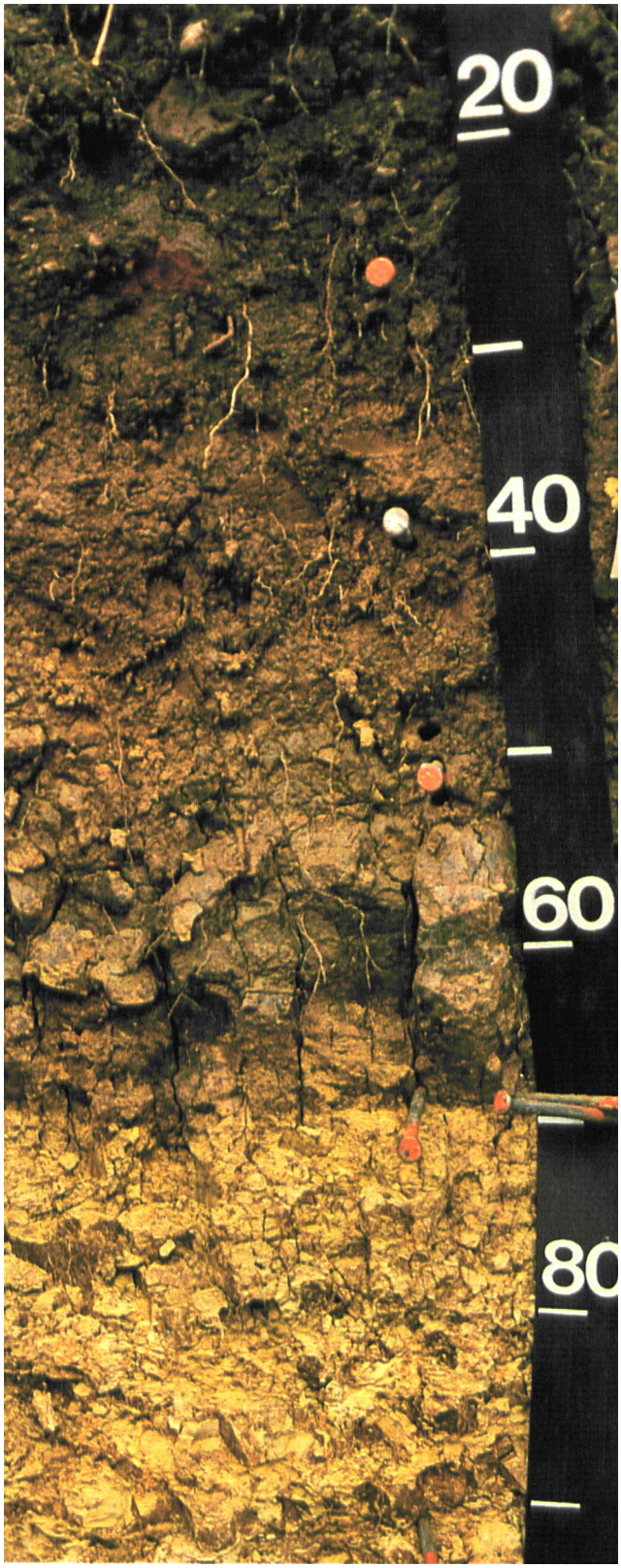


Figure 18.—Profile of Goodson gravelly silt loam. This soil has shale below 1 meter.

firm; many fine roots; many distinct clay films on faces of peds; common fine dark yellowish brown (10YR 4/4) and few fine yellowish red (5YR 4/6) masses of iron accumulation; 5 percent chert gravel; strongly acid; gradual smooth boundary.

2Bt2—15 to 22 inches; brown (7.5YR 5/4) clay; moderate very fine subangular blocky structure; firm; many fine roots; many distinct clay films on faces of peds; common fine strong brown (7.5YR 4/6) and few fine yellowish red (5YR 4/6) masses of iron accumulation; 3 percent chert gravel; very strongly acid; gradual smooth boundary.

2Bt3—22 to 32 inches; brownish yellow (10YR 6/6) silty clay; strong fine subangular blocky structure; very firm; common fine roots; common distinct clay films on faces of peds; few fine dark yellowish brown (10YR 4/6) masses of iron accumulation; 3 percent chert gravel; moderately acid; gradual smooth boundary.

3Bt4—32 to 37 inches; brownish yellow (10YR 6/6) and gray (10YR 6/1) silty clay loam; strong medium subangular blocky structure; very firm; few fine roots; common distinct clay films on faces of peds; 10 percent siltstone channers; slightly alkaline; clear wavy boundary.

3Bt5—37 to 44 inches; light olive gray (5Y 6/2) silty clay loam; strong medium and coarse subangular blocky structure; firm; few fine roots; common faint clay films on faces of peds; many medium olive yellow (2.5Y 6/6) masses of iron accumulation; moderately alkaline; gradual smooth boundary.

3Cr—44 to 54 inches; shale-siltstone.

Range in Characteristics

Thickness of the ochric epipedon: 6 to 15 inches
Depth to the argillic horizon: 6 to 15 inches
Depth to the paralithic contact horizon: 40 to 60 inches
Depth to the lithic contact horizon: 45 to more than 60 inches

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture of the fine-earth fraction—silt loam
Content of rock fragments—5 to 30 percent
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

BA horizon (where present):
Hue—10YR
Value—4
Chroma—3
Texture of the fine-earth fraction—silt loam
Reaction—moderately acid (pH 5.6 to 6.0)

Bt horizon:
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silt loam, or silty clay loam
Content of rock fragments—0 to 60 percent
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

2Bt horizon:
Hue—5YR, 7.5YR, 10YR, or 2.5Y
Value—4 to 6
Chroma—3, 4, 6, or 8
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay or clay
Content of rock fragments—0 to 10 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

3Bt horizon:
Hue—10YR or 5Y
Value—6
Chroma—1, 2, 3, 4, or 6
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam
Content of rock fragments—0 to 10 percent
Reaction—slightly alkaline or moderately alkaline (pH 7.4 to 8.4)

Goss Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Ridge or hill on plateau
Position on the landform: Backslope, shoulder, or summit
Parent material: Local colluvium over residuum from cherty limestone or dolostone
Slope range: Moderately sloping to steep (3 to 35 percent)
Elevation: 1,185 feet
Taxonomic class: Clayey-skeletal, mixed, active, mesic Typic Paleudalfs

Typical Pedon

Goss gravelly silt loam, 8 to 15 percent slopes, in a pasture, 2,000 feet east and 1,950 feet south of the northwest corner of sec. 12, T. 31 N., R. 22 W.; USGS Pleasant Hope topographic quadrangle; latitude 37 degrees 25 minutes 45 seconds N.; longitude 93 degrees 18 minutes 8 seconds W.; UTM coordinates 4,142,330 meters N. and 473,230 meters E.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) gravelly silt loam, light brownish gray (10YR 6/2) dry; weak very fine granular structure; very friable; many medium and coarse roots; 25 percent chert gravel; slightly acid; clear smooth boundary.
E—4 to 10 inches; light yellowish brown (10YR 6/4) very gravelly silt loam; weak very fine granular structure; very friable; many medium and coarse roots; 40 percent chert gravel and 20 percent chert cobbles; strongly acid; clear wavy boundary.
BE—10 to 16 inches; light brown (7.5YR 6/4) very gravelly silt loam; moderate very fine subangular blocky structure; very friable; common fine to coarse roots; few faint silt coats on faces of peds; many fine strong brown (7.5YR 5/6) masses of iron accumulation; 40 percent chert gravel and 20 percent chert cobbles; moderately acid; gradual wavy boundary.
Bt1—16 to 47 inches; brown (7.5YR 5/4), yellowish red (5YR 5/6), and red (10R 4/6) very cobbly clay; moderate very fine subangular blocky structure; very firm; few very fine roots; many distinct clay films on faces of peds; 20 percent chert cobbles and 15 percent chert gravel; very strongly acid; gradual smooth boundary.
Bt2—47 to 60 inches; yellowish red (5YR 5/8), red (2.5YR 5/8), and red (10R 4/8) very cobbly clay; moderate fine angular blocky structure; very firm; many prominent clay films on faces of peds; 30 percent chert cobbles and 10 percent chert gravel; very strongly acid.

Range in Characteristics

Thickness of the ochric epipedon: 6 to 24 inches
Depth to the argillic horizon: 6 to 24 inches
Depth to the lithic contact horizon: 61 to 82 inches

A horizon:
Hue—7.5YR or 10YR
Value—2 to 4
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam
Content of rock fragments—15 to 55 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

E horizon:
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—3 or 4
Texture of the fine-earth fraction—silt loam

Content of rock fragments—22 to 75 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

BE horizon:
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—3 or 4
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam or silty clay loam
Content of rock fragments—45 to 70 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

Bt horizon:
Hue—10R, 2.5YR, 5YR, or 7.5YR
Value—3 to 6
Chroma—3, 4, 6, or 8
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
Content of rock fragments—5 to 80 percent
Reaction—very strongly acid to moderately alkaline (pH 4.5 to 8.4)

2Bt horizon (where present):
Hue—10R, 2.5YR, 5YR, or 7.5YR
Value—3 to 5
Chroma—3, 4, 6, or 8
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
Content of rock fragments—1 to 70 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

3Bt horizon (where present):
Hue—10R, 2.5YR, or 7.5YR
Value—4
Chroma—3, 4, 6, or 8
Texture of the fine-earth fraction—clay
Content of rock fragments—15 to 55 percent
Reaction—slightly acid or neutral (pH 6.1 to 7.3)

Hartville Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Hill on plateau
Position on the landform: Footslope or toeslope
Parent material: Colluvium
Slope range: Moderately sloping (3 to 8 percent)
Elevation: 915 feet
Taxonomic class: Fine, mixed, active, mesic Aquic Hapludalfs

Typical Pedon

Hartville silt loam, 3 to 8 percent slopes, in cropland, 1,400 feet north and 1,050 feet east of the southwest corner of sec. 28, T. 35 N., R. 21 W.; USGS Polk topographic quadrangle; latitude 37 degrees 44 minutes 58 seconds N.; longitude 93 degrees 15 minutes 14 seconds W.; UTM coordinates 4,177,890 meters N. and 477,050 meters E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many fine roots; strongly acid; clear smooth boundary.

Bt1—7 to 12 inches; yellowish brown (10YR 5/4) silty clay loam; weak very fine subangular blocky structure; friable; few fine roots; very few distinct clay films and silt coats on faces of peds; slightly acid; clear smooth boundary.

Bt2—12 to 23 inches; yellowish brown (10YR 5/6) silty clay; moderate very fine subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; few fine yellowish brown (10YR 5/8) masses of iron accumulation, common fine grayish brown (10YR 5/2) iron depletions, and few iron-manganese concretions throughout; moderately acid; gradual smooth boundary.

2Bt3—23 to 35 inches; grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) silty clay; moderate very fine subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; few fine yellowish brown (10YR 5/8) masses of iron accumulation and few iron-manganese concretions throughout; 3 percent chert gravel; neutral; gradual smooth boundary.

2Bt4—35 to 44 inches; grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) silty clay; moderate fine subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; common fine dark yellowish brown (10YR 4/4) masses of iron accumulation and few iron-manganese concretions throughout; 3 percent chert gravel; neutral; gradual smooth boundary.

2Bt5—44 to 57 inches; light brownish gray (10YR 6/2) silty clay; moderate fine subangular blocky structure; firm; common distinct clay films on faces of peds; few fine yellowish brown (10YR 5/8) and few fine dark yellowish brown (10YR 4/4) masses of iron accumulation and few iron-manganese concretions throughout; 3 percent chert gravel; slightly alkaline; gradual smooth boundary.

2Bt6—57 to 60 inches; yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) silty clay; moderate medium subangular blocky structure; firm; few distinct clay films on faces of peds; common fine yellowish brown (10YR 5/8) masses of iron accumulation and few iron-manganese concretions throughout; 3 percent chert gravel; slightly alkaline.

Range in Characteristics

Thickness of the ochric epipedon: 7 to 17 inches
Depth to the argillic horizon: 7 to 17 inches

Ap horizon:
Hue—10YR
Value—4 or 5
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

E horizon (where present):
Hue—10YR
Value—5 or 6
Chroma—3 or 4
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam
Reaction—moderately acid to neutral (pH 5.6 to 7.3)

Bt horizon:
Hue—10YR
Value—4 or 5
Chroma—3, 4, or 6
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam or silty clay
Reaction—strongly acid to slightly acid (pH 5.1 to 6.5)

2Bt horizon:
Hue—10YR
Value—5 or 6
Chroma—2 , 3, 4, or 6
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silty clay
Reaction—neutral or slightly acid (pH 6.6 to 6.5)

Hoberg Series

Root restrictive depth: Moderately deep (20 to 40 inches)
Drainage class: Moderately well drained

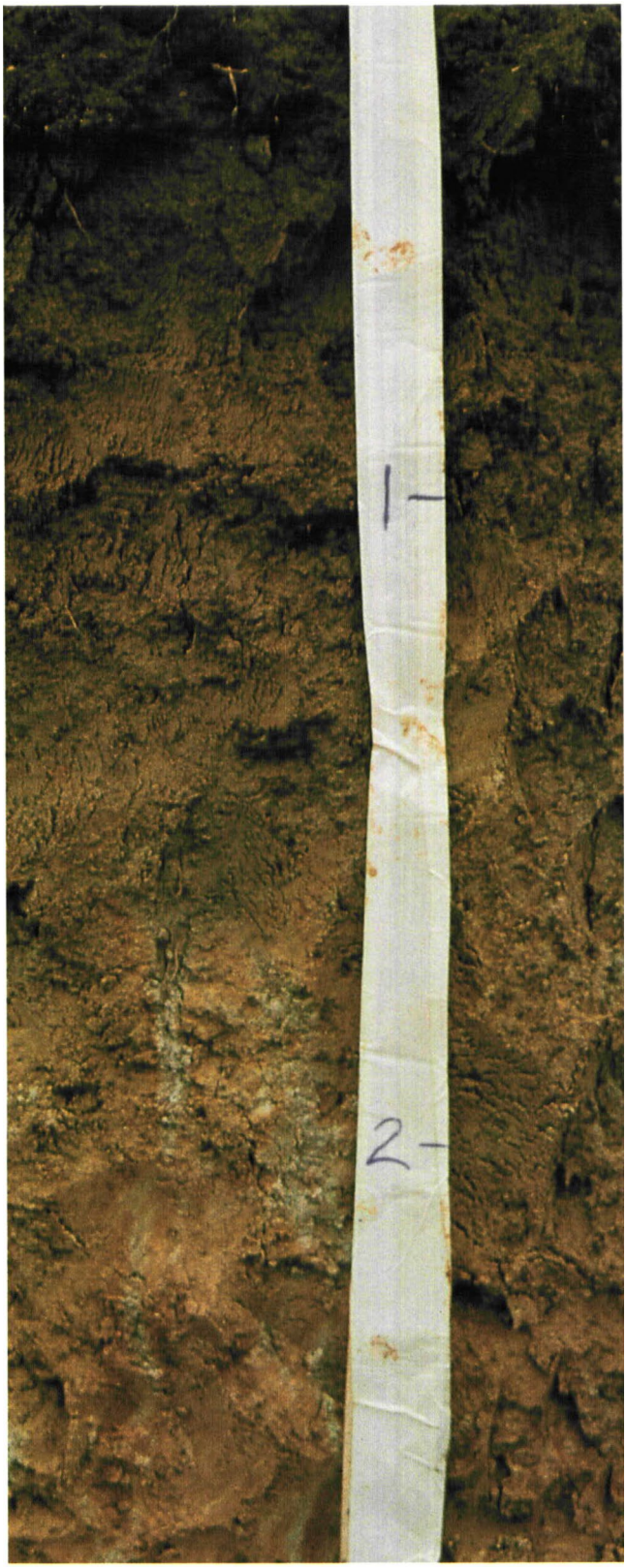


Figure 19.—Profile of Hoberg silt loam. This dark surfaced loamy soil has a fragipan at about 18 inches.

Permeability: Moderate above the fragipan; slow in the fragipan
Landform: Ridge on plateau
Position on the landform: Shoulder or summit
Parent material: Loess over local colluvium over residuum from cherty limestone
Slope range: Gently sloping (2 to 5 percent)
Elevation: 1,140 feet
Taxonomic class: Fine-loamy, siliceous, active, mesic Oxyaquic Fragiudalfs

Typical Pedon

Hoberg silt loam, 2 to 5 percent slopes (fig. 19), in a pasture, 850 feet north and 1,600 feet east of the southwest corner of sec. 25, T. 34 N., R. 21 W.; USGS Buffalo NW topographic quadrangle; latitude 37 degrees 5 minutes 34 seconds N.; longitude 93 degrees 55 minutes 38 seconds W.; UTM coordinates 4,165,420 meters N. and 483,320 meters E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

A—7 to 17 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak very fine subangular blocky structure; friable; many fine roots; moderately acid; clear smooth boundary.

BE—17 to 21 inches; brown (10YR 4/3) silt loam; weak very fine subangular blocky structure; firm; common fine roots; few fine dark yellowish brown (10YR 4/6) masses of iron accumulation; moderately acid; clear smooth boundary.

Bt1—21 to 27 inches; brown (7.5YR 5/4) silty clay loam; weak fine subangular blocky structure; firm; common fine roots; few distinct dark brown (10YR 3/3) clay films on faces of peds; common fine reddish brown (5YR 4/4) masses of iron accumulation and many fine pale brown (10YR 6/3) iron depletions; 10 percent chert gravel; strongly acid; abrupt wavy boundary.

2Btx—27 to 40 inches; light brown (7.5YR 6/4) and reddish brown (5YR 4/4) gravelly silt loam; moderate very coarse prismatic structure parting to moderate medium platy; firm, brittle; few fine roots in cracks; few distinct clay films on faces of peds; few fine pinkish gray (7.5YR 6/2) iron depletions; 20 percent chert gravel; strongly acid; abrupt wavy boundary.

3Bt1—40 to 60 inches; red (2.5YR 4/6) and yellowish red (5YR 5/6) gravelly clay; strong fine subangular blocky structure; very firm; common faint clay films on faces of peds; 15 percent chert gravel; very strongly acid.

Range in Characteristics

Depth to the argillic horizon: 13 to 21 inches
Depth to the fragipan horizon: 26 to 36 inches

Ap horizon:
Hue—10YR
Value—3
Chroma—2
Texture of the fine-earth fraction—silt loam
Reaction—strongly acid (pH 5.1 to 5.5)

A horizon:
Hue—10YR
Value—3
Chroma—2
Texture of the fine-earth fraction—silt loam
Reaction—moderately acid (pH 5.6 to 6.0)

BE horizon:
Hue—10YR
Value—4
Chroma—3
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam
Reaction—moderately acid (pH 5.6 to 6.0)

Bt horizon:
Hue—7.5YR
Value—3 to 5
Chroma—3, 4, or 6
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam
Content of rock fragments—0 to 10 percent
Reaction—strongly acid (pH 5.1 to 5.5)

2Btx horizon:
Hue—2.5YR, 5YR, or 7.5YR
Value—4 to 6
Chroma—4 or 6
Redoximorphic features—iron depletions
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 20 percent
Reaction—strongly acid (pH 5.1 to 5.5)

3Bt horizon:
Hue—2.5YR or 5YR
Value—4 or 5
Chroma—4 or 6
Texture of the fine-earth fraction—clay
Content of rock fragments—10 to 15 percent
Reaction—very strongly acid (pH 4.5 to 5.0)

Horsecreek Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Stream terrace on river valley
Parent material: Alluvium
Slope range: Nearly level (0 to 2 percent)
Elevation: 1,000 feet
Taxonomic class: Fine-silty, mixed, active, mesic Mollic Hapludalfs

Typical Pedon

Horsecreek silt loam, 0 to 2 percent slopes, occasionally flooded, in hayland, 2,460 feet south and 500 feet east of the northwest corner of sec. 18, T. 32 N., R. 21 W.; USGS Cedar Vista topographic quadrangle; latitude 37 degrees 30 minutes 0 seconds N.; longitude 93 degrees 31 minutes 46 seconds E.; UTM coordinates 4,150,210 meters N. and 474,580 meters E.

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate fine granular structure; friable; common fine and common medium roots; slightly acid; clear smooth boundary.
A—9 to 18 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine subangular blocky structure; friable; common fine and few medium roots; few distinct silt coats on faces of peds; neutral; gradual smooth boundary.
Bt1—18 to 53 inches; brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; firm; common fine roots; distinct continuous clay films and common distinct silt coats on faces of peds; strongly acid; gradual smooth boundary.
Bt2—53 to 60 inches; dark brown (7.5YR 3/4) silty clay loam; moderate coarse subangular blocky structure; firm; few fine roots; distinct continuous clay films and few distinct silt coats on faces of peds; strongly acid.

Range in Characteristics

Thickness of the ochric epipedon: 8 to 18 inches
Depth to the argillic horizon: 8 to 18 inches

Ap horizon:
Hue—10YR
Value—3
Chroma—2 or 3
Texture of the fine-earth fraction—silt loam
Reaction—slightly acid (pH 6.1 to 6.5)

A horizon:
Hue—10YR
Value—4
Chroma—3 or 4
Texture of the fine-earth fraction—silt loam
Reaction—neutral (pH 6.6 to 7.3)

Bt horizon:
Hue—7.5YR or 10YR
Value—3 to 5
Chroma—3, 4, or 6
Redoximorphic features—iron depletions
Texture of the fine-earth fraction—silt loam or silty clay loam
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

Humansville Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Moderately slow
Landform: Flood plain on river valley
Parent material: Alluvium
Slope range: Nearly level (0 to 2 percent)
Elevation: 890 feet
Taxonomic class: Fine-silty, mixed, superactive, mesic Cumulic Endoaquolls

Typical Pedon

Humansville silt loam, 0 to 2 percent slopes, frequently flooded, in cropland, 2,000 feet north and 2,400 feet west of the southeast corner of sec. 20, T. 35 N., R. 21 W.; USGS Sentinel topographic quadrangle; latitude 37 degrees 34 minutes 58 seconds N.; longitude 93 degrees 28 minutes 8 seconds W.; UTM coordinates 4,179,710 meters N. and 476,020 meters E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; common very fine roots; moderately acid; clear smooth boundary.
A—7 to 24 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine granular structure; firm; common brown (10YR 4/3) masses of iron accumulation; slightly acid; gradual smooth boundary.
Bg1—24 to 44 inches; dark grayish brown (10YR 4/2) silty clay loam; weak fine subangular blocky structure; firm; many distinct very dark gray (10YR 3/1) organic coats on faces of peds; few fine dark yellowish brown (10YR 4/4) masses of iron accumulation; neutral; gradual smooth boundary.
Bg2—44 to 60 inches; grayish brown (10YR 5/2) silty

clay loam; moderate fine subangular blocky structure; firm; common distinct very dark gray (10YR 3/1) organic coats on faces of peds; common dark yellowish brown (10YR 4/4) and common dark yellowish brown (10YR 4/6) masses of iron accumulation; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 30 inches
Depth to the cambic horizon: 24 to 30 inches

Ap horizon:
Hue—10YR
Value—3
Chroma—2
Texture of the fine-earth fraction—silt loam
Reaction—strongly acid or moderately acid (pH 5.1 to 6.0)

A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam or silty clay loam
Reaction—slightly acid (pH 6.1 to 6.5)

Bg horizon:
Hue—10YR
Value—4 to 6
Chroma—2
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam
Content of rock fragments—0 to 3 percent
Reaction—moderately acid to neutral (pH 5.6 to 7.3)

Liberal Series

Root restrictive depth: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Slow
Landform: Hill on plateau
Position on the landform: Backslope or footslope
Parent material: Local colluvium over residuum from shale-siltstone over solid rock from shale-siltstone
Slope range: Moderately sloping (3 to 8 percent)
Elevation: 1,090 feet
Taxonomic class: Fine, mixed, active, thermic Aquollic Hapludalfs

Typical Pedon

Liberal silt loam, 3 to 8 percent slopes, in cropland, 1,400 feet north and 2,000 feet east of the southwest corner of sec. 7, T. 34 N., R. 21 W.; USGS Polk topographic quadrangle; latitude 37 degrees 42 minutes 15 seconds N.; longitude 93 degrees 19 minutes 4 seconds W.; UTM coordinates 4,170,680 meters N. and 475,670 meters E.

Ap—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.
A—4 to 9 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many fine roots; strongly acid; clear smooth boundary.
Bt1—9 to 14 inches; brown (10YR 4/3) silty clay; weak fine subangular blocky structure; firm; common fine roots; common distinct clay films and few distinct silt coats on faces of peds; few fine yellowish red (5YR 4/6) masses of iron accumulation and few fine iron-manganese concretions; moderately acid; clear smooth boundary.
Bt2—14 to 23 inches; yellowish brown (10YR 5/6) silty clay loam; weak fine subangular blocky structure; firm; common fine roots; many distinct clay films on faces of peds; common fine yellowish brown (10YR 5/8) masses of iron accumulation, many iron-manganese concretions, and many medium grayish brown (10YR 5/2) iron depletions; very strongly acid; clear smooth boundary.
Bt3—23 to 40 inches; yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) silty clay; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; few manganese or iron-manganese stains; moderately acid; gradual smooth boundary.
BC—40 to 50 inches; brownish yellow (10YR 6/8) and grayish brown (10YR 5/2) silty clay loam; weak very fine subangular blocky structure; firm; few fine roots; few manganese or iron-manganese stains; neutral; clear wavy boundary.
Cr—50 to 55 inches; weathered siltstone.
R—55 to 60 inches; siltstone.

Range in Characteristics

Thickness of the ochric epipedon: 7 to 9 inches
Depth to the argillic horizon: 7 to 9 inches
Depth to the paralithic contact horizon: 40 to 59 inches
Depth to the lithic contact horizon: 50 to 62 inches

Ap horizon:
Hue—10YR

Value—3
Chroma—1 or 2
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 10 percent
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

A horizon:
Hue—10YR
Value—3
Chroma—1 or 2
Texture of the fine-earth fraction—silt loam
Reaction—strongly acid (pH 5.1 to 5.5)

Bt horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1, 2, 3, 4, or 6
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
Content of rock fragments—0 to 10 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

BC horizon:
Hue—10YR
Value—5 or 6
Chroma—2, 3, 4, 6, or 8
Texture of the fine-earth fraction—silty clay loam
Reaction—neutral (pH 6.6 to 7.3)

McGirk Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Slow
Landform: Hill on plateau
Position on the landform: Footslope
Parent material: Local colluvium
Slope range: Very gently sloping (1 to 3 percent)
Elevation: 875 feet
Taxonomic class: Fine, smectitic, mesic Chromic Vertic Edoaqualfs

Typical Pedon

McGirk silt loam, 1 to 3 percent slopes, in cropland, 250 feet west and 2,300 feet north of the southeast corner of sec. 33, T. 33 N., R. 24 W.; USGS Aldrich topographic quadrangle; latitude 37 degrees 32 minutes 56 seconds N.; longitude 93 degrees 33 minutes 32 seconds W.; UTM coordinates 4,155,710 meters N. and 450,330 meters E.

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

BEg—4 to 9 inches; grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) silty clay loam; weak fine granular structure; friable; few fine roots; strongly acid; abrupt smooth boundary.

Btg1—9 to 15 inches; dark gray (10YR 4/1) silty clay; weak fine subangular blocky structure; firm; few fine roots; common prominent clay films on faces of peds; many medium yellowish red (5YR 4/6) masses of iron accumulation and common black (N 2/0) hard and soft iron-manganese concretions; very strongly acid; clear smooth boundary.

Btg2—15 to 30 inches; dark gray (10YR 4/1) silty clay; weak very fine subangular blocky structure; firm; few prominent clay films on faces of peds; common medium dark yellowish brown (10YR 4/6) masses of iron accumulation; 3 percent chert gravel; strongly acid; gradual smooth boundary.

2Btg3—30 to 60 inches; dark gray (10YR 4/1) silty clay; weak very fine subangular blocky structure; firm; very few prominent clay films on faces of peds; common medium dark yellowish brown (10YR 4/6) masses of iron accumulation; 3 percent chert gravel; slightly acid.

Range in Characteristics

Ap horizon:
Hue—10YR
Value—4
Chroma—2
Texture of the fine-earth fraction—silt loam
Reaction—neutral (pH 6.6 to 7.3)

BEg horizon:
Hue—10YR
Value—4 or 5
Chroma—2
Texture of the fine-earth fraction—silty clay loam
Reaction—strongly acid (pH 5.1 to 5.5)

Btg horizon:
Hue—10YR
Value—4
Chroma—1
Redoximorphic features—iron-manganese concretions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay
Content of rock fragments—0 to 3 percent
Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

2Btg horizon:
Hue—10YR

Value—4
Chroma—1
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silty clay
Content of rock fragments—0 to 3 percent
Reaction—slightly acid (pH 6.1 to 6.5)

Moko Series

Root restrictive depth: Shallow (4 to 20 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Ridge or hill on plateau
Position on the landform: Backslope, shoulder, or summit
Parent material: Residuum from dolostone or limestone over solid rock from dolostone or limestone
Slope range: Moderately sloping to steep (3 to 35 percent)
Elevation: 980 feet
Taxonomic class: Loamy-skeletal, mixed, superactive, mesic Lithic Hapludolls

Typical Pedon

Moko very gravelly silt loam, 3 to 15 percent slopes, in forest land, 1,400 feet west and 2,600 feet south of the northeast corner of sec. 15, T. 35 N., R. 22 W.; USGS Sentinel topographic quadrangle; latitude 37 degrees 47 minutes 3 seconds N.; longitude 93 degrees 20 minutes 28 seconds W.; UTM coordinates 4,182,120 meters N. and 479,630 meters E.

A1—0 to 7 inches; very dark gray (10YR 3/1) very gravelly silt loam, dark gray (10YR 4/1) dry; strong fine granular structure; very friable; many fine roots; 45 percent chert gravel; moderately alkaline; gradual smooth boundary.
A2—7 to 12 inches; very dark gray (10YR 3/1) very flaggy silt loam, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; friable; common fine roots; 20 percent chert gravel and 40 percent dolomite flagstones; moderately alkaline; gradual smooth boundary.
R—12 to 80 inches; dolostone.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 15 inches
Depth to the lithic contact horizon: 4 to 20 inches

A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture of the fine-earth fraction—silt loam, clay loam, or silty clay loam
Content of rock fragments—20 to 70 percent
Reaction—neutral to moderately alkaline (pH 6.6 to 8.4)

Moniteau Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Moderately slow
Landform: Stream terrace on river valley
Parent material: Alluvium
Slope range: Nearly level (0 to 2 percent)
Elevation: 885 feet
Taxonomic class: Fine-silty, mixed, superactive, mesic Typic Endoaqualfs

Typical Pedon

Moniteau silt loam, 0 to 2 percent slopes, occasionally flooded, in cropland, 1,320 feet south and 500 feet west of the northeast corner of sec. 30, T. 35 N., R. 21 W.; USGS Sentinel topographic quadrangle; latitude 37 degrees 43 minutes 30 seconds N.; longitude 93 degrees 13 minutes 31 seconds W.; UTM coordinates 4,178,700 meters N. and 474,960 meters E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, light gray (10YR 7/2) dry; weak fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.
E—6 to 18 inches; grayish brown (10YR 5/2) silt loam; moderate fine granular structure; very friable; common fine roots; few distinct manganese or iron-manganese stains; slightly acid; clear smooth boundary.
Btg1—18 to 27 inches; dark grayish brown (10YR 4/2) silt loam; weak very fine subangular blocky structure; very friable; common fine roots; common distinct clay films and common distinct light brownish gray (10YR 6/2) silt coats on faces of peds; few fine iron-manganese concretions and common fine dark yellowish brown (10YR 4/4) masses of iron accumulation; strongly acid; gradual smooth boundary.
Btg2—27 to 36 inches; grayish brown (10YR 5/2) silty clay loam; weak very fine subangular blocky structure; firm; common fine roots; few distinct clay films and common distinct light brownish gray (10YR 6/2) silt coats on faces of peds; common fine dark yellowish brown (10YR 4/6) masses of iron accumulation and few fine iron-manganese

concretions throughout; very strongly acid; gradual smooth boundary.
Btg3—36 to 60 inches; gray (10YR 5/1) silty clay loam; weak very fine subangular blocky structure; firm; few fine roots; few distinct clay films and common distinct light brownish gray (10YR 6/2) silt coats on faces of peds; common fine iron-manganese concretions; strongly acid.

Range in Characteristics

Thickness of the ochric epipedon: 9 to 18 inches
Depth to the argillic horizon: 18 to 22 inches
Depth to the albic horizon: 6 to 9 inches

Ap horizon:
Hue—10YR
Value—4 or 5
Chroma—2
Texture of the fine-earth fraction—silt loam
Reaction—slightly acid (pH 6.1 to 6.5)

E horizon:
Hue—10YR
Value—5 to 7
Chroma—1 or 2
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam
Reaction—strongly acid to slightly acid (pH 5.1 to 6.5)

Btg horizon:
Hue—10YR
Value—4 or 5
Chroma—1 or 2
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam or silty clay loam
Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

Ocie Series

Root restrictive depth: Deep (40 to 60 inches)
Drainage class: Moderately well drained
Permeability: Slow
Landform: Ridge or hill on plateau
Position on the landform: Backslope or shoulder
Parent material: Colluvium over residuum from dolostone over solid rock from dolostone
Slope range: Moderately sloping to steep (3 to 35 percent)
Elevation: 1,000 feet
Taxonomic class: Loamy-skeletal over clayey, mixed, semiactive, mesic Oxyaquic Hapludalfs

Typical Pedon

Ocie gravelly silt loam, 3 to 15 percent slopes, in forest land, 400 feet west and 2,000 feet south of the northeast corner of section 28, T. 35 N., R. 21 W.; USGS Urbana topographic quadrangle; latitude 37 degrees 40 minutes 17 seconds N.; longitude 93 degrees 14 minutes 50 seconds W.; UTM coordinates 4,178,420 meters N. and 483,320 meters E.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) gravelly silt loam, grayish brown (10YR 5/2) dry; moderate very fine granular structure; friable; many coarse roots; 35 percent chert gravel; neutral; clear smooth boundary.
E—4 to 10 inches; brown (10YR 5/3) very gravelly silt loam; weak very fine subangular blocky structure; friable; many coarse roots; 40 percent chert gravel; slightly acid; clear smooth boundary.
Bt1—10 to 19 inches; yellowish brown (10YR 5/4) very gravelly silt loam; strong fine subangular blocky structure; firm; common medium roots; few distinct brown (10YR 4/3) clay films and common distinct brown (10YR 5/3) silt coats on faces of peds; 40 percent chert gravel; moderately acid; gradual smooth boundary.
2Bt2—19 to 33 inches; brown (7.5YR 5/4) and yellowish brown (10YR 5/6) clay; strong fine angular blocky structure; very firm; common medium roots; common distinct clay films on faces of peds; few pressure faces; few fine reddish brown (5YR 4/4) masses of iron accumulation; 15 percent chert gravel; moderately acid; gradual smooth boundary.
2Bt3—33 to 39 inches; yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) clay; few fine distinct brown (10YR 5/3) mottles; strong fine and medium angular blocky structure; very firm; few fine roots; common distinct clay films on faces of peds; common pressure faces; few fine reddish brown (5YR 4/4) masses of iron accumulation; 12 percent chert gravel; strongly acid; gradual smooth boundary.
2Bt4—39 to 47 inches; yellowish brown (10YR 5/6) gravelly clay; strong fine and medium angular blocky structure; very firm; few fine roots; common distinct clay films on faces of peds; common pressure faces; common fine light brownish gray (10YR 6/2) and common fine grayish brown (10YR 5/2) iron depletions and few fine reddish brown (5YR 4/4) masses of iron accumulation; 30

percent chert gravel; strongly acid; gradual smooth boundary.
2Bt5—47 to 52 inches; yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) very gravelly clay; moderate fine and medium angular blocky structure; very firm; few fine roots; common distinct clay films on faces of peds; few pressure faces; few fine yellowish brown (10YR 5/6) masses of iron accumulation and few fine gray (2.5Y 6/1) iron depletions; 40 percent chert gravel; strongly acid; abrupt smooth boundary.
2R—52 to 60 inches; unweathered dolostone.

Range in Characteristics

Thickness of the ochric epipedon: 5 to 19 inches
Depth to the argillic horizon: 5 to 19 inches
Depth to the paralithic contact horizon: 42 to 45 inches
Depth to the lithic contact horizon: 40 to 60 inches

A horizon:
Hue—10YR
Value—3 to 5
Chroma—2 or 3
Texture of the fine-earth fraction—sandy loam, fine sandy loam, or silt loam
Content of rock fragments—15 to 55 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

E horizon:
Hue—10YR
Value—5 or 6
Chroma—3 or 4
Texture of the fine-earth fraction—loam or silt loam
Content of rock fragments—20 to 70 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

Bt horizon:
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—4 or 6
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—loam, silt loam, clay loam, or silty clay loam
Content of rock fragments—25 to 85 percent
Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

2Bt horizon:
Hue—2.5YR, 5YR, 7.5YR, or 10YR
Value—4 to 7
Chroma—2, 3, 4, 6, or 8
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—clay
Content of rock fragments—0 to 40 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

Pembroke Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Strath terrace or ridge on plateau
Position on the landform: Footslope, summit, or shoulder
Parent material: Loess over local colluvium over residuum from cherty limestone
Slope range: Gently sloping (2 to 5 percent)
Elevation: 1,055 feet
Taxonomic class: Fine-silty, mixed, active, mesic Mollic Paleudalfs

Typical Pedon

Pembroke silt loam, 2 to 5 percent slopes (fig. 20), in a pasture, 500 feet south and 2,400 feet east of the northwest corner of section 32, T. 32 N., R. 24 W. Howser; USGS Walnut Grove topographic quadrangle; latitude 37 degrees 28 minutes 10 seconds N.; longitude 93 degrees 35 minutes 48 seconds W.; UTM coordinates 4,146,650 meters N. and 447,550 meters E.

Ap—0 to 6 inches; dark brown (7.5YR 3/2) silt loam, dark brown (7.5YR 3/3) dry; moderate medium granular structure; friable; many very fine roots; neutral; abrupt smooth boundary.
A—6 to 9 inches; dark brown (7.5YR 3/3) silt loam, brown (7.5YR 5/3) dry; moderate medium granular structure; friable; many very fine roots; neutral; clear smooth boundary.
Bt1—9 to 16 inches; yellowish red (5YR 4/6) silty clay loam; weak fine subangular blocky structure; firm; many very fine roots; common distinct clay films on faces of peds; neutral; gradual smooth boundary.
Bt2—16 to 24 inches; yellowish red (5YR 4/6) silty clay loam; moderate fine subangular blocky structure; firm; many fine roots; common distinct clay films on faces of peds; neutral; gradual smooth boundary.
Bt3—24 to 37 inches; dark red (2.5YR 3/6) silty clay; moderate medium subangular blocky structure; firm; common fine roots; few distinct clay films on faces of peds; neutral; gradual smooth boundary.
Bt4—37 to 48 inches; red (2.5YR 4/6) silty clay loam;

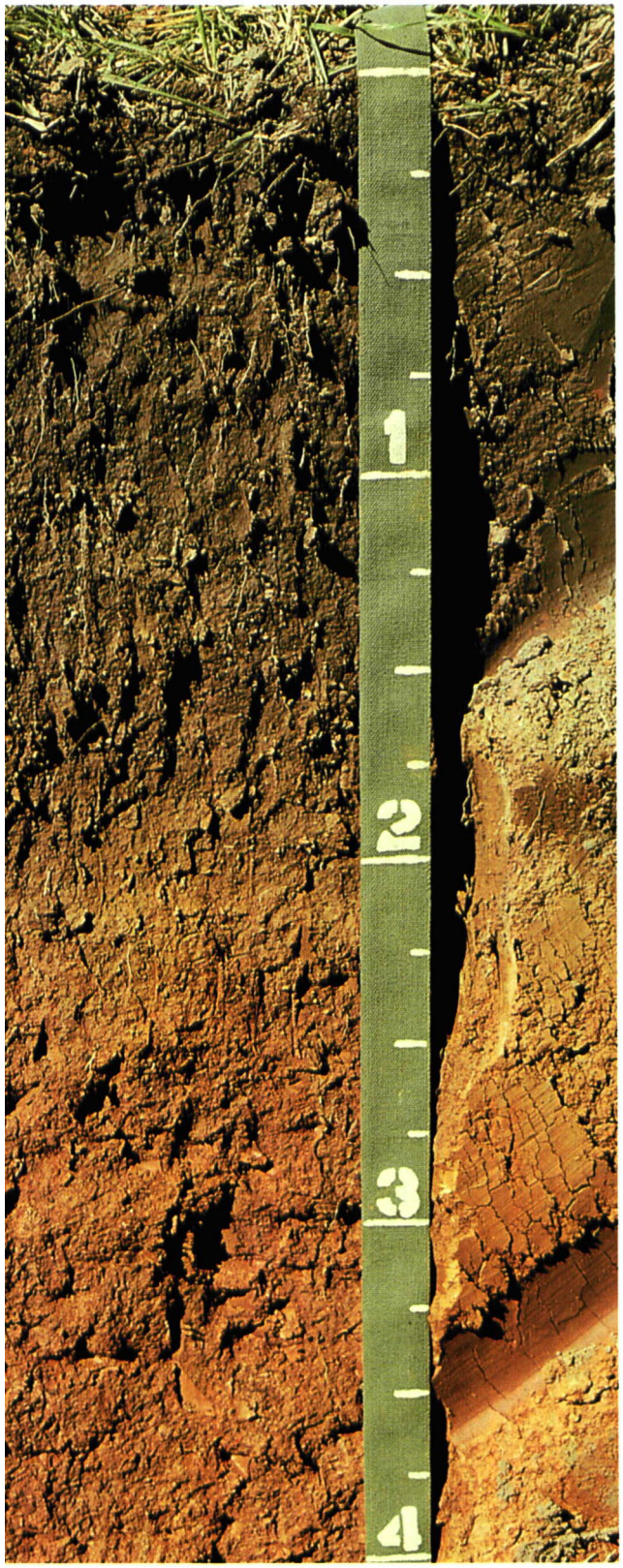


Figure 20.—Profile of Pembroke silt loam. This soil has a dark surface that extends to 18 to 20 inches.

Figure 21.—Profile of Pomme silt loam. This loamy soil is red to depths of greater than 60 inches.

moderate medium and coarse subangular blocky structure; firm; common fine roots; few distinct clay films on faces of peds; moderately acid; clear smooth boundary.

2Bt5—48 to 60 inches; dark red (2.5YR 3/6) very gravelly clay; weak medium subangular blocky structure; firm; few fine roots; few distinct clay films on faces of peds; 30 percent chert gravel and 5 percent chert cobbles; strongly acid.

Range in Characteristics

Thickness of the ochric epipedon: 8 to 9 inches
Depth to the argillic horizon: 8 to 9 inches

Ap horizon:
Hue—7.5YR or 10YR
Value—3
Chroma—2 or 3
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 5 percent
Reaction—moderately acid to neutral (pH 5.6 to 7.3)

A horizon:
Hue—7.5YR
Value—3
Chroma—3
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 5 percent
Reaction—neutral (pH 6.6 to 7.3)

Bt horizon:
Hue—2.5YR or 5YR
Value—3 or 4
Chroma—4 or 6
Texture of the fine-earth fraction—silt loam, clay loam, or silty clay loam
Content of rock fragments—0 to 5 percent
Reaction—moderately acid to neutral (pH 5.6 to 7.3)

2Bt horizon:
Hue—2.5YR or 5YR
Value—3 or 4
Chroma—6
Redoximorphic features—iron depletions
Texture of the fine-earth fraction—silty clay loam, silty clay or clay
Content of rock fragments—0 to 35 percent
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

Peridge Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Ridge or strath terrace on plateau
Position on the landform: Backslope, footslope, shoulder, or summit
Parent material: Loess over local colluvium over residuum from cherty limestone
Slope range: Gently sloping (2 to 5 percent)
Elevation: 1,135 feet
Taxonomic class: Fine-silty, mixed, active, mesic Typic Paleudalfs

Typical Pedon

Peridge silt loam, 2 to 5 percent slopes, in a pasture, 590 feet north and 1,800 feet east of the southwest corner of sec. 3, T. 31 N., R. 21 W.; USGS Fair Grove topographic quadrangle; latitude 37 degrees 26 minutes 5 seconds N.; longitude 93 degrees 23 minutes 8 seconds E.; UTM coordinates 4,142,940 meters N. and 479,560 meters E.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; friable; many very fine roots; very strongly acid; clear smooth boundary.

Bt1—8 to 19 inches; reddish brown (5YR 4/4) silt loam; moderate very fine subangular blocky structure; firm; many very fine roots; few distinct clay films on faces of peds; moderately acid; gradual smooth boundary.

Bt2—19 to 28 inches; yellowish red (5YR 4/6) silty clay loam; moderate fine subangular blocky structure; firm; many very fine roots; common distinct clay films on faces of peds; few fine iron-manganese concretions; strongly acid; gradual smooth boundary.

Bt3—28 to 38 inches; yellowish red (5YR 4/6) silty clay loam; moderate very fine subangular blocky structure; firm; common very fine roots; common distinct clay films on faces of peds; few fine iron-manganese concretions; strongly acid; clear wavy boundary.

Bt4—38 to 60 inches; red (2.5YR 4/6) silty clay loam; weak medium angular blocky structure parting to moderate very fine subangular blocky; firm; few fine roots; few distinct clay films on faces of peds; 5 percent chert gravel; moderately acid.

Range in Characteristics

Thickness of the ochric epipedon: 4 to 10 inches
Depth to the argillic horizon: 4 to 10 inches

Ap horizon:
Hue—10YR
Value—4
Chroma—3 or 4

Texture of the fine-earth fraction—silt loam
Reaction—very strongly acid to moderately acid (pH 4.5 to 6.0)

Bt horizon:
Hue—2.5YR or 5YR
Value—3 or 4
Chroma—4 or 6
Texture of the fine-earth fraction—silt loam, silty clay loam, or silty clay
Content of rock fragments—0 to 9 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

2Bt horizon (where present):
Hue—2.5YR or 5YR
Value—4 or 5
Chroma—4 or 6
Texture of the fine-earth fraction—silty clay loam or clay
Content of rock fragments—0 to 60 percent
Reaction—very strongly acid to neutral (pH 4.5 to 7.3)

Plato Series

Root restrictive depth: Moderately deep (20 to 36 inches)
Drainage class: Somewhat poorly drained
Permeability: Moderately slow above the fragipan; very slow in the fragipan
Landform: Interfluve on plateau
Position on the landform: Summit
Parent material: Loess over colluvium over residuum from cherty limestone
Slope range: Very gently sloping (1 to 3 percent)
Elevation: 1,120 feet
Taxonomic class: Fine, mixed, active, mesic Aquic Fragiudalfs

Typical Pedon

Plato silt loam, 1 to 3 percent slopes, in a pasture, 4,425 feet east and 160 feet north of the southwest corner of sec. 32, T. 34 N., R. 21 W.; USGS Cedar Vista topographic quadrangle; latitude 37 degrees 45 minutes 35 seconds N.; longitude 93 degrees 15 minutes 22 seconds W.; UTM coordinates 4,163,790 meters N. and 477,740 meters E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; many coarse roots; strongly acid; clear smooth boundary.
E—5 to 9 inches; pale brown (10YR 6/3) and light brownish gray (10YR 6/2) silt loam; weak fine granular structure; friable; common very fine roots; very strongly acid; clear wavy boundary.
Bt1—9 to 16 inches; yellowish brown (10YR 5/4) silty clay; moderate fine subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; common fine grayish brown (10YR 5/2) iron depletions; strongly acid; gradual smooth boundary.
Bt2—16 to 23 inches; yellowish brown (10YR 5/4) and brown (10YR 5/3) silty clay; moderate fine subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; few fine grayish brown (10YR 5/2) iron depletions; very strongly acid; clear smooth boundary.
Bt3—23 to 29 inches; grayish brown (10YR 5/2) silty clay; moderate fine subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; common medium yellowish brown (10YR 5/6) masses of iron accumulation; 5 percent chert gravel; very strongly acid; clear wavy boundary.
2Btx1—29 to 38 inches; light brownish gray (10YR 6/2) silt loam; moderate coarse and very coarse prismatic structure; very firm, brittle; few fine roots in cracks; few distinct clay films in root channels and/or pores; common medium yellowish brown (10YR 5/6) masses of iron accumulation; strongly acid; gradual smooth boundary.
2Btx2—38 to 65 inches; light gray (10YR 7/1) silty clay loam; moderate medium prismatic structure parting to moderate fine subangular blocky; friable, brittle; few distinct clay films in root channels and/or pores; common medium yellowish brown (10YR 5/6) masses of iron accumulation; very strongly acid.

Range in Characteristics

Ap horizon:
Hue—10YR
Value—4 to 6
Chroma—2 or 3
Texture of the fine-earth fraction—silt loam
Reaction—strongly acid (pH 5.1 to 5.5)

E horizon:
Hue—10YR
Value— 5 or 6
Chroma—2 or 3
Texture of the fine-earth fraction—silt loam
Reaction—very strongly acid (pH 4.5 to 5.0)

Bt horizon:
Hue—10YR
Value—4 or 5
Chroma—4 or 6

Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silty clay
Content of rock fragments—0 to 5 percent
Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

2Btx horizon:
Hue—10YR
Value—6 or 7
Chroma—1 or 2
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silt loam or silty clay loam
Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

3Bt horizon (where present):
Hue—5YR, 7.5YR, or 10YR
Value—3 to 6
Chroma—4 or 6
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

Pomme Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Strath terrace on plateau
Position on the landform: Shoulder, summit, or toeslope
Parent material: Loess over local colluvium over residuum from cherty limestone
Slope range: Moderately sloping (3 to 8 percent)
Elevation: 900 feet
Taxonomic class: Fine-loamy, mixed, semiactive, mesic Typic Paleudalfs

Typical Pedon

Pomme silt loam, 3 to 8 percent slopes (fig. 21), in a pasture, 3,050 feet east and 5,300 feet north of the southwest corner of sec. 2, T. 34 N., R. 23 W.; USGS Cliquot topographic quadrangle; latitude 37 degrees 42 minutes 48 seconds N.; longitude 93 degrees 24 minutes 57 seconds E.; UTM coordinates 4,173,980 meters N. and 463,300 meters E.

Ap—0 to 7 inches; brown (7.5YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine subangular blocky structure parting to moderate fine granular; friable; many fine roots; 5 percent subrounded chert gravel; moderately acid; clear smooth boundary.

Bt1—7 to 19 inches; yellowish red (5YR 4/6) clay loam; moderate very fine subangular blocky structure; firm; many fine roots; common distinct red (2.5YR 4/6) clay films on faces of peds; 5 percent subrounded chert gravel; slightly acid; gradual smooth boundary.

2Bt2—19 to 57 inches; red (2.5YR 4/6) very gravelly silty clay loam; moderate fine subangular blocky structure; firm; common fine roots; common distinct clay films and few prominent reddish yellow (5YR 6/6) silt coats on faces of peds; 55 percent subrounded chert gravel; strongly acid; clear wavy boundary.

3Bt3—57 to 86 inches; yellowish red (5YR 5/8) and reddish yellow (5YR 6/8) extremely gravelly clay; moderate coarse subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; few manganese or iron-manganese stains and common fine masses of iron-manganese accumulation; 2 percent sandstone cobbles and 70 percent dolomite gravel; very strongly acid.

Range in Characteristics

Thickness of the ochric epipedon: 6 to 11 inches
Depth to the argillic horizon: 6 to 11 inches

Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 10 percent
Reaction—strongly acid to neutral (pH 5.1 to 7.3)

A horizon (where present):
Hue—7.5YR or 10YR
Value—4
Chroma—2 or 3
Texture of the fine-earth fraction—silt loam
Content of rock fragments—5 to 10 percent
Reaction—moderately acid to neutral (pH 5.6 to 7.3)

Bt horizon:
Hue—2.5YR, 5YR, or 7.5YR
Value—3 or 4
Chroma—4 or 6
Redoximorphic features—iron depletions or masses of iron accumulation

Texture of the fine-earth fraction—silt loam, clay loam, or silty clay loam
Content of rock fragments—5 to 35 percent
Reaction—moderately acid to neutral (pH 5.6 to 7.3)

2Bt horizon:
Hue—10R, 2.5YR, 5YR, or 10YR
Value—3 to 5
Chroma—4 or 6
Redoximorphic features—iron depletions
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
Content of rock fragments—40 to 70 percent
Reaction—strongly acid to slightly acid (pH 4.5 to 6.5)

3Bt horizon:
Hue—5YR
Value—5 or 6
Chroma—8
Texture of the fine-earth fraction—clay
Content of rock fragments—50 to 75 percent
Reaction—very strongly acid (pH 4.5 to 5.0)

Racket Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plain
Parent material: Alluvium
Slope range: Nearly level or very gently sloping (0 to 3 percent)
Elevation: 905 feet
Taxonomic class: Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls

Typical Pedon

Racket silt loam, 0 to 3 percent slopes, in a pasture, 2,550 feet south and 100 feet east of the northwest corner of sec. 20, T. 34 N., R. 24 W.; USGS Fair Play topographic quadrangle; latitude 37 degrees 40 minutes 3 seconds N.; longitude 93 degrees 35 minutes 26 seconds W.; UTM coordinates 4,168,830 meters N. and 447,720 meters E.

A1—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; 4 percent rounded chert gravel; slightly acid; clear smooth boundary.
A2—10 to 24 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; moderate fine granular structure; friable; many fine roots; many distinct very dark grayish brown (10YR 3/2) organic coats; 8 percent rounded chert gravel; neutral; clear smooth boundary.
BW—24 to 38 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak very fine subangular blocky structure; friable; common fine roots; 10 percent rounded chert gravel; neutral; clear smooth boundary.
2C1—38 to 51 inches; dark grayish brown (10YR 4/2) gravelly sandy loam; massive; very friable; few fine roots; few fine brown (10YR 4/3) masses of iron accumulation; 25 percent subrounded chert gravel; neutral; clear wavy boundary.
2C2—51 to 60 inches; brown (10YR 4/3) very gravelly sandy loam; massive; very friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coats; 30 percent subrounded chert gravel; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 51 to 63 inches

A horizon:
Hue—10YR
Value—2 or 3
Chroma—2 or 3
Texture of the fine-earth fraction—loam or silt loam
Content of rock fragments—0 to 8 percent
Reaction—slightly acid or neutral (pH 6.1 to 7.3)

BW horizon:
Hue—10YR
Value—3
Chroma—2
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 10 percent
Reaction—neutral (pH 6.6 to 7.3)

2C horizon:
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—sandy loam
Content of rock fragments—25 to 35 percent
Reaction—neutral (pH 6.6 to 7.3)

Sacville Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Slow
Landform: Hill on plateau

Position on the landform: Backslope, footslope, or head of drainageway
Parent material: Local colluvium over residuum from limestone-shale
Slope range: Very gently sloping (1 to 3 percent)
Elevation: 1,025 feet
Taxonomic class: Fine, smectitic, mesic Vertic Argiaquolls

Typical Pedon

Sacville silty clay loam, 1 to 3 percent slopes, in a pasture, 1,500 feet east and 975 feet north of the Southwest corner of sec. 31, T. 35 N., R. 21 W.; USGS Polk topographic quadrangle; latitude 42 degrees 44 minutes 35 seconds N.; longitude 93 degrees 17 minutes 52 seconds W.; UTM coordinates 4,176,240 meters N. and 473,860 meters E.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate very fine subangular blocky structure; friable; many fine roots; few fine dark yellowish brown (10YR 3/4) masses of iron accumulation; slightly acid; abrupt smooth boundary.

Btg1—7 to 17 inches; very dark gray (10YR 3/1) silty clay, grayish brown (10YR 5/2) dry; strong very fine subangular blocky structure; firm; many fine roots; few distinct clay films on faces of peds; common fine dark yellowish brown (10YR 3/4) masses of iron accumulation; 2 percent subrounded chert gravel; neutral; clear smooth boundary.

Btg2—17 to 24 inches; dark grayish brown (10YR 4/2) clay; strong fine subangular blocky structure; very firm; common very fine roots; common distinct very dark gray (10YR 3/1) clay films on faces of peds; common fine iron-manganese concretions and common fine dark yellowish brown (10YR 3/4) masses of iron accumulation; 10 percent subrounded chert gravel; neutral; clear smooth boundary.

2Btg3—24 to 33 inches; dark grayish brown (2.5Y 4/2) clay; strong coarse subangular blocky structure; very firm; few very fine roots; many distinct dark gray (10YR 4/1) clay films on faces of peds; common fine yellowish brown (10YR 5/6) masses of iron accumulation; 2 percent subrounded chert gravel; neutral; gradual smooth boundary.

2Btg4—33 to 46 inches; grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; very firm; few very fine roots; very few distinct clay films on faces of peds; very few prominent pressure faces; few fine yellowish brown (10YR 5/8) and few fine strong brown (7.5YR 5/6) masses of iron accumulation; 5 percent subrounded chert gravel; slightly alkaline; abrupt smooth boundary.

3Btg5—46 to 65 inches; light brownish gray (2.5Y 6/2) very gravelly clay; weak fine subangular blocky structure; firm; few fine roots; very few faint clay films on faces of peds; common medium yellowish brown (10YR 5/8) masses of iron accumulation; 50 percent chert gravel; slightly alkaline; gradual smooth boundary.

3Btg6—65 to 80 inches; light brownish gray (2.5Y 6/2) very cobbly clay; weak fine subangular blocky structure; firm; few fine roots; few distinct clay films on faces of peds and very few distinct organic coats in root channels and/or pores; common medium yellowish brown (10YR 5/8) masses of iron accumulation; 25 percent sandstone-siltstone cobbles and 25 percent chert gravel; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 12 to 19 inches
Depth to the argillic horizon: 9 to 19 inches

Ap horizon:
- Hue—10YR
- Value—2 or 3
- Chroma—1
- Redoximorphic features—masses of iron accumulation
- Texture of the fine-earth fraction—silty clay loam
- Content of rock fragments—0 to 1 percent
- Reaction—slightly acid to slightly alkaline (pH 6.1 to 7.8)

A horizon (where present):
- Hue—10YR
- Value—2 or 3
- Chroma—1
- Texture of the fine-earth fraction—silty clay loam
- Content of rock fragments—0 to 3 percent
- Reaction—moderately acid to moderately alkaline (pH 5.6 to 8.4)

Btg horizon:
- Hue—10YR or 2.5Y
- Value—3 to 6
- Chroma—1 or 2
- Redoximorphic features—iron depletions or masses of iron accumulation
- Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
- Content of rock fragments—0 to 20 percent
- Reaction—moderately acid to moderately alkaline (pH 5.6 to 8.4)

2Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 or 2
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay
Content of rock fragments—0 to 5 percent
Reaction—neutral or slightly alkaline (pH 6.6 to 7.8)

3Btg horizon:
Hue—2.5Y
Value—6
Chroma—2
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—clay
Content of rock fragments—1 to 60 percent
Reaction—slightly alkaline (pH 7.4 to 7.8)

Sturkie Series

Root restrictive depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plain on river valley
Parent material: Alluvium
Slope range: Nearly level (0 to 2 percent)
Elevation: 915 feet
Taxonomic class: Fine-silty, mixed, superactive, mesic Cumulic Hapludolls

Typical Pedon

Sturkie silt loam, 0 to 2 percent slopes, frequently flooded, in a pasture, 700 feet west and 150 feet south of the northeast corner of sec. 4, T. 34 N., R. 21 W.; USGS Buffalo NW topographic quadrangle; latitude 37 degrees 43 minutes 8 seconds N.; longitude 93 degrees 13 minutes 34 seconds W.; UTM coordinates 4,174,500 meters N. and 479,630 meters E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many very fine roots; neutral; clear smooth boundary.
A—9 to 19 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate very fine granular structure; friable; common very fine roots; neutral; clear smooth boundary.
Bw1—19 to 30 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate very fine subangular blocky structure; friable; common very fine roots; neutral; clear smooth boundary.
Bw2—30 to 60 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; very friable; few very fine roots; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 60 to 80 inches

Ap and A horizons:
Hue—7.5YR or 10YR
Value—3
Chroma—2 or 3
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 1 percent
Reaction—neutral (pH 6.6 to 7.3)

Bw horizon:
Hue—10YR
Value—3
Chroma—2 or 3
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 2 percent
Reaction—neutral (pH 6.6 to 7.3)

C horizon (where present):
Hue—10YR
Value—3 or 4
Chroma—1 to 3
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silt loam or silty clay loam
Reaction—neutral or slightly alkaline (pH 6.6 to 7.8)

Viraton Series

Root restrictive depth: Moderately deep (18 to 33 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan; very slow in the fragipan
Landform: Ridge on plateau
Position on the landform: Shoulder, summit, or toeslope
Parent material: Loess over local colluvium over gravelly colluvium over residuum from cherty dolostone
Slope range: Gently sloping or moderately sloping (2 to 9 percent)

Figure 22.—Profile of Viraton silt loam. This soil has light colored surfaces and a fragipan at about 19 inches.

Elevation: 1,010 feet
Taxonomic class: Fine-loamy, siliceous, active, mesic Oxyaquic Fragiudalfs

Typical Pedon

Viraton silt loam, 2 to 5 percent slopes (fig. 22), in a pasture, 2,350 feet east and 1,950 south of the northwest corner of sec. 31, T. 35 N., R. 21 W.; USGS Polk topographic quadrangle; latitude 37 degrees 44 minutes 27 seconds N.; longitude 93 degrees 17 minutes 34 seconds W.; UTM coordinates 4,176,940 meters N. and 474,150 meters E.

Ap—0 to 6 inches; brown (10YR 5/3) silt loam; weak very fine granular structure; friable; common fine roots; strongly acid; clear smooth boundary.

BE—6 to 11 inches; brown (7.5YR 5/4) silt loam; moderate very fine subangular blocky structure; firm; common fine roots; 6 percent subrounded chert gravel; slightly acid; clear smooth boundary.

Bt—11 to 24 inches; strong brown (7.5YR 5/6) silt loam; moderate very fine subangular blocky structure; firm; common fine roots and common coarse; common distinct clay films on faces of peds; few fine masses of iron-manganese accumulation; 6 percent subrounded chert gravel; strongly acid; gradual smooth boundary.

2Btx1—24 to 29 inches; strong brown (7.5YR 5/6) gravelly silt loam; moderate very coarse prismatic structure; very firm, brittle; few fine roots; few distinct clay films on faces of peds; few fine iron depletions; 15 percent subrounded chert gravel; strongly acid; clear wavy boundary.

2Btx2—29 to 40 inches; brown (7.5YR 5/4) gravelly silt loam; moderate very coarse prismatic structure; very firm, brittle; few very fine roots; common faint clay films on faces of peds; common fine iron depletions; 25 percent subrounded chert gravel; strongly acid; clear wavy boundary.

3Bt—40 to 60 inches; red (2.5YR 4/6) extremely gravelly silty clay loam; moderate very fine angular blocky structure; very firm; few very fine roots; many distinct clay films on faces of peds; 60 percent subrounded chert gravel; strongly acid.

Range in Characteristics

Thickness of the ochric epipedon: 4 to 11 inches
Depth to the argillic horizon: 4 to 11 inches
Depth to the fragipan horizon: 18 to 33 inches

Ap horizon:
Hue—10YR
Value—4 or 5
Chroma—3 or 4

Texture of the fine-earth fraction—silt loam
Reaction—strongly acid or moderately acid (pH 5.1 to 6.0)

A horizon (where present):
Hue—10YR
Value—4
Chroma—2
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 3 percent
Reaction—strongly acid or moderately acid (pH 5.1 to 6.0)

E horizon (where present):
Hue—10YR
Value—4 or 5
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 3 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

BE horizon:
Hue—7.5YR
Value—5
Chroma—4
Texture of the fine-earth fraction—silt loam
Content of rock fragments—0 to 6 percent
Reaction—slightly acid (pH 6.1 to 6.5)

Bt horizon:
Hue—5YR, 7.5YR, or 10YR
Value—4 to 6
Chroma—3, 4, or 6
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—silt loam, clay loam, or silty clay loam
Content of rock fragments—0 to 10 percent
Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

2Btx horizon:
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—1, 2, 3, 4, or 6
Redoximorphic features—iron depletions or masses of iron accumulation
Texture of the fine-earth fraction—loam, silt loam, or silty clay loam
Content of rock fragments—10 to 70 percent
Reaction—extremely acid to moderately acid (pH 3.5 to 6.0)

3Bt horizon:
Hue—2.5YR, 5YR, or 7.5YR
Value—3 to 5
Chroma—4, 6, or 8
Redoximorphic features—masses of iron accumulation
Texture of the fine-earth fraction—silty clay loam or clay
Content of rock fragments—18 to 60 percent
Reaction—strongly acid to moderately alkaline (pH 5.1 to 8.4)

Wilderness Series

Root restrictive depth: Moderately deep (15 to 29 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan; slow in the fragipan
Landform: Ridge on plateau
Position on the landform: Shoulder or summit
Parent material: Local colluvium over residuum from cherty limestone
Slope range: Moderately sloping (3 to 8 percent)
Elevation: 1,030 feet
Taxonomic class: Loamy-skeletal, siliceous, active, mesic Oxyaquic Fragiudalfs

Typical Pedon

Wilderness gravelly silt loam, 3 to 8 percent slopes, in forest land, 1,100 feet east and 1,100 feet south of the northwest corner of sec. 13, T. 33 N., R. 24 W.; USGS Aldrich topographic quadrangle; latitude 37 degrees 35 minutes 47 seconds N.; longitude 93 degrees 31 minutes 8 seconds W.; UTM coordinates 4,160,350 meters N. and 454,200 meters E.

Ap—0 to 6 inches; brown (10YR 4/3) gravelly silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; 15 percent chert gravel and 2 percent chert cobbles; moderately acid; clear smooth boundary.

E—6 to 11 inches; yellowish brown (10YR 5/4) gravelly silt loam; moderate medium granular structure; friable; many fine roots; 20 percent chert gravel and 2 percent chert cobbles; slightly acid; gradual smooth boundary.

Bt1—11 to 16 inches; brown (7.5YR 4/4) very gravelly silt loam; weak fine subangular blocky structure; firm; common fine roots; common distinct clay films on faces of peds; 45 percent chert gravel and 5 percent chert cobbles; slightly acid; clear wavy boundary.

Bt2—16 to 25 inches; strong brown (7.5YR 4/6) extremely gravelly silty clay loam; moderate fine subangular blocky and medium subangular blocky structure; firm; few fine roots; common distinct clay

films and common distinct silt coats on faces of peds; common fine brown (10YR 5/3) iron depletions; 70 percent chert gravel and 5 percent chert cobbles; strongly acid; abrupt wavy boundary.

Btx—25 to 32 inches; yellowish red (5YR 4/6), strong brown (7.5YR 5/6), and dark grayish brown (10YR 4/2) very gravelly silt loam; weak very coarse prismatic structure parting to weak coarse subangular blocky; very firm, brittle; few fine roots; few distinct clay films on faces of peds; 45 percent chert gravel and 10 percent chert cobbles; strongly acid; clear wavy boundary.

2Bt1—32 to 48 inches; red (2.5YR 4/6) and reddish yellow (7.5YR 6/8) gravelly clay; moderate medium subangular blocky structure; very firm; few very fine roots; common distinct clay films on faces of peds; 20 percent chert gravel and 5 percent chert cobbles; very strongly acid; gradual smooth boundary.

2Bt2—48 to 60 inches; red (2.5YR 4/6) gravelly clay; moderate coarse subangular blocky structure; very firm; common distinct clay films on faces of peds; many fine brownish yellow (10YR 6/8) masses of iron accumulation; 30 percent chert gravel; slightly acid.

Range in Characteristics

Thickness of the ochric epipedon: 5 to 11 inches
Depth to the argillic horizon: 7 to 31 inches
Depth to the fragipan horizon: 15 to 29 inches

Ap horizon:
- Hue—10YR
- Value—4 or 5
- Chroma—2 or 3
- Texture of the fine-earth fraction—silt loam
- Content of rock fragments—5 to 20 percent
- Reaction—moderately acid (pH 5.6 to 6.0)

E horizon:
- Hue—10YR
- Value—4 or 5
- Chroma—2 to 4
- Texture of the fine-earth fraction—silt loam
- Content of rock fragments—7 to 40 percent
- Reaction—strongly acid to slightly acid (pH 5.1 to 6.5)

Bt horizon:
- Hue—7.5YR or 10YR
- Value—4 or 5
- Chroma—4 or 6
- Redoximorphic features—iron depletions
- Texture of the fine-earth fraction—silt loam or silty clay loam
- Content of rock fragments—10 to 80 percent
- Reaction—strongly acid to slightly acid (pH 5.1 to 6.5)

Btx horizon:
- Hue—2.5YR, 5YR, 7.5YR, or 10YR
- Value—4 to 6
- Chroma—2, 3, 4, 6, or 8
- Redoximorphic features—iron depletions
- Texture of the fine-earth fraction—silt loam, clay loam, or silty clay loam
- Content of rock fragments—55 to 65 percent
- Reaction—very strongly acid or strongly acid (pH 4.5 to 5.5)

2Bt horizon:
- Hue—2.5YR or 7.5YR
- Value—4 to 6
- Chroma—3, 4, 6, or 8
- Redoximorphic features—masses of iron accumulation
- Texture of the fine-earth fraction—clay
- Content of rock fragments—25 to 75 percent
- Reaction—very strongly acid to slightly acid (pH 4.5 to 6.5)

Formation of the Soils

Mike Burney, soil scientist, Natural Resources Conservation Service, helped prepare this section.

This section relates the soils in the survey area to the major factors of soil formation.

Soil is the product of soil-forming processes acting on accumulated or deposited geologic material. The characteristics of the soil are determined by the type of parent material; the plant and animal life on and in the soil; the climate under which the soil-forming factors were active; relief, or lay of the land; and the length of time these forces have been active.

The parent material affects the kind of soil profile that is formed and, in extreme cases, determines it almost entirely. Plant and animal life are the active factors of soil formation. The climate determines the amount of water available for leaching and the amount of heat for physical and chemical changes. Together, climate and plant and animal life act on the parent material and slowly change it to a natural body that has genetically related horizons. Relief often modifies these other factors. Finally, time is required for changes in the parent material to result in the formation of a soil. Generally, a long time is required for the development of distinct soil horizons.

These factors of soil formation are all so closely interrelated in their effects on the soil that few generalizations can be made about the effect of any one factor unless conditions are specified for the other four. Soil formation is complex, and many processes of soil development are still unknown.

Parent Material

Parent material is the unconsolidated mass from which soil is formed. The formation or the deposition of this material is the first step in the development of a soil profile. The characteristics of the material determine the chemical and mineralogical composition of the soil. The parent material in Polk County formed from weathered dolomite, limestone, shale, and sandstone bedrock; alluvium; loess; or a combination of these.

In Polk County, most of the material weathered from dolomitic bedrock and is of Ordovician age. This material tends to weather to clay containing varying amounts of chert. Blueye, Ocie, and Gatewood soils are examples of soils formed from dolomitic material.

Limestone bedrock tends to form a very deep, cherty red clay soil. Bona and Goss soils formed mostly in the Mississippian age limestone material.

Shale bedrock from the Northview Formation, also from the Mississippian age, usually weathers into a greenish clay material. Alsup, Goodson, and Liberal are shale-formed soils.

The sandstone bedrock from the Pennsylvanian and Ordovician age weathers to a clay loam or other loamy material. Basehor and Bolivar are soils formed from sandstone bedrock.

Alluvium is material that was transported by water and deposited on flood plains and terraces in stream valleys. Because of the various origins and differing velocities of flowing water, this material varies greatly in texture and mineralogical composition. The source of the parent material on the flood plains along small tributary streams is limited to local uplands. Cedargap, Humansville, and Sturkie soils formed from alluvial material.

Loess is a silty material transported by the wind. None of the soils in Polk County formed solely in this material. Its influence is evident, however, on broad ridge crests where soils have a fragipan. Creldon, Plato, and Viraton soils show this influence.

Climate

Climate has been and still is an important factor of soil formation. Geologic erosion; plant and animal life; and, in more recent times, accelerated erosion all have varied with the climate.

High temperatures and adequate rainfall encourage rapid chemical and physical changes. When calcium carbonate and other soluble salts are removed by leaching, soil fertility declines. This type of climate is conducive to the breakdown of minerals and the relocation of clay within the soil. The clay is moved downward into the soil profile, and this downward movement results in the formation of the subsoil. Nearly all of the upland soils in the county, such as Bona and Goss soils, show evidence of this illuviation.

Some evidence suggests that changes in climate have occurred over geologic time. Geologic erosion, stone lines, and loess deposition indicate climatic conditions different from those prevalent today.

Living Organisms

Plants and animals living on or in the soil are active in the soil-forming process. Plants furnish organic matter to the soil and bring up plant nutrients from underlying layers to the surface layer. As plants die and decay, they contribute organic matter to the soil. Bacteria and fungi decompose the plant remains and help to incorporate the organic matter into the soil.

The composition of plant communities varies, depending on climate and the fertility, available water capacity, drainage, and depth of the soil. Because of the nature of grasses, the organic matter in the surface layer is derived mainly from the decay of annual and biennial plants. This thick dark layer is high in organic matter and microorganisms. Bona and Sacville were formed under grassland vegetation. In contrast, the organic matter in the surface layer of light-colored soils formed under forest vegetation. This organic matter is derived mainly from leaves, twigs, and logs. These soils have a thin surface layer and are low in organic matter. Bolivar, Wilderness, and Goss soils formed under this plant cover. Many areas in Polk County, however, formed under mixed grass and forest vegetation. Barden, Creldon, and Pembroke soils are examples of transition soils.

Burrowing animals, microorganisms, and humans can greatly influence soil formation. Worms, insects, and especially microorganisms play an important part in the decomposition of plant residue. When the plant material is reduced to humus, plant nutrients are released, soil structure is enhanced, and the physical condition of the surface layer is improved. The reverse is true in many of the activities of man, such as intensive cultivation, clearing of trees, and overuse of fertilizers and chemicals.

Relief

Relief, or topography, affects soil formation through its influence on drainage, runoff, the rate of water infiltration, and other related factors. Relief refers to the length, shape, aspect, and uniformity of the slopes that make up a landscape.

The amount of water entering the soil depends on steepness of slope, permeability, and the intensity of rainfall. Soils on level or gentle slopes commonly have less runoff and more infiltration, thus, making a more developed profile and a deeper soil. In contrast, soils on steep slopes are characterized by rapid runoff, little infiltration, and more erosion.

Slopes that face south and west tend to be warmer and drier than those facing north and east.

Time

The degree of profile development is dependent on the length of time that the parent material has been in place and subject to the soil-forming processes. Older soils show the effects of leaching and clay movement and have developed distinct horizons. Young soils show little profile development.

The age of the soils in Polk County is varied. Soils that formed in recent alluvial deposits, such as Cedargap and Sturkie soils, are among the youngest. Some of the older soils have a greater number of profile features. The clay has been concentrated in a distinct subsoil through weathering and through translocation caused by percolating water. Soils with a fragipan horizon, such as Viraton and Wilderness soils, are among the most developed soils in the survey area.

Geology, Physiography, and Hydrology

Polk County is situated in the Ozarks Plateau Province. The county can be further divided into two plateaus. The southwestern one-third of the county is on the Springfield Plateau, and the northeastern two-thirds is on the Salem Plateau. The two plateaus are separated by the northwest-southeast trending the Eureka Springs escarpment. The landscape varies from steeply sloping wooded hills and narrow, rocky valleys in the Pomme de Terre region to gently rolling prairie uplands in western parts of the county. Bedrock in the county consists of sedimentary rocks ranging from Ordovician age Jefferson City dolomite to Pennsylvanian age sandstone and conglomerate.

There are several geologically old and inactive faults that pass through Polk County. One of the most prominent is the Fair Play fault that trends in a southeast-northwest direction across central Polk County. Highway 13 crosses the Fair Play fault approximately one mile south of Slagle; the steeply dipping bedrock exposed in the roadcut is an example of fault displacement.

Because of the effects of weathering, the bedrock surface is quite uneven. Depth to top of bedrock ranges from less than a foot on glades and rocky slopes to over 50 feet in areas where bedrock weathering has been severe. In Polk County, cherty dolomite, cherty limestone, sandstone, and shale play a significant part in the development of soils. Physical

and chemical weathering caused a slow disintegration of the bedrock until it was reduced to its least soluble components, which are chert and clay. Weathering has altered the soluble carbonate portion of the limestone and dolomite into a brown to red clay, but chert in the bedrock consists of crystalline silica, which is more resistant to weathering. The chert remains behind in the form of fragments or wavy horizontal beds sandwiched between layers of clay. Where there has not been significant movement of soil vertically through the slumping of bedrock or through downslope creep, the sequence of clay and chert retain a relict structure of the original unweathered bedrock. The clay and chert that remains after bedrock disintegration is called bedrock residuum. Bedrock thickness varies according to the extent of erosion and weathering. Precambrian granites and gneiss are from 1,500 to 1,800 feet below the surface.

From oldest to youngest, geologic formations that outcrop in Polk County are the Jefferson City Dolomite, Cotter Dolomite, Compton Formation, Northview Formation, Burlington-Keokuk Limestone, and Pennsylvanian age sandstone and conglomerate.

The Jefferson City Dolomite is 200 feet thick and consists of cherty gray to brown silty dolomite with some sandstone beds. A particular type of chert called silcrete is common in the southeast part of the county. The Jefferson City Dolomite is exposed only along the Pomme de Terre River throughout the county. The upper part of the Jefferson City Dolomite is often weathered and eroded; consequently, depth to bedrock and residuum thickness will vary. The soils in areas of this formation are generally richer in clay and contain less rocks in the residuum than soils weathered from limestone in other areas.

The Cotter Dolomite (fig. 23) is 100 to 175 feet thick and is composed of silty gray to brown dolomite with some locally persistent sandstone beds. Some sandstone beds are 25 to 30 feet thick and prominent in the Bolivar and Halfway areas. The Swan Creek Sandstone is one of the members of the Cotter. The Cotter Dolomite is exposed in roadcuts and river bluffs in the northeastern two-thirds of the county. The upper part of the Cotter Dolomite is often weathered and eroded; consequently, depth to bedrock and residuum thickness will vary. The soils in areas of this formation are generally richer in clay and contain less rocks in the residuum than soils weathered from limestone in other areas.

The Compton Formation is 2 to 20 feet thick and consists of bedded, light gray limestone. It has fragments of small fossils and outcrops along the base of the Eureka Springs escarpment. The Compton Formation is best exposed on some roadcuts near Bona. This formation has contributed very little to the development of soils in the county or to the topography of the county, but generally forms shallow soils with small areas of rock outcrop.

The Northview Formation generally is 10 to 80 feet thick and consists of green, silty shale. The upper part of this formation has several thick beds of greenish tan siltstone. The siltstone can be identified by numerous wormlike holes and cauda-galli (rooster tails) cast on the stone surface. The shale can be easily identified by its greenish color and sticky clay texture. Its very slow permeability retards the downward percolation of ground water. The water moves laterally along the top of the shale and commonly resurfaces as a spring on a valley slope or in a gully that intersects the shale. The Northview Formation can be found throughout most of the county. To the north, the formation has increasing amounts of bluish gray to brown, massive bedded limestone and dolomite at the bottom and interfingers with the Sedalia Formation. The soil cover on the Northview Formation generally is thin and retains some residue of shale and siltstone bedrock.

The Burlington and Keokuk are recognized as separate formations. Because of their geological similarities in southwest Missouri, however, the two formations have been combined as a single unit. The Burlington-Keokuk Limestone consists of light gray, coarse crystalline limestone that generally ranges from less than 10 feet to up to 200 feet thick. This formation is thin to massive, bedded limestone that has discontinuous bands of chert and is oolitic chert nodules. In the southern part of the county, there are a number of sinkholes in the formation. Infiltration of surface water through stony residuum, cracks, and fractures in the bedrock has slowly dissolved the calcium in the limestone forming a network of underground openings. Sinkholes are formed when the ceiling of an underground opening begins to "stope" or enlarge in an upward direction. The soil and rock forming the ceiling of the underground opening continue to collapse until the roof becomes so weak that there is a complete collapse reaching the surface. The cherty clay residual soil from this formation varies in thickness. Many of the glade areas on uplands in Polk County are in the Burlington-Keokuk Formation.

The youngest bedrock in the county is the Pennsylvanian age sandstone and conglomerate. This formation is limited to the western part of the county. It ranges from less than 10 feet to 90 feet thick and consists of red to brown, fine to coarse grained sandstone and cobble conglomerates with sandstone matrix. Some red to black shales also occur in the unit. This formation is poorly cemented, and many times gravels and sand are the only evidence of its

Figure 23.—Outcrops of Cotter Dolomite create glade areas.

occurrence. Close examination shows that the Pennsylvanian sandstone has small flakes of mica, which can be used to differentiate it from the Cotter sandstone. The soil cover on the Pennsylvanian age bedrock generally is thin, and the residual material shows the marked influence of sandstone.

All bedrock units will yield water to some degree. The Burlington-Keokuk and Pierson Formations produce 1 to 10 gallons per minute in shallow wells. The Northview Formation is a silty shale that acts as an aquitard. As such, it retards the downward percolation of water. The silty shale does not produce any ground water, but numerous springs are along the top of the shale. The Compton, Cotter, and Jefferson City Formations provide small quantities of water for homes and farms but are not major sources of ground water. The Swan Creek sandstone in the Cotter Formation has produced small amounts of ground

water. The quality of the water has deteriorated, however, because of contamination from the surface and poorly constructed and cased wells. The major high-yielding source of ground water in the county is the dolomites in the lower Ordovician and Cambrian Formations. Several cities obtain water from wells in these formations. Wells drilled for private water supplies are typically 150 to 400 feet deep and yield 10 to 25 gallons per minute. Wells drilled for public water supplies are generally 500 to 1,000 feet deep and yield up to 500 gallons per minute.

References

(1) American Association of State Highway and Transportation Officials. 1986. Standard specifications for highway materials and methods of sampling and testing. Ed. 14, 2 vols.

(2) American Society for Testing and Materials. 1993. Standard classification of soils for engineering purposes. ASTM Stand. D 2487.

(3) Brady, Nyle C. 1974. The nature and properties of soils, 8th edition.

(4) Brandle, J.R., D.L. Hintz, and J.W. Sturrock, editors. 1988. Windbreak technology. Elservier Science Publs.

(5) Currier, M.P. 1989. Missouri natural features inventory of Dallas, Greene, Hickory, Polk, and Webster Counties. Mo. Dep. of Conserv.

(6) Evans, Pricilla and Dean W. Francis English. 1975. Lake country regional profile.

(7) Geissman, N.F., et. al. 1986. Distribution of forest land in Missouri. Transcripts of the Missouri Academy of Science. Vol. 20: 5-14.

(8) Historical Society of Polk County. September 1977. A brief history of Polk County.

(9) Held, Robert J. 1985. Soil survey of Franklin County, Missouri. U.S. Dep. Agric., Soil Conserv. Serv.

(10) Krusekopf, H.H. 1926. Soil survey of Polk County, Missouri. U.S. Dep. Agric., Bur. of chem. and soils.

(11) Marbut, C.F. 1910. Soil reconnaissance of the Ozarks region of Missouri and Arkansas. Field operations of the Bureau of Soils. U.S. Dep. of Agric.

(12) Missouri Crop and Livestock Reporting Service. 1990. Polk County agric-facts.

(13) Missouri Department of Agriculture. 1991. Missouri farm facts.

(14) Missouri Department of Conservation. 1990. Study No. 68: Archer's index of upland furbearer populations. Job No. 1: Archer's index of upland furbearer populations, 1989. Fed. Aid Project No. W-13-R-44.

(15) Missouri Department of Conservation. 1990. Study No. 10: Furbearer harvest evaluation. Job No. W-13-R-44.

(16) Missouri Geological Survey and Water Resources Division. 1990. The stratigraphic succession in Missouri. 185 pp., illus.

(17) Robinette, G.O. 1972. Plants/people/environmental quality. U.S. Dep. of Interior, Nat. Park Ser.

(18) Scholten, H. 1988. Farmstead shelterbelts-protection against wind and snow. Univ. of Minn., CD-BU-0468

(19) Schroeder, Walter A. 1982. Presettlement prairie of Missouri. Natural History Series, No. 2. Mo. Dep. of Conserv.

(20) Thom, Richard H. and James H. Wilson. 1980. The natural divisions of Missouri. Transactions of the Missouri Academy of Sciences. Vol. 14, 9-23.

(21) United States Department of Agriculture, Soil Conservation Service. 1981. Land resource regions and major land resource areas of the United States. U.S. Dep. Agric. Handb. 296.

(22) United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210.

(23) United States Department of Agriculture, Soil Conservation Service. 1987. Basic statistics, 1982 national resources inventory. Stat. Bull. 756.

(24) United States Department of Agriculture, Soil Conservation Service. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. U.S. Dep. Agric. Handb. 436.

(25) United States Department of Agriculture, Soil Conservation Service. 1993. Soil survey manual. Soil Surv. Staff, U.S. Dep. Agric. Handb. 18.

(26) United States Department of Agriculture, Natural Resources Conservation Service. 1996. Keys to soil taxonomy. 7th ed. Soil Surv. Staff.

(27) Waltkins, W.I., et al. 1919. Soil survey of Polk County. U. S. Dep. of Agric.

Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Argillite. Weakly metamorphosed mudstone or shale.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

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

Bedrock-controlled topography. A landscape where

the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bedrock-floored plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by hard bedrock and has a slope of 0 to 8 percent.

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

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Board foot. A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

Bottomland. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channeled. Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material

Channery soil material. Soil material that is, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

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

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

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

Clayey soil. Silty clay, sandy clay, or clay.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above

it. A claypan is commonly hard when dry and plastic or stiff when wet.

Clearcut. A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from the adjacent stands.

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

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Codominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

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

Commercial forest. Forest land capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

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

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Dominant trees. Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

Effective cation-exchange capacity. The sum of ammonium acetate extractable bases plus potassium chloride extractable aluminum used for soils that have pH value less than 5.5.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

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.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Even aged. Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fast intake (in tables). The rapid movement of water into the soil.

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

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

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

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Footslope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head out. To form a flower head.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or

browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydraulic conductivity (K). The current standard for measuring a soil's ability to transmit water. Hydraulic conductivity is a numerical variable in an equation that can be either measured or estimated. It is one of the terms in Darcy's law: Q=KAi—where "Q" is outflow (volume), "K" is the hydraulic conductivity of the material, "A" is the area through which the fluid moves per unit time, and "i" is the pressure gradient.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

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

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

*Controlled flooding.*Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or

tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Ksat. See Saturated hydraulic conductivity.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mean annual increment (MAI). The average annual increase in volume of a tree during the entire life of the tree.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Merchantable trees. Trees that are of sufficient size to be economically processed into wood products.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Micro-high. An area that is 2 to 12 inches higher than the adjacent micro-low.

Micro-low. An area that is 2 to 12 inches lower than the adjacent micro-high.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately deep soil. A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Overstory. The trees in a forest that form the upper crown cover.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

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

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

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

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

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

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

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Quartzite, metamorphic. Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

Quartzite, sedimentary. Very hard but unmetamorphosed andstone consisting chiefly of quartz grains.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly 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

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regeneration. The new growth of a natural plant community, developing from seed.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy soil. Sand or loamy sand.

Saturated hydraulic conductivity (Ksat). Refers to the amount of water that would move vertically through a unit time under unit hydraulic gradient. Saturated hydraulic conductivity (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields. Terms describing Ksat are as follows:

Ksat class	cm/hr	in/hr
Very low	<0.0036	<0.001417
Low	0.00360 to <0.036	0.001417 to <0.1417
Moderately low	0.0360 to <0.360	0.01417 to <0.1417
Moderately high	0.360 to <3.60	0.1417 to <1.417
High	3.60 to <36.0	1.417 to <14.17
Very high	>36.0	>14.17

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sawlogs. Logs of suitable size and quality for the production of lumber.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Scribner's log rule. A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sedimentary plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sedimentary uplands. Land areas of bedrock formed from water- or wind-deposited sediments. They are higher on the landscape than the flood plain.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Semiconsolidated sedimentary beds. Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shelterwood system. A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

Shoulder slope. The uppermost inclined surface at the top of a hillside. It is the transition zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site class. A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

Site curve (50-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.

Site curve (100-year). A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. Pathways along which logs are dragged to a common site for loading onto a logging truck.

Slash. The branches, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

Slickens. Accumulations of fine textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Level	0 to 1 percent
Nearly level	0 to 2 percent
Very gently sloping	1 to 3 percent
Gently sloping	2 to 5 percent
Moderately sloping	3 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 20 percent
Steep	20 to 35 percent
Very steep	>35 percent and higher

Classes for complex slopes are as follows:

Level	0 to 1 percent
Nearly level	0 to 2 percent
Gently undulating	1 to 3 percent
Undulating	2 to 5 percent
Gently rolling	3 to 8 percent
Rolling	8 to 15 percent
Hilly	15 to 20 percent
Steep	20 to 35 percent
Very steep	35 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

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

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Species. A single, distinct kind of plant or animal having certain distinguishing characteristics.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stream channel. The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Tailwater. The water directly downstream of a structure.

Talus. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The textural classes used in this survey are C—clay, CL—clay loam, FSL—fine sandy loam, L—loam, LS—loamy sand, S—sand, SCL—sandy clay loam, SIC—silty clay, SICL—silty clay loam, SIL—silt loam, SL—sandy loam, and VFSL—very fine sandy loam. Terms used in lieu of texture are WB—weathered bedrock and UWB—unweathered bedrock. The texture modifiers that may apply to textural classes are CBV—very cobbly, CBX—extremely cobbly, CN—channery, CNV—very channery, CNX—extremely channery, FLV—very flaggy, GR—gravelly, GRV—very gravelly, GRX—extremely gravelly, and STV—very stony.

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tread. The relatively flat surface that was cut or built by stream or wave action.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Very deep soil. A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Very shallow soil. A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Water-spreading. Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

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

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Bolivar, Missouri)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall**
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	41.6	18.2	29.9	71	-10	39	1.63	0.39	2.61	3	5.2
February	46.4	22.7	34.5	75	-7	73	2.07	0.91	3.06	3	5.1
March	57.4	32.8	45.1	82	6	237	3.78	1.92	5.40	6	3.5
April	69.0	43.7	56.3	88	23	494	4.11	2.43	5.61	6	.4
May	76.4	52.3	64.4	90	32	748	4.97	3.01	6.72	7	.0
June	84.1	61.0	72.6	96	43	970	5.01	2.62	7.10	7	.0
July	90.0	65.2	77.6	101	49	1,157	3.38	1.27	5.15	4	.0
August	89.0	63.1	76.0	102	45	1,116	3.36	1.66	4.83	5	.0
September	81.0	55.7	68.4	97	32	850	4.49	1.97	6.65	6	.0
October	70.8	43.6	57.2	90	24	535	4.19	1.82	6.21	5	.0
November	57.4	33.3	45.3	79	9	222	3.39	1.25	5.17	5	1.6
December	45.8	23.5	34.7	72	-4	71	2.64	1.15	3.90	4	3.8
Yearly:											
Average	67.4	42.9	55.2	---	---	---	---	---	---	---	---
Extreme	107	-19	---	103	-12	---	---	---	---	---	---
Total	---	---	---	---	---	6,512	43.02	28.51	51.39	61	19.5

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

** Average snowfall data is from Springfield, Missouri. Data from Bolivar, Missouri was incomplete for the 1961-1990 period.

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Bolivar, Missouri)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 10	April 18	May 7
2 years in 10 later than--	April 4	April 14	May 2
5 years in 10 later than--	March 25	April 6	April 22
First freezing temperature in fall:			
1 year in 10 earlier than--	October 18	October 4	September 22
2 years in 10 earlier than--	October 25	October 11	September 28
5 years in 10 earlier than--	November 7	October 23	October 10

Table 3.--Growing Season

(Recorded in the period 1961-90 at Bolivar, Missouri)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	205	177	149
8 years in 10	212	185	157
5 years in 10	227	200	172
2 years in 10	242	215	187
1 year in 10	250	223	194

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
15000	BASEHOR FINE SANDY LOAM, 3 TO 15 PERCENT SLOPES	3,309	0.8
15001	BASEHOR FINE SANDY LOAM, ROCKY, 15 TO 35 PERCENT SLOPES, VERY STONY	981	0.2
15002	MCGIRK SILT LOAM, 1 TO 3 PERCENT SLOPES	718	0.2
40000	BARDEN SILT LOAM, 1 TO 3 PERCENT SLOPES	13,052	3.2
40001	BOLIVAR LOAM, 3 TO 8 PERCENT SLOPES	11,452	2.8
40002	LIBERAL SILT LOAM, 3 TO 8 PERCENT SLOPES	1,308	0.3
46000	HUMANSVILLE SILT LOAM, 0 TO 2 PERCENT SLOPES, FREQUENTLY FLOODED	3,688	0.9
66000	MONITEAU SILT LOAM, 0 TO 2 PERCENT SLOPES, OCCASIONALLY FLOODED	2,740	0.7
66001	DAMERON SILT LOAM, 0 TO 3 PERCENT SLOPES, FREQUENTLY FLOODED	70	*
70000	BONA GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	17,081	4.2
70001	BONA GRAVELLY SILT LOAM, 8 TO 15 PERCENT SLOPES	3,966	1.0
70002	ALSUP GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	7,089	1.7
70003	ALSUP GRAVELLY SILT LOAM, 8 TO 15 PERCENT SLOPES	7,285	1.8
70004	ALSUP SILT LOAM, 15 TO 35 PERCENT SLOPES, VERY STONY	11,137	2.7
70005	BLUEYE-MOKO COMPLEX, 3 TO 15 PERCENT SLOPES	5,349	1.3
70006	CRELDON SILT LOAM, 1 TO 3 PERCENT SLOPES	12,001	2.9
70007	CLIQUOT GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES	1,293	0.3
70008	GOSS GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	21,147	5.1
70009	GOSS GRAVELLY SILT LOAM, 8 TO 15 PERCENT SLOPES	23,611	5.7
70010	GOSS VERY COBBLY SILT LOAM, 15 TO 35 PERCENT SLOPES	4,367	1.1
70011	GOSS-MOKO COMPLEX, 8 TO 35 PERCENT SLOPES	3,334	0.8
70012	HOBERG SILT LOAM, 2 TO 5 PERCENT SLOPES	16,954	4.1
70013	MOKO VERY GRAVELLY SILT LOAM, 3 TO 15 PERCENT SLOPES	6,217	1.5
70014	MOKO-ROCK OUTCROP COMPLEX, 15 TO 35 PERCENT SLOPES, VERY STONY	7,521	1.8
70015	PEMBROKE SILT LOAM, 2 TO 5 PERCENT SLOPES	4,305	1.0
70016	GOODSON SILT LOAM, 1 TO 3 PERCENT SLOPES	4,235	1.0
70017	GOODSON GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	7,111	1.7
70018	GOODSON GRAVELLY SILT LOAM, 8 TO 15 PERCENT SLOPES	1,825	0.4
70039	SACVILLE SILTY CLAY LOAM, 1 TO 3 PERCENT SLOPES	8,055	2.0
73000	POMME SILT LOAM, 3 TO 8 PERCENT SLOPES	23,123	5.6
73001	GLENSTED SILT LOAM, 0 TO 2 PERCENT SLOPES	1,701	0.4
73002	OCIE-GATEWOOD COMPLEX, 8 TO 15 PERCENT SLOPES	31,322	7.6
73003	OCIE-GATEWOOD COMPLEX, 15 TO 35 PERCENT SLOPES	6,897	1.7
73004	OCIE VERY GRAVELLY SILT LOAM, 8 TO 25 PERCENT SLOPES, VERY STONY	1,156	0.3
73005	OCIE GRAVELLY SILT LOAM, 3 TO 15 PERCENT SLOPES	25,248	6.1
73006	PERIDGE SILT LOAM, 2 TO 5 PERCENT SLOPES	7,910	1.9
73007	PLATO SILT LOAM, 1 TO 3 PERCENT SLOPES	6,718	1.6
73008	VIRATON SILT LOAM, 2 TO 5 PERCENT SLOPES	45,910	11.2
73009	VIRATON SILT LOAM, 5 TO 9 PERCENT SLOPES	2,021	0.5
73010	WILDERNESS GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	1,774	0.4
74625	HARTVILLE SILT LOAM, 3 TO 8 PERCENT SLOPES	10,350	2.5
75375	HORSECREEK SILT LOAM, 0 TO 2 PERCENT SLOPES, OCCASIONALLY FLOODED	1,918	0.5
75376	CEDARGAP GRAVELLY SILT LOAM, 0 TO 3 PERCENT SLOPES, FREQUENTLY FLOODED	8,851	2.2
75377	RACKET SILT LOAM, 0 TO 3 PERCENT SLOPES, FREQUENTLY FLOODED	11,074	2.7
75378	STURKIE SILT LOAM, 0 TO 2 PERCENT SLOPES, FREQUENTLY FLOODED	10,977	2.7
99000	PITS, QUARRIES	155	*
99001	WATER	2,970	0.7
99003	MISCELLANEOUS WATER	20	*
	Total	411,296	100.0

* Less than 0.1 percent.

Table 5.--Land Capability and Yields per Acre of Grain and Seed Crops

(Yields are those that can be expected under a high level of nonirrigated management by component. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capability	Corn	Grain sorghum	Soybeans	Tall fescue seed	Winter wheat
		Bu	Bu	Bu	Lbs	Bu
15000:						
BASEHOR	VIs	---	---	---	97.0	---
15001:						
BASEHOR	VIIs	---	---	---	---	---
15002:						
MCGIRK	IIe	83.0	66.0	28.0	292.0	33.0
40000:						
BARDEN	IIe	117.0	92.0	39.0	408.0	47.0
40001:						
BOLIVAR	IIIe	72.0	57.0	24.0	253.0	29.0
40002:						
LIBERAL	IIIe	100.0	79.0	33.0	350.0	40.0
46000:						
HUMANSVILLE	IIIw	128.0	101.0	42.0	447.0	51.0
66000:						
MONITEAU	IIIw	106.0	83.0	35.0	369.0	42.0
66001:						
DAMERON	IIIw	94.0	74.0	31.0	330.0	38.0
70000:						
BONA	IIIe	72.0	57.0	24.0	253.0	29.0
70001:						
BONA	IVe	---	50.0	---	224.0	26.0
70002:						
ALSUP	IIIe	61.0	48.0	20.0	214.0	24.0
70003:						
ALSUP	VIe	---	42.0	---	185.0	21.0
70004:						
ALSUP	VIIe	---	---	---	126.0	---
70005:						
BLUEYE	VIe	---	---	---	126.0	---
MOKO	VIs	---	---	---	---	---
70006:						
CRELDON	IIe	97.0	76.0	32.0	340.0	39.0
70007:						
CLIQUOT	IVe	---	44.0	---	194.0	22.0
70008:						
GOSS	IVe	58.0	46.0	19.0	204.0	23.0

Table 5.--Land Capability and Yields per Acre of Grain and Seed Crops--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Soybeans	Tall fescue seed	Winter wheat
		Bu	Bu	Bu	Lbs	Bu
70009:						
GOSS	VIe	---	37.0	---	165.0	19.0
70010:						
GOSS	VIIe	---	---	---	107.0	---
70011:						
GOSS	VIIe	---	---	---	78.0	---
MOKO	VIIs	---	---	---	---	---
70012:						
HOBERG	IIIe	100.0	79.0	33.0	350.0	40.0
70013:						
MOKO	VIs	---	---	---	---	---
70014:						
MOKO	VIIs	---	---	---	---	---
ROCK OUTCROP.						
70015:						
PEMBROKE	IIe	117.0	92.0	39.0	408.0	47.0
70016:						
GOODSON	IIe	106.0	83.0	35.0	369.0	42.0
70017:						
GOODSON	IIIe	83.0	66.0	26.0	292.0	33.0
70018:						
GOODSON	IVe	---	59.0	---	350.0	30.0
70039:						
SACVILLE	IIw	94.0	74.0	31.0	330.0	38.0
73000:						
POMME	IIIe	80.0	63.0	27.0	282.0	32.0
73001:						
GLENSTED	IIIe	100.0	79.0	33.0	350.0	40.0
73002:						
OCIE	VIe	---	46.0	---	204.0	23.0
GATEWOOD	VIe	---	19.0	---	165.0	20.0
73003:						
OCIE	VIIe	---	---	---	107.0	---
GATEWOOD	VIIe	---	---	---	107.0	---
73004:						
OCIE	VIIe	---	42.0	---	185.0	21.0
73005:						
OCIE	IVe	---	46.0	---	204.0	23.0
73006:						
PERIDGE	IIe	111.0	87.0	37.0	389.0	44.0

Table 5.--Land Capability and Yields per Acre of Grain and Seed Crops--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Soybeans	Tall fescue seed	Winter wheat
		Bu	Bu	Bu	Lbs	Bu
73007: PLATO	IIe	78.0	61.0	26.0	272.0	31.0
73008: VIRATON	IIe	69.0	55.0	23.0	243.0	28.0
73009: VIRATON	IIIe	64.0	50.0	21.0	224.0	26.0
73010: WILDERNESS	IVs	---	35.0	---	156.0	18.0
74625: HARTVILLE	IIIe	86.0	68.0	29.0	301.0	34.0
75375: HORSECREEK	IIw	122.0	96.0	41.0	428.0	49.0
75376: CEDARGAP	IIIw	56.0	44.0	19.0	194.0	22.0
75377: RACKET	IIw	94.0	74.0	31.0	330.0	39.0
75378: STURKIE	IIw	100.0	79.0	33.0	400.0	40.0
99000. PITS, QUARRIES						
99001. WATER						
99003. MISCELLANEOUS WATER						

Table 6.--Land Capability and Yields per Acre of Forage Crops

(Yields are those that can be expected under a high level of nonirrigated management by component. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capability	Caucasian bluestem	Orchardgrass-alfalfa hay	Tall fescue hay	Tall fescue-red clover hay	Warm season grasses
		Tons	Tons	Tons	Tons	Tons
15000:						
BASEHOR	VIs	---	---	0.8	---	1.2
15001:						
BASEHOR	VIIs	---	---	---	---	---
15002:						
MCGIRK	IIe	---	---	2.5	---	3.5
40000:						
BARDEN	IIe	4.1	5.0	3.5	4.1	4.9
40001:						
BOLIVAR	IIIe	2.5	3.1	2.2	2.5	3.0
40002:						
LIBERAL	IIIe	3.5	4.3	3.0	3.5	4.2
46000:						
HUMANSVILLE	IIIw	---	---	3.8	4.5	5.1
66000:						
MONITEAU	IIIw	---	---	3.2	---	3.7
66001:						
DAMERON	IIIw	3.3	4.0	2.8	3.3	4.0
70000:						
BONA	IIIe	2.5	3.1	2.2	---	3.0
70001:						
BONA	IVe	2.2	2.7	1.9	2.2	2.7
70002:						
ALSUP	IIIe	---	2.0	1.8	2.1	2.6
70003:						
ALSUP	VIe	1.8	2.3	1.6	1.8	2.2
70004:						
ALSUP	VIIe	1.5	---	1.1	1.3	1.5
70005:						
BLUEYE	VIe	---	---	1.1	1.3	1.5
MOKO	VIs	---	---	1.1	1.3	1.5
70006:						
CRELDON	IIe	3.4	4.2	2.9	3.4	4.1
70007:						
CLIQUOT	IVe	1.9	2.4	1.7	1.9	2.3
70008:						
GOSS	IVe	2.0	2.5	1.8	2.0	2.4

Table 6.--Land Capability and Yields per Acre of Forage Crops--Continued

Map symbol and soil name	Land capability	Caucasian bluestem	Orchardgrass-alfalfa hay	Tall fescue hay	Tall fescue-red clover hay	Warm season grasses
		Tons	Tons	Tons	Tons	Tons
70009:						
GOSS	VIe	1.6	2.0	1.4	1.6	2.0
70010:						
GOSS	VIIe	1.1	1.3	0.9	1.1	1.3
70011:						
GOSS	VIIe	0.8	---	---	---	0.9
MOKO	VIIs	---	---	---	---	---
70012:						
HOBERG	IIIe	3.5	4.3	3.0	---	4.2
70013:						
MOKO	VIs	---	---	0.5	---	0.7
70014:						
MOKO	VIIs	---	---	0.3	---	0.4
ROCK OUTCROP.						
70015:						
PEMBROKE	IIe	4.1	5.0	3.5	4.1	4.9
70016:						
GOODSON	IIe	3.7	4.5	3.2	3.7	4.4
70017:						
GOODSON	IIIe	2.9	3.6	2.5	2.9	3.5
70018:						
GOODSON	IVe	2.6	4.0	3.0	2.6	3.2
70039:						
SACVILLE	IIw	---	---	2.8	3.3	5.4
73000:						
POMME	IIIe	2.8	3.4	2.4	2.8	3.4
73001:						
GLENSTED	IIIe	---	---	3.0	3.5	4.2
73002:						
OCIE	VIe	2.0	2.5	1.8	2.0	2.4
GATEWOOD	VIe	1.6	2.0	1.4	1.6	2.0
73003:						
OCIE	VIIe	1.8	---	0.9	1.8	2.2
GATEWOOD	VIIe	1.1	1.1	0.9	1.1	1.3
73004:						
OCIE	VIIe	1.8	---	1.6	1.8	2.2
73005:						
OCIE	IVe	2.0	2.5	1.8	2.0	2.4
73006:						
PERIDGE	IIe	3.9	4.8	3.3	3.9	4.7

Table 6.--Land Capability and Yields per Acre of Forage Crops--Continued

Map symbol and soil name	Land capability	Caucasian bluestem	Orchardgrass-alfalfa hay	Tall fescue hay	Tall fescue-red clover hay	Warm season grasses
		Tons	Tons	Tons	Tons	Tons
73007: PLATO	IIe	2.7	---	2.3	2.7	3.3
73008: VIRATON	IIe	2.4	3.0	2.1	2.4	2.9
73009: VIRATON	IIIe	2.2	2.7	1.9	2.2	2.7
73010: WILDERNESS	IVs	1.6	---	1.3	1.6	1.9
74625: HARTVILLE	IIIe	3.0	---	2.6	3.0	3.6
75375: HORSECREEK	IIw	4.3	5.1	3.7	4.3	5.1
75376: CEDARGAP	IIIw	1.9	2.4	1.7	1.9	2.3
75377: RACKET	IIw	3.3	4.0	2.8	3.3	4.0
75378: STURKIE	IIw	3.5	5.0	3.5	3.5	4.2
99000. PITS, QUARRIES						
99001. WATER						
99003. MISCELLANEOUS WATER						

Table 7.--Pasture and Hayland Suitability Groups

Map symbol	Soil name	Component name	Pasture and hayland suitability groups
70002	ALSUP GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	ALSUP	GrU
70003	ALSUP GRAVELLY SILT LOAM, 8 TO 15 PERCENT SLOPES	ALSUP	GrU
70004	ALSUP SILT LOAM, 15 TO 35 PERCENT SLOPES, VERY STONY	ALSUP	GrU
40000	BARDEN SILT LOAM, 1 TO 3 PERCENT SLOPES	BARDEN	CyU
15000	BASEHOR FINE SANDY LOAM, 3 TO 15 PERCENT SLOPES	BASEHOR	ShU
15001	BASEHOR FINE SANDY LOAM, ROCKY, 15 TO 35 PERCENT SLOPES, VERY STONY	BASEHOR	ShU
70005	BLUEYE-MOKO COMPLEX, 3 TO 15 PERCENT SLOPES	BLUEYE	MDU
		MOKO	ShU
40001	BOLIVAR LOAM, 3 TO 8 PERCENT SLOPES	BOLIVAR	MDU
70000	BONA GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	BONA	GrU
70001	BONA GRAVELLY SILT LOAM, 8 TO 15 PERCENT SLOPES	BONA	GrU
75376	CEDARGAP GRAVELLY SILT LOAM, 0 TO 3 PERCENT SLOPES, FREQUENTLY FLOODED	CEDARGAP	GrO
70007	CLIQUOT GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES	CLIQUOT	GrU
70006	CRELDON SILT LOAM, 1 TO 3 PERCENT SLOPES	CRELDON	LyP
66001	DAMERON SILT LOAM, 0 TO 3 PERCENT SLOPES, FREQUENTLY FLOODED	DAMERON	LyO
73001	GLENSTED SILT LOAM, 0 TO 2 PERCENT SLOPES	GLENSTED	WCU
70017	GOODSON GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	GOODSON	GrU
70018	GOODSON GRAVELLY SILT LOAM, 8 TO 15 PERCENT SLOPES	GOODSON	GrU
70016	GOODSON SILT LOAM, 1 TO 3 PERCENT SLOPES	GOODSON	GrU
70008	GOSS GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	GOSS	GrU
70009	GOSS GRAVELLY SILT LOAM, 8 TO 15 PERCENT SLOPES	GOSS	GrU
70010	GOSS VERY COBBLY SILT LOAM, 15 TO 35 PERCENT SLOPES	GOSS	GrU
70011	GOSS-MOKO COMPLEX, 8 TO 35 PERCENT SLOPES	GOSS	GrU
		MOKO	ShU
74625	HARTVILLE SILT LOAM, 3 TO 8 PERCENT SLOPES	HARTVILLE	WCU
70012	HOBERG SILT LOAM, 2 TO 5 PERCENT SLOPES	HOBERG	LyP
75375	HORSECREEK SILT LOAM, 0 TO 2 PERCENT SLOPES, OCCASIONALLY FLOODED	HORSECREEK	LyO
46000	HUMANSVILLE SILT LOAM, 0 TO 2 PERCENT SLOPES, FREQUENTLY FLOODED	HUMANSVILLE	WLO
40002	LIBERAL SILT LOAM, 3 TO 8 PERCENT SLOPES	LIBERAL	CyU
15002	MCGIRK SILT LOAM, 1 TO 3 PERCENT SLOPES	MCGIRK	WCU
99003	MISCELLANEOUS WATER	MISCELLANEOUS WATER	---
70013	MOKO VERY GRAVELLY SILT LOAM, 3 TO 15 PERCENT SLOPES	MOKO	ShU
70014	MOKO-ROCK OUTCROP COMPLEX, 15 TO 35 PERCENT SLOPES, VERY STONY	ROCK OUTCROP	---
		MOKO	ShU
66000	MONITEAU SILT LOAM, 0 TO 2 PERCENT SLOPES, OCCASIONALLY FLOODED	MONITEAU	WLB
73005	OCIE GRAVELLY SILT LOAM, 3 TO 15 PERCENT SLOPES	OCIE	GrU
73004	OCIE VERY GRAVELLY SILT LOAM, 8 TO 25 PERCENT SLOPES, VERY STONY	OCIE	GrU
73003	OCIE-GATEWOOD COMPLEX, 15 TO 35 PERCENT SLOPES	OCIE	GrU
		GATEWOOD	MDU
73002	OCIE-GATEWOOD COMPLEX, 8 TO 15 PERCENT SLOPES	OCIE	GrU
		GATEWOOD	MDU
70015	PEMBROKE SILT LOAM, 2 TO 5 PERCENT SLOPES	PEMBROKE	LyU
73006	PERIDGE SILT LOAM, 2 TO 5 PERCENT SLOPES	PERIDGE	LyU
99000	PITS, QUARRIES	PITS, QUARRIES	---
73007	PLATO SILT LOAM, 1 TO 3 PERCENT SLOPES	PLATO	WtP
73000	POMME SILT LOAM, 3 TO 8 PERCENT SLOPES	POMME	LyU
75377	RACKET SILT LOAM, 0 TO 3 PERCENT SLOPES, FREQUENTLY FLOODED	RACKET	LyO
70039	SACVILLE SILTY CLAY LOAM, 1 TO 3 PERCENT SLOPES	SACVILLE	WCU
75378	STURKIE SILT LOAM, 0 TO 2 PERCENT SLOPES, FREQUENTLY FLOODED	STURKIE	LyO
73008	VIRATON SILT LOAM, 2 TO 5 PERCENT SLOPES	VIRATON	LyP
73009	VIRATON SILT LOAM, 5 TO 9 PERCENT SLOPES	VIRATON	LyP
99001	WATER	WATER	---
73010	WILDERNESS GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	WILDERNESS	GrP

Table 8.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume* of wood fiber	
									m3/ha	
15000:										
BASEHOR	2D	Slight	Slight	Moderate	Severe	Slight	common hackberry	45	---	eastern redcedar, shortleaf pine
							green ash	45	2	
							northern red oak	40	2	
							white oak	35	2	
15001:										
BASEHOR	2R	Severe	Moderate	Moderate	Severe	Slight	common hackberry	45	---	black oak, common hackberry
							green ash	45	2	
							northern red oak	40	2	
							white oak	35	2	
15002:										
MCGIRK	3W	Slight	Severe	Moderate	Moderate	Severe	white oak	55	3	eastern cottonwood, green ash, pecan, pin oak, sweetgum
							green ash	---	---	
							pecan	---	---	
40001:										
BOLIVAR	3D	Slight	Slight	Slight	Moderate	Slight	black oak	56	3	green ash, shortleaf pine, white oak, black oak
							black walnut	---	---	
							northern red oak	73	4	
							white oak	53	2	
46000:										
HUMANSVILLE	9W	Slight	Moderate	Moderate	Slight	Severe	eastern cottonwood	100	9	eastern cottonwood, silver maple, pecan
							sycamore	---	---	
							silver maple	---	---	
66000:										
MONITEAU	4W	Slight	Severe	Moderate	Moderate	Severe	pin oak	70	4	eastern cottonwood, green ash, pin oak, silver maple
							silver maple	---	---	
							eastern cottonwood	---	---	
							green ash	---	---	
66001:										
DAMERON	5A	Slight	Slight	Slight	Slight	Moderate	green ash	70	5	black walnut, green ash, pecan
							American sycamore	---	---	
							black walnut	72	---	
							white oak	---	---	
70002, 70003:										
ALSUP	2A	Slight	Slight	Slight	Slight	Slight	black oak	51	2	black oak, northern red oak, white oak
							northern red oak	79	4	
							white oak	---	---	
70004:										
ALSUP	2R	Slight	Slight	Slight	Slight	Slight	black oak	51	2	black oak, northern red oak, white oak
							northern red oak	79	4	
							white oak	---	---	

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume* of wood fiber	Suggested trees to plant
									m3/ha	
70005:										
BLUEYE----------	2A	Slight	Slight	Slight	Slight	Moderate	eastern redcedar----	35	2	eastern redcedar, post oak
							blackjack oak-------	---	---	
							post oak------------	---	---	
MOKO------------	2X	Slight	Moderate	Moderate	Severe	Slight	eastern redcedar----	30	2	eastern redcedar
70007:										
CLIQUOT---------	3F	Slight	Moderate	Slight	Slight	Moderate	black oak-----------	55	3	black oak, eastern redcedar, shortleaf pine
							eastern redcedar----	30	2	
							post oak------------	50	2	
70008, 70009:										
GOSS------------	3F	Slight	Slight	Moderate	Slight	Slight	white oak-----------	60	3	white oak, black oak, shortleaf pine
							post oak------------	---	---	
							black oak-----------	---	---	
70010:										
GOSS------------	3R	Slight	Moderate	Moderate	Slight	Slight	white oak-----------	60	3	white oak, black oak, shortleaf pine
							post oak------------	---	---	
							black oak-----------	---	---	
70011:										
GOSS------------	3R	Moderate	Moderate	Moderate	Slight	Slight	white oak-----------	60	3	white oak, black oak, shortleaf pine
							post oak------------	---	---	
							black oak-----------	---	---	
MOKO------------	2R	Slight	Moderate	Moderate	Severe	Slight	eastern redcedar----	30	2	eastern redcedar
70012:										
HOBERG----------	3D	Slight	Slight	Slight	Moderate	Slight	white oak-----------	60	3	white oak, black oak, shortleaf pine
							black oak-----------	---	---	
							shortleaf pine------	---	---	
70013:										
MOKO------------	2X	Slight	Moderate	Moderate	Severe	Slight	eastern redcedar----	30	2	eastern redcedar
70014:										
MOKO------------	2R	Slight	Moderate	Moderate	Severe	Slight	eastern redcedar----	30	2	eastern redcedar
ROCK OUTCROP.										
70015:										
PEMBROKE--------	3A	Slight	Slight	Slight	Slight	---	white oak-----------	60	3	black walnut, white oak
							black oak-----------	---	---	
73000:										
POMME-----------	3A	Slight	Slight	Slight	Slight	Moderate	northern red oak----	65	3	black walnut, shortleaf pine, white oak
							white oak-----------	65	3	

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume* of wood fiber	Suggested trees to plant
									m3/ha	
73002:										
OCIE	3F	Slight	Slight	Moderate	Slight	Slight	black oak	58	3	northern red oak, shortleaf pine
							northern red oak	---	---	
							white oak	57	3	
GATEWOOD	2A	Slight	Slight	Slight	Slight	Moderate	black oak	42	2	eastern redcedar, shortleaf pine
							eastern redcedar	40	3	
							post oak	43	2	
							white oak	45	2	
73003:										
OCIE	3R	Slight	Moderate	Moderate	Slight	Slight	black oak	58	3	northern red oak, shortleaf pine
							northern red oak	---	---	
							white oak	57	3	
GATEWOOD	2R	Slight	Moderate	Slight	Slight	Moderate	black oak	42	2	eastern redcedar, shortleaf pine
							eastern redcedar	40	3	
							post oak	43	2	
							white oak	45	2	
73004:										
OCIE	3R	Slight	Moderate	Moderate	Slight	Slight	black oak	58	3	northern red oak, shortleaf pine
							northern red oak	---	---	
							white oak	57	3	
73005:										
OCIE	3F	Slight	Slight	Moderate	Slight	Slight	black oak	58	3	northern red oak, shortleaf pine
							northern red oak	---	---	
							white oak	57	3	
73006:										
PERIDGE	4A	Slight	Slight	Slight	Slight	Severe	northern red oak	70	4	black walnut, northern red oak, white oak
							black walnut	---	---	
							eastern redcedar	50	4	
							white oak	---	---	
73007:										
PLATO	3D	Slight	Slight	Slight	Moderate	Slight	black oak	60	3	black oak, post oak, shortleaf pine
							white oak	55	3	
73008, 73009:										
VIRATON	3D	Slight	Slight	Moderate	Moderate	Slight	black oak	60	3	black oak, shortleaf pine, white oak
							white oak	55	3	
73010:										
WILDERNESS	3D	Slight	Slight	Moderate	Moderate	Slight	black oak	63	3	black oak, shortleaf pine, white oak
							northern red oak	64	3	
							white oak	56	3	
74625:										
HARTVILLE	3C	Slight	Slight	Severe	Severe	Slight	white oak	55	3	eastern cottonwood, pin oak, tuliptree

See footnote at end of table.

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume* of wood fiber	Suggested trees to plant
									m3/ha	
75375:										
HORSECREEK------	5A	Slight	Slight	Slight	Slight	Moderate	pin oak----------	94	5	ck walnut,
							American elm--------	---	---	ern
							American sycamore---	---	---	tonwood,
							Shumard's oak-------	93	4	tiptree,
							common hackberry----	---	---	white ash
							hickory----------	---	---	
							white ash----------	---	---	
75376:										
CEDARGAP--------	3F	Slight	Slight	Moderate	Slight	Moderate	black oak----------	66	3	black oak,
							black walnut--------	---	---	green ash
							green ash----------	---	---	
75377:										
RACKET----------	5A	Slight	Slight	Slight	Slight	Moderate	American sycamore---	---	---	black walnut,
							black cherry--------	---	---	northern red
							black walnut--------	72	5	oak, white ash,
							northern red oak----	---	---	tulip poplar
							white ash----------	---	---	
75378:										
STURKIE---------	6W	Slight	Slight	Moderate	Slight	Severe	American sycamore---	80	6	American
							eastern cottonwood--	100	9	sycamore, black
							northern red oak----	80	4	walnut, eastern
							white oak----------	70	4	cottonwood,
										northern red
										oak

* Volume is the yield in cubic meters per hectare per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

Table 9.--Windbreaks and Environmental Plantings

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-				
	<8	8-15	16-25	26-35	>35
15000, 15001. BASEHOR					
15002: MCGIRK	fragrant sumac, ninebark	gray dogwood, possumhaw, Amur maple	eastern redcedar	Austrian pine, Norway spruce, common hackberry, thornless honeylocust, pin oak, shortleaf pine	---
40000: BARDEN	fragrant sumac, ninebark	gray dogwood, possumhaw, Amur maple	eastern redcedar	Austrian pine, Norway spruce, common hackberry, thornless honeylocust, pin oak, shortleaf pine	---
40001: BOLIVAR	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, thornless honeylocust	---	---
40002: LIBERAL	fragrant sumac, ninebark	gray dogwood, possumhaw, Amur maple	eastern redcedar	Austrian pine, Norway spruce, common hackberry, thornless honeylocust, pin oak, shortleaf pine	---
46000: HUMANSVILLE	buttonbush	possumhaw	nannyberry, eastern arborvitae, eastern redcedar	common hackberry, baldcypress, pin oak, pecan	eastern cottonwood
66000: MONITEAU	buttonbush	possumhaw	nannyberry, eastern arborvitae, eastern redcedar	common hackberry, baldcypress, pin oak, pecan	eastern cottonwood
66001. DAMERON					

Table 9.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of—				
	<8	8-15	16-25	26-35	>35
70000, 70001: BONA	fragrant sumac, ninebark	gray dogwood, possumhaw, Amur maple	eastern redcedar	Austrian pine, Norway spruce, common hackberry, thornless honeylocust, pin oak, shortleaf pine	---
70002, 70003, 70004: ALSUP	fragrant sumac	American plum, gray dogwood, southern arrowwood	Washington hawthorn, eastern redbud, eastern redcedar	white fir, green ash, northern red oak, tuliptree	eastern white pine, shortleaf pine
70005: BLUEYE	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, thornless honeylocust	---	---
MOKO.					
70006: CRELDON	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, thornless honeylocust	---	---
70007. CLIQUOT					
70008, 70009, 70010: GOSS	fragrant sumac	American plum, gray dogwood, southern arrowwood	Washington hawthorn, eastern redbud, eastern redcedar	white fir, green ash, northern red oak, tuliptree	eastern white pine, shortleaf pine
70011: GOSS	fragrant sumac	American plum, gray dogwood, southern arrowwood	Washington hawthorn, eastern redbud, eastern redcedar	white fir, green ash, northern red oak, tuliptree	eastern white pine, shortleaf pine
MOKO.					
70012: HOBERG	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, thornless honeylocust	---	---
70013. MOKO					

Table 9.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of–				
	<8	8-15	16-25	26-35	>35
70014: MOKO.					
ROCK OUTCROP.					
70015: PEMBROKE--------	silky dogwood, fragrant sumac	American plum, blackhaw, gray dogwood	white fir, eastern redcedar, flowering dogwood, redbud	Norway spruce, green ash, sweetgum, thornless honeylocust	eastern white pine, pin oak
70016, 70017, 70018: GOODSON--------	fragrant sumac, ninebark	gray dogwood, possumhaw, Amur maple	eastern redcedar	Austrian pine, Norway spruce, common hackberry, thornless honeylocust, pin oak, shortleaf pine	---
70039: SACVILLE--------	fragrant sumac, ninebark	gray dogwood, possumhaw, Amur maple	eastern redcedar	Austrian pine, Norway spruce, common hackberry, thornless honeylocust, pin oak, shortleaf pine	---
73000: POMME----------	fragrant sumac	American plum, gray dogwood, southern arrowwood	Washington hawthorn, eastern redbud, eastern redcedar	white fir, green ash, northern red oak, tuliptree	eastern white pine, shortleaf pine
73001: GLENSTED--------	buttonbush	possumhaw	nannyberry, eastern arborvitae, eastern redcedar	common hackberry, baldcypress, pin oak	eastern cottonwood
73002, 73003: OCIE----------	fragrant sumac	American plum, gray dogwood, southern arrowwood	Washington hawthorn, eastern redbud, eastern redcedar	white fir, green ash, northern red oak, tuliptree	eastern white pine, shortleaf pine
GATEWOOD--------	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, thornless honeylocust	---	---
73004, 73005: OCIE----------	fragrant sumac	American plum, gray dogwood, southern arrowwood	Washington hawthorn, eastern redbud, eastern redcedar	white fir, green ash, northern red oak, tuliptree	eastern white pine, shortleaf pine

Table 9.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-				
	<8	8-15	16-25	26-35	>35
73006:					
PERIDGE	silky dogwood, fragrant sumac	American plum, blackhaw, gray dogwood	white fir, eastern redcedar, flowering dogwood, redbud	Norway spruce, green ash, sweetgum, thornless honeylocust	eastern white pine, pin oak
73007:					
PLATO	common lilac, fragrant sumac	Amur maple, American plum	Manchurian crabapple, eastern redcedar, common hackberry, green ash, Austrian pine	thornless honeylocust	---
73008, 73009:					
VIRATON	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, thornless honeylocust	---	---
73010:					
WILDERNESS	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, thornless honeylocust		
74625:					
HARTVILLE	fragrant sumac, ninebark	gray dogwood, possumhaw, Amur maple	eastern redcedar	Austrian pine, Norway spruce, common hackberry, thornless honeylocust, pin oak, shortleaf pine	---
75375:					
HORSECREEK	silky dogwood, fragrant sumac	American plum, blackhaw, gray dogwood	white fir, eastern redcedar, flowering dogwood, redbud	Norway spruce, green ash, sweetgum, thornless honeylocust	eastern white pine, pin oak
75376:					
CEDARGAP	silky dogwood, fragrant sumac	American plum, blackhaw, gray dogwood	white fir, eastern redcedar, flowering dogwood, redbud	Norway spruce, green ash, sweetgum, thornless honeylocust	eastern white pine, pin oak
75377:					
RACKET	silky dogwood, fragrant sumac	American plum, blackhaw, gray dogwood	white fir, eastern redcedar, flowering dogwood, redbud	Norway spruce, green ash, sweetgum, thornless honeylocust	eastern white pine, pin oak

Table 9.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-				
	<8	8-15	16-25	26-35	>35
75378: STURKIE	silky dogwood, fragrant sumac	American plum, blackhaw, gray dogwood	white fir, eastern redcedar, flowering dogwood, redbud	Norway spruce, green ash, sweetgum, thornless honeylocust	eastern white pine, pin oak
99000. PITS, QUARRIES					
99001. WATER					
99003. MISCELLANEOUS WATER					

Table 10.--Windbreak Suitability Groups

Map symbol	Soil name	Component name	Windbreak suitability group
15000	BASEHOR FINE SANDY LOAM, 3 TO 15 PERCENT SLOPES	BASEHOR	10
15001	BASEHOR FINE SANDY LOAM, ROCKY, 15 TO 35 PERCENT SLOPES, VERY STONY	BASEHOR	10
15002	MCGIRK SILT LOAM, 1 TO 3 PERCENT SLOPES	MCGIRK	4
40000	BARDEN SILT LOAM, 1 TO 3 PERCENT SLOPES	BARDEN	4
40001	BOLIVAR LOAM, 3 TO 8 PERCENT SLOPES	BOLIVAR	6D
40002	LIBERAL SILT LOAM, 3 TO 8 PERCENT SLOPES	LIBERAL	4
46000	HUMANSVILLE SILT LOAM, 0 TO 2 PERCENT SLOPES, FREQUENTLY FLOODED	HUMANSVILLE	2
66000	MONITEAU SILT LOAM, 0 TO 2 PERCENT SLOPES, OCCASIONALLY FLOODED	MONITEAU	2
66001	DAMERON SILT LOAM, 0 TO 3 PERCENT SLOPES, FREQUENTLY FLOODED	DAMERON	1
70000	BONA GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	BONA	4
70001	BONA GRAVELLY SILT LOAM, 8 TO 15 PERCENT SLOPES	BONA	4
70002	ALSUP GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	ALSUP	3
70003	ALSUP GRAVELLY SILT LOAM, 8 TO 15 PERCENT SLOPES	ALSUP	3
70004	ALSUP SILT LOAM, 15 TO 35 PERCENT SLOPES, VERY STONY	ALSUP	3
70005	BLUEYE-MOKO COMPLEX, 3 TO 15 PERCENT SLOPES	BLUEYE	6D
		MOKO	10
70006	CRELDON SILT LOAM, 1 TO 3 PERCENT SLOPES	CRELDON	6D
70007	CLIQUOT GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES	CLIQUOT	10
70008	GOSS GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	GOSS	10
70009	GOSS GRAVELLY SILT LOAM, 8 TO 15 PERCENT SLOPES	GOSS	10
70010	GOSS VERY COBBLY SILT LOAM, 15 TO 35 PERCENT SLOPES	GOSS	10
70011	GOSS-MOKO COMPLEX, 8 TO 35 PERCENT SLOPES	GOSS	10
		MOKO	10
70012	HOBERG SILT LOAM, 2 TO 5 PERCENT SLOPES	HOBERG	6D
70013	MOKO VERY GRAVELLY SILT LOAM, 3 TO 15 PERCENT SLOPES	MOKO	10
70014	MOKO-ROCK OUTCROP COMPLEX, 15 TO 35 PERCENT SLOPES, VERY STONY	MOKO	10
		ROCK OUTCROP	---
70015	PEMBROKE SILT LOAM, 2 TO 5 PERCENT SLOPES	PEMBROKE	1
70016	GOODSON SILT LOAM, 1 TO 3 PERCENT SLOPES	GOODSON	4
70017	GOODSON GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	GOODSON	4
70018	GOODSON GRAVELLY SILT LOAM, 8 TO 15 PERCENT SLOPES	GOODSON	4
70039	SACVILLE SILTY CLAY LOAM, 1 TO 3 PERCENT SLOPES	SACVILLE	4
73000	POMME SILT LOAM, 3 TO 8 PERCENT SLOPES	POMME	3
73001	GLENSTED SILT LOAM, 0 TO 2 PERCENT SLOPES	GLENSTED	2
73002	OCIE-GATEWOOD COMPLEX, 8 TO 15 PERCENT SLOPES	OCIE	3
		GATEWOOD	6D
73003	OCIE-GATEWOOD COMPLEX, 15 TO 35 PERCENT SLOPES	OCIE	10
		GATEWOOD	6D
73004	OCIE VERY GRAVELLY SILT LOAM, 8 TO 25 PERCENT SLOPES, VERY STONY	OCIE	10
73005	OCIE GRAVELLY SILT LOAM, 3 TO 15 PERCENT SLOPES	OCIE	3
73006	PERIDGE SILT LOAM, 2 TO 5 PERCENT SLOPES	PERIDGE	1
73007	PLATO SILT LOAM, 1 TO 3 PERCENT SLOPES	PLATO	4
73008	VIRATON SILT LOAM, 2 TO 5 PERCENT SLOPES	VIRATON	6D
73009	VIRATON SILT LOAM, 5 TO 9 PERCENT SLOPES	VIRATON	6D
73010	WILDERNESS GRAVELLY SILT LOAM, 3 TO 8 PERCENT SLOPES	WILDERNESS	10
74625	HARTVILLE SILT LOAM, 3 TO 8 PERCENT SLOPES	HARTVILLE	4
75375	HORSECREEK SILT LOAM, 0 TO 2 PERCENT SLOPES, OCCASIONALLY FLOODED	HORSECREEK	1
75376	CEDARGAP GRAVELLY SILT LOAM, 0 TO 3 PERCENT SLOPES, FREQUENTLY FLOODED	CEDARGAP	1
75377	RACKET SILT LOAM, 0 TO 3 PERCENT SLOPES, FREQUENTLY FLOODED	RACKET	1
75378	STURKIE SILT LOAM, 0 TO 2 PERCENT SLOPES, FREQUENTLY FLOODED	STURKIE	1
99000	PITS, QUARRIES	PITS, QUARRIES	---
99001	WATER	WATER	---
99003	MISCELLANEOUS WATER	MISCELLANEOUS WATER	---

Table 11.--Recreational Development

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
15000:					
BASEHOR	Severe: depth to rock	Severe: depth to rock	Severe: slope, depth to rock	Slight	Severe: depth to rock
15001:					
BASEHOR	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: large stones, slope, depth to rock	Severe: slope	Severe: large stones, slope, depth to rock
15002:					
MCGIRK	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
40000:					
BARDEN	Moderate: percs slowly, wetness	Moderate: percs slowly, wetness	Moderate: percs slowly, slope, wetness	Slight	Slight
40001:					
BOLIVAR	Slight	Slight	Moderate: slope, depth to rock	Slight	Moderate: depth to rock
40002:					
LIBERAL	Moderate: percs slowly, wetness	Moderate: percs slowly, wetness	Moderate: percs slowly, slope, wetness	Slight	Slight
46000:					
HUMANSVILLE	Severe: flooding, wetness	Moderate: flooding, percs slowly, wetness	Severe: flooding, wetness	Moderate: flooding, wetness	Severe: flooding
66000:					
MONITEAU	Severe: flooding, wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
66001:					
DAMERON	Severe: flooding	Moderate: flooding	Severe: flooding	Moderate: flooding	Severe: flooding
70000:					
BONA	Moderate: percs slowly, small stones	Moderate: percs slowly, small stones	Severe: small stones	Slight	Moderate: large stones, small stones, droughty
70001:					
BONA	Moderate: slope, percs slowly, small stones	Moderate: slope, percs slowly, small stones	Severe: slope, small stones	Slight	Moderate: slope, large stones, small stones, droughty

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
70002:					
ALSUP	Moderate: percs slowly, small stones	Moderate: percs slowly, small stones	Severe: slope, small stones	Slight	Moderate: large stones, small stones
70003:					
ALSUP	Moderate: percs slowly, slope, small stones	Moderate: percs slowly, slope, small stones	Severe: slope, small stones	Slight	Moderate: large stones, slope, small stones
70004:					
ALSUP	Severe: slope	Severe: slope	Severe: slope, large stones, small stones	Severe: slope	Severe: slope
70005:					
BLUEYE	Moderate: percs slowly, slope, small stones	Moderate: percs slowly, slope, small stones	Severe: slope, small stones	Slight	Moderate: large stones, small stones, droughty
MOKO	Severe: small stones, depth to rock	Severe: small stones, depth to rock	Severe: slope, small stones, depth to rock	Moderate: large stones	Severe: large stones, small stones, depth to rock
70006:					
CRELDON	Severe: percs slowly	Severe: percs slowly	Severe: percs slowly	Moderate: wetness	Moderate: wetness
70007:					
CLIQUOT	Moderate: slope, percs slowly, small stones	Moderate: slope, percs slowly, small stones	Severe: slope, small stones	Slight	Moderate: slope, small stones, large stones
70008:					
GOSS	Moderate: small stones	Moderate: small stones	Severe: slope, small stones	Slight	Moderate: small stones, droughty
70009:					
GOSS	Moderate: slope, small stones	Moderate: slope, small stones	Severe: slope, small stones	Slight	Moderate: large stones, small stones, slope, droughty
70010:					
GOSS	Severe: slope, small stones, large stones	Severe: slope, small stones, large stones	Severe: slope, small stones, large stones	Severe: slope, large stones	Severe: large stones, slope, small stones
70011:					
GOSS	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: large stones, slope

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
70011:					
MOKO	Severe: small stones, depth to rock, slope	Severe: small stones, depth to rock, slope	Severe: slope, small stones, depth to rock	Severe: slope	Severe: large stones, small stones, depth to rock, slope
70012:					
HOBERG	Moderate: percs slowly, wetness	Moderate: percs slowly, wetness	Moderate: slope, small stones, wetness	Moderate: wetness	Moderate: wetness, droughty
70013:					
MOKO	Severe: small stones, depth to rock	Severe: small stones, depth to rock	Severe: slope, small stones, depth to rock	Moderate: large stones	Severe: large stones, small stones, depth to rock
70014:					
MOKO	Severe: small stones, depth to rock, slope	Severe: small stones, depth to rock, slope	Severe: slope, small stones, depth to rock	Moderate: large stones, slope	Severe: large stones, small stones, depth to rock, slope
ROCK OUTCROP.					
70015:					
PEMBROKE	Slight	Slight	Moderate: slope	Slight	Slight
70016:					
GOODSON	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly, small stones	Slight	Slight
70017:					
GOODSON	Moderate: percs slowly, small stones	Moderate: percs slowly, small stones	Moderate: percs slowly, slope, small stones	Slight	Moderate: small stones
70018:					
GOODSON	Moderate: slope, percs slowly, small stones	Moderate: slope, percs slowly, small stones	Severe: slope, small stones	Slight	Moderate: slope, small stones
70039:					
SACVILLE	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
73000:					
POMME	Slight	Slight	Moderate: slope, small stones	Slight	Slight
73001:					
GLENSTED	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
73002:					
OCIE	Moderate: small stones, slope, percs slowly	Moderate: small stones, slope	Severe: slope, small stones	Slight	Moderate: slope, small stones
GATEWOOD	Moderate: slope, small stones, wetness, percs slowly	Moderate: slope, small stones, wetness	Severe: slope, small stones	Moderate: wetness	Moderate: large stones, small stones, wetness
73003:					
OCIE	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope
GATEWOOD	Severe: slope	Severe: slope	Severe: slope, small stones	Severe: slope	Severe: slope, small stones
73004:					
OCIE	Severe: small stones, slope	Severe: small stones, slope	Severe: slope, small stones, large stones	Moderate: too cobbly, slope	Severe: small stones, slope
73005:					
OCIE	Moderate: slope, small stones, percs slowly	Moderate: slope, small stones, percs slowly	Severe: slope, small stones	Slight	Moderate: slope, small stones
73006:					
PERIDGE	Slight	Slight	Moderate: slope	Slight	Slight
73007:					
PLATO	Severe: percs slowly, wetness	Severe: percs slowly	Severe: percs slowly, wetness	Severe: erodes easily	Moderate: wetness, droughty
73008:					
VIRATON	Severe: percs slowly	Severe: percs slowly	Severe: percs slowly	Moderate: wetness	Moderate: wetness, droughty
73009:					
VIRATON	Severe: percs slowly	Severe: percs slowly	Severe: slope, percs slowly	Moderate: wetness	Moderate: wetness, droughty
73010:					
WILDERNESS	Moderate: small stones, wetness	Moderate: small stones, percs slowly, wetness	Severe: small stones, wetness	Moderate: wetness	Severe: droughty
74625:					
HARTVILLE	Moderate: percs slowly, wetness	Moderate: percs slowly, wetness	Moderate: percs slowly, slope, wetness	Moderate: wetness	Moderate: wetness

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
75375:					
HORSECREEK------	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
75376:					
CEDARGAP--------	Severe: flooding	Moderate: small stones flooding	Severe: flooding small stones	Moderate: small stones	Severe: flooding
75377:					
RACKET----------	Severe: flooding	Moderate: flooding	Severe: flooding	Moderate: flooding	Severe: flooding
75378:					
STURKIE---------	Severe: flooding	Moderate: flooding	Severe: flooding	Moderate: flooding	Severe: flooding
99000. PITS, QUARRIES					
99001. WATER					
99003. MISCELLANEOUS WATER					

Table 12.--Wildlife Habitat

(Absence of an entry indicates that the soil was not rated)

Map symbol and soil name	Potential for habitat elements								Potential as habitat for-		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
15000:											
BASEHOR	Poor	Poor	Fair	Good	Good	---	Very poor	Very poor	Poor	Good	Very poor
15001:											
BASEHOR	Very poor	Poor	Fair	Good	Good	---	Very poor	Very poor	Poor	Good	Very poor
15002:											
MCGIRK	Fair	Fair	Fair	Fair	Fair	---	Poor	Very poor	Fair	Fair	Very poor
40000:											
BARDEN	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor
40001:											
BOLIVAR	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor
40002:											
LIBERAL	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor
46000:											
HUMANSVILLE	Fair	Fair	Fair	Fair	Fair	---	Good	Good	Fair	Fair	Good
66000:											
MONITEAU	Fair	Fair	Fair	Fair	Fair	---	Good	Fair	Fair	Fair	Fair
66001:											
DAMERON	Poor	Fair	Fair	Good	Good	---	Poor	Poor	Fair	Good	Poor
70000, 70001:											
BONA	Fair	Fair	Fair	Fair	Fair	---	Very poor	Very poor	Fair	Fair	Very poor
70002, 70003:											
ALSUP	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor
70004:											
ALSUP	Poor	Fair	Good	Good	Good	---	Very poor	Very poor	Fair	Good	Very poor
70005:											
BLUEYE	Poor	Fair	Good	Fair	Fair	---	Very poor	Very poor	Fair	Fair	Very poor
MOKO	Very poor	Poor	Poor	Very poor	Fair	---	Very poor	Very poor	Poor	Fair	Very poor
70006:											
CRELDON	Fair	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor
70007:											
CLIQUOT	Poor	Fair	Good	Good	Good	---	Very poor	Very poor	Fair	Good	Very poor
70008, 70009:											
GOSS	Poor	Fair	Fair	Fair	Fair	---	Very poor	Very poor	Fair	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for-		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
70010:											
GOSS	Very poor	Fair	Fair	Fair	Fair	---	Very poor	Very poor	Poor	Fair	Very poor
70011:											
GOSS	Very poor	Poor	Fair	Fair	Fair	---	Very poor	Very poor	Poor	Fair	Very poor
MOKO	Very poor	Poor	Poor	Very poor	Fair	---	Very poor	Very poor	Poor	Fair	Very poor
70012:											
HOBERG	Fair	Good	Good	Fair	Fair	---	Poor	Very poor	Good	Fair	Very poor
70013:											
MOKO	Very poor	Poor	Poor	Very poor	Fair	---	Very poor	Very poor	Poor	Fair	Very poor
70014:											
MOKO	Very poor	Very poor	Poor	Very poor	Fair	---	Very poor	Very poor	Poor	Fair	Very poor
ROCK OUTCROP.											
70015:											
PEMBROKE	Fair	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor
70016:											
GOODSON	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Fair	Very poor
70017:											
GOODSON	Good	Good	Good	Good	Good	---	Very poor	Very poor	Good	Fair	Very poor
70018:											
GOODSON	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Fair	Very poor
70039:											
SACVILLE	Fair	Fair	Fair	Good	Good	---	Very poor	Very poor	Fair	Good	Very poor
73000:											
POMME	Fair	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor
73001:											
GLENSTED	Fair	Fair	Fair	Fair	Fair	---	Poor	Very poor	Fair	Fair	Very poor
73002:											
OCIE	Poor	Poor	Fair	Fair	Fair	---	Very poor	Very poor	Poor	Fair	Very poor
73002:											
GATEWOOD	Fair	Good	Good	Fair	Fair	---	Very poor	Very poor	Good	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for-		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
73003:											
OCIE	Very poor	Very poor	Fair	Fair	Fair	---	Very poor	Very poor	Poor	Fair	Very poor
GATEWOOD	Very poor	Fair	Good	Fair	Fair	---	Very poor	Very poor	Fair	Fair	Very poor
73004:											
OCIE	Very poor	Poor	Fair	Fair	Fair	---	Very poor	Very poor	Poor	Fair	Very poor
73005:											
OCIE	Poor	Poor	Fair	Fair	Fair	---	Very poor	Very poor	Poor	Fair	Very poor
73006:											
PERIDGE	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor
73007:											
PLATO	Fair	Good	Good	Fair	Fair	---	Poor	Very poor	Good	Fair	Very poor
73008, 73009:											
VIRATON	Fair	Good	Good	Fair	Fair	---	Poor	Very poor	Good	Fair	Very poor
73010:											
WILDERNESS	Poor	Poor	Very poor	Poor	Poor	---	Poor	Very poor	Poor	Poor	Very poor
74625:											
HARTVILLE	Fair	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor
75375:											
HORSECREEK	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor
75376:											
CEDARGAP	Fair	Fair	Fair	Fair	Fair	---	Very poor	Very poor	Fair	Fair	Very poor
75377:											
RACKET	Good	Good	Good	Good	Good	---	Poor	Very poor	Good	Good	Very poor
75378:											
STURKIE	Poor	Fair	Fair	Good	Good	---	Poor	Very poor	Fair	Good	Very poor
99000. PITS, QUARRIES											
99001. WATER											
99003. MISCELLANEOUS WATER											

Table 13.--Building Site Development

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
15000:						
BASEHOR	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: depth to rock
15001:						
BASEHOR	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: large stones slope depth to rock
15002:						
MCGIRK	Severe: wetness	Severe: shrink-swell wetness	Severe: shrink-swell wetness	Severe: shrink-swell wetness	Severe: low strength shrink-swell wetness	Severe: wetness
40000:						
BARDEN	Severe: wetness	Severe: shrink-swell	Severe: shrink-swell wetness	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
40001:						
BOLIVAR	Moderate: depth to rock	Moderate: shrink-swell	Moderate: shrink-swell depth to rock	Moderate: shrink-swell slope	Moderate: low strength shrink-swell	Moderate: depth to rock
40002:						
LIBERAL	Severe: wetness	Severe: shrink-swell	Severe: shrink-swell wetness	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
46000:						
HUMANSVILLE	Severe: wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding low strength	Severe: flooding
66000:						
MONITEAU	Severe: wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding low strength wetness	Severe: wetness
66001:						
DAMERON	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding low strength	Severe: flooding
70000:						
BONA	Moderate: too clayey	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Severe: low strength	Moderate: large stones small stones droughty

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
70001:						
BONA	Moderate: slope, too clayey	Moderate: slope, shrink-swell	Moderate: slope, shrink-swell	Moderate: slope, shrink-swell	Severe: slope, low strength	Moderate: slope, large stones, small stones, droughty
70002:						
ALSUP	Moderate: too clayey, wetness	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength, shrink-swell	Moderate: large stones, small stones
70003:						
ALSUP	Moderate: slope, too clayey, wetness	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell, slope	Severe: low strength, shrink-swell	Moderate: large stones, slope, small stones
70004:						
ALSUP	Severe: slope	Severe: slope, shrink-swell	Severe: slope, shrink-swell	Severe: slope, shrink-swell	Severe: slope, low strength, shrink-swell	Severe: slope
70005:						
BLUEYE	Severe: depth to rock	Severe: shrink-swell	Severe: shrink-swell, depth to rock	Severe: shrink-swell, slope	Severe: low strength, shrink-swell	Moderate: large stones, small stones, droughty
MOKO	Severe: large stones, depth to rock	Severe: large stones, depth to rock	Severe: large stones, depth to rock	Severe: large stones, slope, depth to rock	Severe: large stones, depth to rock	Severe: large stones, small stones, depth to rock
70006:						
CRELDON	Severe: wetness	Moderate: shrink-swell, wetness	Severe: wetness	Moderate: shrink-swell, wetness	Severe: low strength	Moderate: wetness
70007:						
CLIQUOT	Moderate: slope, too clayey, wetness	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell, slope	Severe: low strength, shrink-swell	Moderate: slope, small stones, large stones
70008:						
GOSS	Moderate: too clayey, large stones	Moderate: shrink-swell, large stones	Moderate: shrink-swell, large stones	Moderate: slope, shrink-swell, large stones	Moderate: shrink-swell	Moderate: droughty, small stones
70009:						
GOSS	Moderate: slope, too clayey, large stones	Moderate: slope, shrink-swell, large stones	Moderate: slope, shrink-swell, large stones	Severe: slope	Moderate: slope, shrink-swell	Moderate: droughty, slope, small stones, large stones

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
70010:						
GOSS	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope small stones
70011:						
GOSS	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope
MOKO	Severe: large stones depth to rock slope	Severe: large stones depth to rock slope	Severe: large stones depth to rock slope	Severe: large stones slope depth to rock	Severe: large stones depth to rock slope	Severe: large stones small stones depth to rock slope
70012:						
HOBERG	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: frost action wetness	Moderate: wetness droughty
70013:						
MOKO	Severe: large stones depth to rock	Severe: large stones depth to rock	Severe: large stones depth to rock	Severe: large stones slope depth to rock	Severe: large stones depth to rock	Severe: large stones small stones depth to rock
70014:						
MOKO	Severe: large stones depth to rock slope	Severe: large stones depth to rock slope	Severe: large stones depth to rock slope	Severe: large stones slope depth to rock	Severe: large stones depth to rock slope	Severe: large stones small stones depth to rock slope
ROCK OUTCROP.						
70015:						
PEMBROKE	Moderate: too clayey	Slight	Slight	Slight	Severe: frost action low strength	Slight
70016:						
GOODSON	Moderate: too clayey wetness	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Slight
70017:						
GOODSON	Moderate: too clayey wetness	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: small stones
70018:						
GOODSON	Moderate: slope too clayey wetness	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell	Severe: low strength shrink-swell	Moderate: slope small stones

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
70039:						
SACVILLE	Severe: wetness	Severe: shrink-swell wetness	Severe: shrink-swell wetness	Severe: shrink-swell wetness	Severe: low strength shrink-swell wetness	Severe: wetness
73000:						
POMME	Moderate: too clayey	Slight	Slight	Moderate: slope	Slight	Slight
73001:						
GLENSTED	Severe: wetness	Severe: shrink-swell wetness	Severe: shrink-swell wetness	Severe: shrink-swell wetness	Severe: low strength shrink-swell wetness	Severe: wetness
73002:						
OCIE	Moderate: slope too clayey depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell slope	Severe: low strength shrink-swell	Moderate: slope small stones
GATEWOOD	Severe: depth to rock wetness	Severe: shrink-swell	Severe: shrink-swell wetness depth to rock	Severe: shrink-swell slope	Severe: low strength shrink-swell	Moderate: large stones small stones wetness
73003:						
OCIE	Severe: slope	Severe: slope shrink-swell	Severe: slope shrink-swell	Severe: slope shrink-swell	Severe: slope low strength shrink-swell	Severe: slope
GATEWOOD	Severe: slope depth to rock wetness	Severe: slope shrink-swell	Severe: slope depth to rock shrink-swell wetness	Severe: slope shrink-swell	Severe: slope low strength shrink-swell	Severe: slope
73004:						
OCIE	Severe: slope	Severe: slope shrink-swell	Severe: slope shrink-swell	Severe: slope shrink-swell	Severe: slope low strength shrink-swell	Severe: slope small stones
73005:						
OCIE	Moderate: slope too clayey depth to rock	Severe: shrink-swell	Severe: shrink-swell	Severe: shrink-swell slope	Severe: low strength shrink-swell	Moderate: slope small stones
73006:						
PERIDGE	Slight	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell	Severe: low strength	Slight
73007:						
PLATO	Severe: wetness	Severe: shrink-swell wetness	Severe: shrink-swell wetness	Severe: shrink-swell wetness	Severe: low strength shrink-swell	Moderate: wetness droughty

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
73008: VIRATON	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: frost action wetness	Moderate: wetness droughty
73009: VIRATON	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: slope wetness	Moderate: slope wetness frost action	Moderate: wetness droughty
73010: WILDERNESS	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: slope wetness	Moderate: frost action wetness	Severe: small stones droughty
74625: HARTVILLE	Severe: wetness	Severe: shrink-swell	Severe: shrink-swell wetness	Severe: shrink-swell	Severe: frost action low strength shrink-swell	Moderate: wetness
75375: HORSECREEK	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding low strength	Moderate: flooding
75376: CEDARGAP	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding
75377: RACKET	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding
75378: STURKIE	Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding
99000. PITS, QUARRIES						
99001. WATER						
99003. MISCELLANEOUS WATER						

Table 14.--Sanitary Facilities

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
15000:					
BASEHOR	Severe: depth to rock	Severe: seepage, slope, depth to rock	Severe: seepage, depth to rock	Severe: depth to rock	Poor: depth to rock
15001:					
BASEHOR	Severe: slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: seepage, slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
15002:					
MCGIRK	Severe: percs slowly, wetness	Moderate: slope	Severe: too clayey, wetness	Severe: wetness	Poor: hard to pack, too clayey, wetness
40000:					
BARDEN	Severe: percs slowly, wetness	Moderate: slope	Severe: too clayey	Moderate: wetness	Poor: hard to pack, too clayey
40001:					
BOLIVAR	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
40002:					
LIBERAL	Severe: percs slowly, wetness	Moderate: slope, depth to rock	Severe: too clayey, depth to rock	Moderate: wetness, depth to rock	Poor: hard to pack, too clayey
46000:					
HUMANSVILLE	Severe: flooding, percs slowly, wetness	Severe: flooding, wetness	Severe: flooding, too clayey, wetness	Severe: flooding, wetness	Poor: hard to pack, too clayey, wetness
66000:					
MONITEAU	Severe: flooding, percs slowly, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Severe: flooding, wetness	Poor: wetness
66001:					
DAMERON	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Fair: too clayey
70000:					
BONA	Severe: percs slowly	Moderate: large stones, seepage, slope	Severe: too clayey	Slight	Poor: hard to pack, too clayey
70001:					
BONA	Severe: percs slowly	Severe: slope	Severe: too clayey	Moderate: slope	Poor: hard to pack, too clayey

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
70002:					
ALSUP	Severe: percs slowly wetness	Severe: wetness	Severe: too clayey depth to rock	Moderate: depth to rock wetness	Poor: hard to pack too clayey
70003:					
ALSUP	Severe: percs slowly wetness	Severe: slope wetness	Severe: too clayey depth to rock	Moderate: slope wetness depth to rock	Poor: hard to pack too clayey
70004:					
ALSUP	Severe: wetness slope percs slowly	Severe: slope wetness	Severe: slope too clayey depth to rock	Severe: slope	Poor: slope hard to pack too clayey
70005:					
BLUEYE	Severe: percs slowly depth to rock	Severe: slope depth to rock	Severe: too clayey depth to rock	Severe: depth to rock	Poor: hard to pack too clayey depth to rock
MOKO	Severe: large stones depth to rock	Severe: large stones slope depth to rock	Severe: large stones depth to rock	Severe: depth to rock	Poor: large stones depth to rock
70006:					
CRELDON	Severe: percs slowly wetness	Severe: wetness	Severe: wetness	Moderate: wetness	Poor: wetness
70007:					
CLIQUOT	Severe: percs slowly wetness	Severe: slope	Severe: too clayey depth to rock	Moderate: slope depth to rock	Poor: hard to pack too clayey
70008:					
GOSS	Moderate: percs slowly large stones	Severe: seepage	Severe: too clayey	Severe: seepage	Poor: too clayey small stones
70009:					
GOSS	Moderate: slope percs slowly large stones	Severe: slope seepage	Severe: too clayey	Severe: seepage	Poor: too clayey small stones
70010:					
GOSS	Severe: slope	Severe: large stones seepage slope	Severe: slope too clayey	Severe: seepage slope	Poor: small stones slope too clayey
70011:					
GOSS	Severe: slope	Severe: large stones seepage slope	Severe: slope too clayey	Severe: seepage slope	Poor: small stones slope too clayey

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
70011:					
MOKO	Severe: large stones, depth to rock, slope	Severe: large stones, slope, depth to rock	Severe: large stones, depth to rock, slope	Severe: depth to rock, slope	Poor: large stones, depth to rock, slope
70012:					
HOBERG	Severe: percs slowly, wetness	Moderate: seepage, slope	Severe: wetness	Moderate: wetness	Poor: hard to pack, small stones
70013:					
MOKO	Severe: large stones, depth to rock	Severe: large stones, slope, depth to rock	Severe: large stones, depth to rock	Severe: depth to rock	Poor: large stones, depth to rock
70014:					
MOKO	Severe: large stones, depth to rock, slope	Severe: large stones, slope, depth to rock	Severe: large stones, depth to rock, slope	Severe: depth to rock, slope	Poor: large stones, depth to rock, slope
ROCK OUTCROP.					
70015:					
PEMBROKE	Moderate: percs slowly	Moderate: seepage, slope	Moderate: too clayey	Slight	Fair: thin layer, too clayey
70016, 70017:					
GOODSON	Severe: percs slowly, wetness	Severe: wetness	Severe: too clayey, depth to rock	Moderate: wetness, depth to rock	Poor: hard to pack, too clayey
70018:					
GOODSON	Severe: percs slowly, wetness	Severe: slope, wetness	Severe: too clayey, depth to rock	Moderate: slope, wetness, depth to rock	Poor: hard to pack, too clayey
70039:					
SACVILLE	Severe: percs slowly, wetness	Moderate: slope	Severe: too clayey, wetness	Severe: wetness	Poor: hard to pack, too clayey, wetness
73000:					
POMME	Moderate: percs slowly	Moderate: seepage, slope	Moderate: large stones, too clayey	Slight	Poor: small stones
73001:					
GLENSTED	Severe: percs slowly, wetness	Moderate: seepage	Severe: too clayey, wetness	Severe: wetness	Poor: hard to pack, too clayey, wetness
73002:					
OCIE	Severe: percs slowly, wetness	Severe: slope	Severe: too clayey, depth to rock	Moderate: slope, depth to rock	Poor: hard to pack, too clayey

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
73002:					
GATEWOOD	Severe: percs slowly, wetness, depth to rock	Severe: slope, wetness, depth to rock	Severe: too clayey, wetness, depth to rock	Severe: depth to rock	Poor: hard to pack, too clayey, depth to rock
73003:					
OCIE	Severe: slope, percs slowly	Severe: slope	Severe: slope, too clayey, depth to rock	Severe: slope	Poor: slope, hard to pack, too clayey
GATEWOOD	Severe: slope, percs slowly, wetness, depth to rock	Severe: slope, wetness, depth to rock	Severe: slope, too clayey, wetness, depth to rock	Severe: slope, depth to rock	Poor: slope, hard to pack, too clayey, depth to rock
73004:					
OCIE	Severe: slope, percs slowly	Severe: slope	Severe: slope, too clayey, depth to rock	Severe: slope	Poor: slope, hard to pick, too clayey
73005:					
OCIE	Severe: percs slowly	Severe: slope	Severe: too clayey, depth to rock	Moderate: slope, depth to rock	Poor: hard to pack, too clayey
73006:					
PERIDGE	Moderate: percs slowly	Moderate: seepage, slope	Moderate: too clayey	Slight	Poor: hard to pack, small stones
73007:					
PLATO	Severe: percs slowly, wetness	Severe: wetness	Severe: too clayey, wetness	Severe: wetness	Poor: hard to pack, too clayey, wetness
73008:					
VIRATON	Severe: percs slowly, wetness	Severe: wetness	Severe: too clayey, wetness	Moderate: wetness	Poor: small stones, too clayey
73009:					
VIRATON	Severe: percs slowly, wetness	Severe: slope, wetness	Severe: too clayey, wetness	Moderate: wetness	Poor: small stones, too clayey
73010:					
WILDERNESS	Severe: percs slowly, wetness	Severe: wetness	Severe: too clayey	Moderate: wetness	Poor: too clayey
74625:					
HARTVILLE	Severe: percs slowly, wetness	Moderate: slope	Severe: too clayey, wetness	Moderate: wetness	Poor: hard to pack, too clayey

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
75375:					
HORSECREEK------	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Fair: too clayey
75376:					
CEDARGAP--------	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Poor: small stones
75377:					
RACKET----------	Severe: flooding wetness poor filter	Severe: flooding seepage	Severe: flooding seepage wetness	Severe: flooding seepage	Poor: thin layer
75378:					
STURKIE---------	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Fair: too clayey
99000. PITS, QUARRIES					
99001. WATER					
99003. MISCELLANEOUS WATER					

Table 15.--Construction Materials

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
15000:				
BASEHOR	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones, depth to rock
15001:				
BASEHOR	Poor: slope, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones, slope, depth to rock
15002:				
MCGIRK	Poor: low strength, shrink-swell, wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey, wetness
40000:				
BARDEN	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
40001:				
BOLIVAR	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
40002:				
LIBERAL	Poor: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
46000:				
HUMANSVILLE	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: thin layer, too clayey
66000:				
MONITEAU	Poor: low strength, wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
66001:				
DAMERON	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim
70000, 70001:				
BONA	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: small stones
70002, 70003:				
ALSUP	Poor: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones, too clayey
70004:				
ALSUP	Poor: slope, low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones, too clayey

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
70005:				
BLUEYE----------	Poor: low strength, shrink-swell, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones, too clayey
MOKO----------	Poor: large stones, depth to rock	Improbable: large stones, excess fines	Improbable: large stones, excess fines	Poor: large stones, depth to rock
70006:				
CRELDON---------	Poor: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones, too clayey
70007:				
CLIQUOT---------	Poor: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: small stones, too clayey
70008, 70009:				
GOSS----------	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: small stones, too clayey
70010:				
GOSS----------	Poor: low strength, slope	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones, too clayey
70011:				
GOSS----------	Poor: low strength, slope	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones, too clayey
MOKO----------	Poor: large stones, depth to rock, slope	Improbable: large stones, excess fines	Improbable: large stones, excess fines	Poor: large stones, depth to rock, slope
70012:				
HOBERG----------	Fair: thin layer, wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones
70013:				
MOKO----------	Poor: large stones, depth to rock	Improbable: large stones, excess fines	Improbable: large stones, excess fines	Poor: large stones, depth to rock
70014:				
MOKO----------	Poor: large stones, depth to rock, slope	Improbable: large stones, excess fines	Improbable: large stones, excess fines	Poor: large stones, depth to rock, slope
ROCK OUTCROP.				

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
70015:				
PEMBROKE	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim, small stones, too clayey
70016, 70017, 70018:				
GOODSON	Poor: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones, too clayey
70039:				
SACVILLE	Poor: low strength, shrink-swell, wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey, wetness
73000:				
POMME	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones
73001:				
GLENSTED	Poor: low strength, shrink-swell, wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey, wetness
73002:				
OCIE	Poor: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: small stones, too clayey
GATEWOOD	Poor: low strength, shrink-swell, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones, too clayey
73003:				
OCIE	Poor: slope, low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones, too clayey
GATEWOOD	Poor: slope, low strength, shrink-swell, depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones, too clayey
73004:				
OCIE	Poor: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: slope, small stones, too clayey
73005:				
OCIE	Poor: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: small stones, too clayey

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
73006:				
PERIDGE	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones
73007:				
PLATO	Poor: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones, too clayey
73008, 73009:				
VIRATON	Fair: shrink-swell, wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones
73010:				
WILDERNESS	Moderate: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones
74625:				
HARTVILLE	Poor: low strength, shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
75375:				
HORSECREEK	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: small stones, too clayey
75376:				
CEDARGAP	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim, small stones
75377:				
RACKET	Good	Probable	Probable	Poor: area reclaim
75378:				
STURKIE	Fair: low strength	Improbable: excess fines	Improbable: excess fines	Fair: small stones, too clayey
99000. PITS, QUARRIES				
99001. WATER				
99003. MISCELLANEOUS WATER				

Table 16.--Water Management

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Limitations for--			Features affecting-			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
15000:							
BASEHOR	Severe: slope, depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope, soil blowing, depth to rock	Limitation: slope, soil blowing, depth to rock	Limitation: slope, depth to rock
15001:							
BASEHOR	Severe: slope, depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope, depth to rock	Limitation: large stones, slope, depth to rock	Limitation: large stones, slope, depth to rock
15002:							
MCGIRK	Slight	Severe: hard to pack, wetness	Severe: no water	Limitation: frost action, percs slowly	Limitation: erodes easily, percs slowly, wetness	Limitation: erodes easily, percs slowly, wetness	Limitation: erodes easily, percs slowly, wetness
40000:							
BARDEN	Slight	Moderate: hard to pack, wetness	Severe: no water	Limitation: percs slowly	Limitation: erodes easily, percs slowly, wetness	Limitation: erodes easily, percs slowly, wetness	Limitation: erodes easily, percs slowly
40001:							
BOLIVAR	Moderate: seepage, slope, depth to rock	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: slope, depth to rock	Limitation: depth to rock	Limitation: depth to rock
40002:							
LIBERAL	Moderate: slope, depth to rock	Moderate: hard to pack, thin layer, wetness	Severe: no water	Limitation: percs slowly, slope	Limitation: percs slowly, slope, wetness	Limitation: erodes easily, percs slowly, wetness	Limitation: erodes easily, percs slowly
46000:							
HUMANSVILLE	Slight	Severe: hard to pack	Severe: no water	Limitation: flooding, percs slowly	Limitation: erodes easily, percs slowly, wetness	Limitation: erodes easily, percs slowly, wetness	Limitation: erodes easily, percs slowly, wetness
66000:							
MONITEAU	Slight	Severe: wetness	Severe: slow refill	Limitation: flooding, frost action	Limitation: erodes easily, flooding, wetness	Limitation: erodes easily, wetness	Limitation: erodes easily, wetness
66001:							
DAMERON	Moderate: seepage	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: flooding	Favorable	Favorable
70000:							
BONA	Moderate: seepage, slope	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: slope, droughty	Limitation: large stones	Limitation: large stones, droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting- Drainage	Irrigation	Terraces and diversions	Grassed waterways
70001:							
BONA	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope large stones	Limitation: slope large stones droughty
70002:							
ALSUP	Moderate: slope depth to rock	Moderate: hard to pack thin layer wetness	Severe: no water	Limitation: slope	Limitation: slope wetness	Limitation: erodes easily wetness	Limitation: erodes easily
70003, 70004:							
ALSUP	Severe: slope	Moderate: hard to pack thin layer wetness	Severe: no water	Limitation: slope	Limitation: slope wetness	Limitation: erodes easily slope wetness	Limitation: erodes easily slope
70005:							
BLUEYE	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope droughty	Limitation: erodes easily slope depth to rock	Limitation: erodes easily slope droughty
MOKO	Severe: slope depth to rock	Severe: large stones	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope droughty
70006:							
CRELDON	Moderate: seepage	Moderate: thin layer wetness	Severe: no water	Limitation: percs slowly	Limitation: percs slowly rooting depth wetness	Limitation: erodes easily rooting depth wetness	Limitation: erodes easily percs slowly rooting depth
70007:							
CLIQUOT	Severe: slope	Moderate: hard to pack large stones thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope droughty	Limitation: large stones percs slowly slope	Limitation: large stones slope droughty
70008:							
GOSS	Moderate: slope seepage	Severe: large stones	Severe: no water	Limitation: deep to water	Limitation: slope large stones droughty	Limitation: large stones	Limitation: large stones droughty
70009, 70010:							
GOSS	Severe: slope	Severe: large stones	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope	Limitation: large stones slope droughty
70011:							
GOSS	Severe: slope	Severe: large stones	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope	Limitation: large stones slope droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting- Drainage	Irrigation	Terraces and diversions	Grassed waterways
70011:							
MOKO	Severe: slope, depth to rock	Severe: large stones	Severe: no water	Limitation: deep to water	Limitation: large stones, slope, droughty	Limitation: large stones, slope, depth to rock	Limitation: large stones, slope, droughty
70012:							
HOBERG	Moderate: seepage, slope	Severe: hard to pack	Severe: no water	Limitation: large stones, percs slowly, slope	Limitation: slope, wetness, droughty	Limitation: erodes easily, large stones, wetness	Limitation: erodes easily, large stones, droughty
70013:							
MOKO	Severe: slope, depth to rock	Severe: large stones	Severe: no water	Limitation: deep to water	Limitation: large stones, slope, droughty	Limitation: large stones, slope, depth to rock	Limitation: large stones, slope, droughty
70014:							
MOKO	Severe: slope, depth to rock	Severe: large stones	Severe: no water	Limitation: deep to water	Limitation: large stones, slope, droughty	Limitation: large stones, slope, depth to rock	Limitation: large stones, slope, droughty
ROCK OUTCROP.							
70015:							
PEMBROKE	Moderate: seepage, slope	Moderate: piping	Severe: no water	Limitation: deep to water	Limitation: slope	Favorable	Favorable
70016:							
GOODSON	Moderate: depth to rock	Moderate: hard to pack, large stones, thin layer	Severe: no water	Favorable	Limitation: wetness	Limitation: wetness	Favorable
70017:							
GOODSON	Moderate: slope, depth to rock	Moderate: hard to pack, large stones, thin layer	Severe: no water	Limitation: slope	Limitation: slope, wetness	Limitation: wetness	Favorable
70018:							
GOODSON	Severe: slope	Moderate: hard to pack, large stones, thin layer	Severe: no water	Limitation: slope	Limitation: slope, wetness	Limitation: slope, wetness	Limitation: slope
70039:							
SACVILLE	Slight	Severe: hard to pack, wetness	Severe: no water	Limitation: frost action, percs slowly	Limitation: erodes easily, percs slowly, wetness	Limitation: erodes easily, percs slowly, wetness	Limitation: erodes easily, percs slowly, wetness
73000:							
POMME	Moderate: seepage, slope	Moderate: large stones, thin layer	Severe: no water	Limitation: deep to water	Limitation: slope	Limitation: large stones	Limitation: large stones

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting- Drainage	Irrigation	Terraces and diversions	Grassed waterways
73001:							
GLENSTED	Slight	Severe: hard to pack wetness	Severe: no water	Limitation: frost action percs slowly	Limitation: percs slowly wetness	Limitation: percs slowly wetness	Limitation: percs slowly wetness
73002, 73003:							
OCIE	Severe: slope	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope droughty	Limitation: large stones percs slowly slope	Limitation: large stones slope droughty
GATEWOOD	Severe: slope	Severe: hard to pack	Severe: no water	Limitation: percs slowly slope depth to rock	Limitation: percs slowly slope wetness	Limitation: slope wetness depth to rock	Limitation: percs slowly slope depth to rock
73004, 73005:							
OCIE	Severe: slope	Severe: thin layer	Severe: no water	Limitation: deep to water	Limitation: percs slowly slope droughty	Limitation: large stones percs slowly slope	Limitation: large stones slope droughty
73006:							
PERIDGE	Moderate: seepage slope	Moderate: hard to pack piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes easily	Limitation: erodes easily
73007:							
PLATO	Moderate: seepage	Moderate: hard to pack thin layer wetness	Severe: no water	Limitation: percs slowly too acid	Limitation: wetness droughty	Limitation: erodes easily wetness	Limitation: erodes easily wetness
73008, 73009:							
VIRATON	Moderate: seepage slope	Moderate: wetness	Severe: no water	Limitation: large stones percs slowly slope	Limitation: slope wetness droughty	Limitation: erodes easily rooting depth wetness	Limitation: erodes easily rooting depth droughty
73010:							
WILDERNESS	Moderate: seepage slope	Moderate: large stones wetness	Severe: no water	Limitation: percs slowly slope too acid	Limitation: slope wetness droughty	Limitation: large stones rooting depth wetness	Limitation: large stones rooting depth droughty
74625:							
HARTVILLE	Moderate: slope	Moderate: hard to pack wetness	Severe: no water	Limitation: frost action percs slowly slope	Limitation: percs slowly slope wetness	Limitation: erodes easily percs slowly wetness	Limitation: erodes easily percs slowly
75375:							
HORSECREEK	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: flooding	Limitation: erodes easily	Limitation: erodes easily
75376:							
CEDARGAP	Moderate: seepage	Moderate: large stones	Severe: no water	Limitation: deep to water	Limitation: flooding droughty	Limitation: large stones	Limitation: large stones droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting-			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
75377:							
RACKET----------	Severe: seepage	Severe: piping	Severe: cutbanks cave	Limitation: deep to water	Limitation: flooding	Favorable	Favorable
75378:							
STURKIE---------	Moderate: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily flooding	Limitation: erodes easily	Limitation: erodes easily
99000. PITS, QUARRIES							
99001. WATER							
99003. MISCELLANEOUS WATER							

Table 17.--Engineering Index Properties

(The symbol > means more than. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage Passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
15000:												
BASEHOR---------	0-6	FSL	SM, ML, SC, CL	A-4	0	0	80-100	80-100	70-95	40-55	16-23	3-7
	6-15	FSL, GR-FSL	SM, SC, ML, CL	A-4	0	0	60-100	55-100	50-95	25-55	16-30	3-11
	15-80	UWB			---	---	---	---	---	---	---	---
15001:												
BASEHOR---------	0-2	STV-FSL	CL-ML, ML, SC-SM, SM	A-4	20-35	15-40	80-100	75-95	70-90	40-75	16-25	3-8
	2-10	FSL, L, GR-FSL	CL, CL-ML	A-4	0	0-20	80-100	80-100	70-95	50-75	16-25	3-8
	10-16	FSL, L, GR-FSL	CL, CL-ML	A-4	0	0-20	80-100	65-85	70-95	50-75	16-30	3-13
	16-80	UWB			---	---	---	---	---	---	---	---
15002:												
MCGIRK----------	0-4	SIL	CL, CL-ML	A-6, A-4	0	0	100	100	90-100	70-90	25-40	5-15
	4-9	SICL, SIL	CH, CL	A-7	0	0	100	100	90-100	85-95	40-55	15-30
	9-30	SIC, SICL	CH, MH	A-7	0	0	100	85-100	80-100	75-95	50-75	25-40
	30-91	SIC, SICL	CH, MH	A-7	0	0	100	85-100	80-100	71-95	50-75	25-40
40000:												
BARDEN----------	0-8	SIL	CL	A-6, A-4	0	0	100	100	90-100	75-85	25-35	8-15
	8-16	SIC, SICL, CL	CH, CL	A-7	0	0	100	100	90-100	80-95	40-60	25-40
	16-76	SICL, CL, SCL	CL	A-6, A-7	0	0	100	90-100	90-100	50-90	30-45	15-25
40001:												
BOLIVAR---------	0-9	L, FSL	ML	A-4	0	0	100	90-100	70-85	45-55	15-30	NP-5
	9-25	L, SCL, CL	CL, SC	A-6	0	0-5	90-100	85-100	80-95	65-80	25-40	8-15
	25-38	CN-SCL, CN-CL	CL, CL-ML, SC, SC-SM	A-4, A-6	0-5	0-10	65-95	60-90	55-80	35-55	25-40	8-15
	38-42	WB			---	---	---	---	---	---	---	---
	42-80	UWB			---	---	---	---	---	---	---	---
40002:												
LIBERAL---------	0-9	SIL	CL	A-6	0	0	100	90-100	80-90	65-85	25-35	10-15
	9-23	SICL, SIC	CH, CL	A-7	0	0	100	90-100	85-90	80-85	40-60	15-30
	23-40	SICL, SIC, CL	CH, CL	A-7	0	0	100	90-100	85-90	80-85	40-60	20-40
	40-50	C, SIC, SICL	CH, CL	A-7	0	0	100	90-100	85-95	80-90	30-55	15-32
	50-55	WB			---	---	---	---	---	---	---	---
	55-60	UWB			---	---	---	---	---	---	---	---
46000:												
HUMANSVILLE-----	0-7	SIL	CL	A-6, A-4	0	0	100	95-100	90-100	80-95	28-34	9-18
	7-24	SIL, SICL	CL	A-4, A-6, A-7-6	0	0	95-100	85-100	75-100	70-95	28-43	9-21
	24-60	SICL, SIC	CH, CL, MH	A-7	0	0	95-100	85-100	75-100	70-95	36-57	15-32
66000:												
MONITEAU--------	0-6	SIL	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	85-100	25-35	5-15
	6-18	SIL	CL, CL-ML	A-6, A-4	0	0	100	100	90-100	85-100	25-35	5-15
	18-60	SICL, SIL	CL	A-6, A-7	0	0	100	100	85-100	80-95	30-45	15-25
66001:												
DAMERON---------	0-9	SIL	CL	A-6	0	0-1	95-100	90-100	85-100	80-95	25-40	10-20
	9-15	SIL, SICL	CL	A-6	0	0-1	95-100	90-100	85-100	80-95	25-40	10-20
	15-24	SICL, GRV-SICL, GR-SICL, GRV-CL	CL, GC, SC	A-2-6, A-6	0	5-15	35-75	25-70	25-70	20-65	30-40	15-25
	24-72	SIL, SICL	CL	A-6	0	0-1	85-100	75-100	70-100	45-95	25-40	10-20
	72-80	GRX-CL	GC	A-2-6	0	0-1	35-75	20-70	15-65	15-65	30-40	10-20

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage Passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
70000:												
BONA	0-6	GR-SIL	CL, GC, GC-GM	A-4	0	0-15	55-90	50-85	45-85	35-80	20-30	5-10
	6-18	GR-SIL, GRV-SIL	GC, GC-GM	A-1-b, A-2, A-4	0	0-25	30-65	25-60	20-55	15-50	25-30	5-10
	18-24	GRX-SIL, GRX-SICL	GC	A-2-6, A-2-7	0	0-30	15-45	10-40	5-35	5-30	25-45	10-20
	24-30	GRV-C, GRV-SIC	GM	A-2-7, A-7	0	0-15	35-55	30-50	25-45	20-40	55-70	20-30
	30-72	C, SIC	MH	A-7	0	0-15	80-100	75-100	70-95	65-90	55-70	20-30
	72-90	UWB			---	---	---	---	---	---	---	---
70001:												
BONA	0-7	GR-SIL	CL, GC, GC-GM	A-4	0	0-15	55-90	50-85	45-85	35-80	20-30	5-10
	7-12	GR-SIL, GRV-SIL	GC, GC-GM	A-1-b, A-2, A-4	0	0-25	30-65	25-60	20-55	15-50	25-30	5-10
	12-19	GRX-SIL, GRX-SICL	GC	A-2-6, A-2-7	0	0-30	15-45	10-40	5-35	5-30	25-45	10-20
	19-45	GRV-C, GRV-SIC	GM	A-2-7, A-7	0	0-15	35-55	30-50	25-45	20-40	55-70	20-30
	45-62	C, SIC	MH	A-7	0	0-15	80-100	75-100	70-95	65-90	55-70	20-30
	62-80	UWB			---	---	---	---	---	---	---	---
70002:												
ALSUP	0-4	GR-SIL, SIL	CL	A-6	0-3	0-5	70-85	50-75	50-70	50-65	30-40	10-15
	4-13	GR-SIL, GRV-SIL	CL	A-6	0-5	0-5	50-90	45-85	40-80	30-60	30-40	10-15
	13-23	SICL, SIC, CN-SIC, CNV-SIC, C	CL	A-7	0-5	0-10	90-100	85-100	85-100	85-100	40-50	20-30
	23-39	CNV-SICL, CNV-SIC, CNX-SICL, C	CH, CL	A-7	0-5	0-20	55-100	50-100	50-100	50-100	40-65	25-40
	39-44	CNV-SICL, CNV-SIC, CNX-SICL	CH, CL	A-7	0-5	0-20	55-100	50-90	45-90	35-85	40-60	25-40
	44-54	WB			---	---	---	---	---	---	---	---
70003:												
ALSUP	0-7	GR-SIL, SIL	CL	A-6	0-3	0-5	70-85	50-75	50-70	50-65	30-40	10-15
	7-12	GR-SIL, GRV-SIL	CL	A-6	0-5	0-5	50-90	45-85	40-80	30-60	30-40	10-15
	12-40	SICL, SIC, CN-SIC, CNV-SIC, C	CL	A-7	0-5	0-10	90-100	85-100	85-100	85-100	40-50	20-30
	40-56	CNV-SICL, CNV-SIC, CNX-SICL	CH, CL	A-7	0-5	0-20	55-100	50-90	45-90	35-85	40-60	25-40
	56-66	WB			---	---	---	---	---	---	---	---
70004:												
ALSUP	0-4	GR-SIL, SIL	CL	A-6	0-3	0-5	70-85	50-75	50-70	50-65	30-40	10-15
	4-9	GR-SIL, GRV-SIL	CL	A-6	0-5	0-5	50-90	45-85	40-80	30-60	30-40	10-15
	9-27	SICL, SIC, CN-SIC, CNV-SIC, C	CL	A-7	0-5	0-10	90-100	85-100	85-100	85-100	40-50	20-30
	27-41	CNV-SICL, CNV-SIC, CNX-SICL, C	CH, CL	A-7	0-5	0-20	55-100	50-100	50-100	50-100	40-65	25-40
	41-46	CNV-SICL, CNV-SIC, CNX-SICL	CH, CL	A-7	0-5	0-20	55-100	50-90	45-90	35-85	40-60	25-40

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage Passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
70005:												
BLUEYE----------	0-9	GR-SIL	CL, CL-ML, GC, SC	A-4, A-6	0	0-10	50-75	50-75	45-75	35-65	25-35	5-15
	9-15	GR-SIL, GRV-SIL, GR-SICL	CL, CL-ML, GC, SC	A-2-4, A-4, A-6	0	0-10	40-75	35-75	30-75	25-70	25-35	5-15
	15-21	SIC, GR-SIC, GR-C	CH, GC, SC	A-7	0	0-5	55-90	50-90	50-90	40-85	60-85	35-60
	21-35	C, GR-C	CH, GC, SC	A-7	0	0-5	55-90	50-90	50-90	40-85	65-85	45-60
	35-80	UWB			---	---	---	---	---	---	---	---
MOKO----------	0-7	GRV-CL, GRV-SIL	GC	A-2	0-5	5-40	40-60	35-55	30-50	25-35	25-45	10-20
	7-12	CNX-SICL, CNV-CL, FLV-SIL, CNV-SIL	CL, GC, SC	A-7, A-6	0-10	40-80	65-90	60-85	55-80	40-80	25-45	10-20
	12-80	UWB			---	---	---	---	---	---	---	---
70006:												
CRELDON---------	0-10	SIL	CL, CL-ML, ML	A-6, A-4	0	0	100	95-100	90-100	70-90	20-40	2-15
	10-14	SICL	CL	A-7	0	0	90-100	90-100	85-95	75-90	35-50	15-25
	14-26	SICL, SIC	CH	A-7	0	0	90-100	90-100	85-100	80-95	44-60	22-35
	26-41	SIL, SICL, GR-SICL	CL	A-6, A-7	0	0-5	75-100	70-100	65-95	60-90	35-45	15-25
	41-51	GRV-SICL, GRX-SICL, CBX-SIL	GC	A-6, A-7, A-2	0	0-45	30-65	30-60	25-55	20-50	35-45	15-25
	51-60	GRV-C, GRX-C, GR-C, C	CH, GC, SC	A-2, A-7	0	0-45	45-75	40-75	35-70	30-65	55-80	35-60
70007:												
CLIQUOT---------	0-4	GR-L	SC, GC-GM, GC	A-2-4, A-2-6, A-4	0	0-20	55-80	50-75	45-70	30-50	15-25	5-15
	4-10	GRV-L, GR-L, GRV-SIL, GRV-FSL	GC, SC	A-2-4, A-2-6, A-4	0	0-25	35-70	35-65	30-55	15-45	20-35	8-15
	10-41	C, CN-SIC, CNV-SIC	CH, CL	A-7	0	0-15	40-100	35-100	30-95	15-85	50-65	20-35
	41-48	C, CN-SIC, CNV-SIC	CH, CL	A-7	0	0-15	55-100	50-100	45-95	40-85	40-65	15-35
	48-55	C, CN-SIC, CNV-SIC	CH, CL	A-7	0	0-15	55-100	50-100	45-95	40-85	40-55	15-30
	55-80	WB			---	---	---	---	---	---	---	---
70008:												
GOSS----------	0-6	GR-SIL	CL, CL-ML, ML	A-4	0-5	0-40	55-80	50-75	45-70	35-65	20-30	2-10
	6-10	GRX-SIL, GRV-SIL	GC, GC-GM, GM	A-4	0-5	0-40	40-60	35-55	30-50	25-35	20-30	2-12
	10-14	CBV-C, GRX-SIC, GRV-SIC, GRV-SICL	GC, SC	A-2-7, A-7	0-5	5-45	30-70	20-65	20-50	20-45	35-70	15-35
	14-80	SIC, C, GR-C, CBV-C	CH, CL	A-7	0	0-10	70-100	70-100	70-95	70-95	45-65	20-35

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage Passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
70009:												
GOSS----------	0-4	GR-SIL	GC, GM, GC-GM	A-2	0-5	0-40	55-80	50-75	45-70	30-65	20-30	2-10
	4-10	GRX-SIL, GRV-SIL	GC, GC-GM, GM	A-2	0-5	0-40	40-60	35-55	30-50	25-35	20-30	2-12
	10-16	CBV-C, GRX-SIC, GRV-SIC, GRV-SICL	GC, SC	A-2-7, A-7	0-5	5-45	30-70	20-65	20-50	20-45	35-70	15-35
	16-60	SIC, C, GR-C, CBV-C	CH, CL	A-7	0	0-10	70-100	70-100	70-95	70-95	45-65	20-35
70010:												
GOSS----------	0-3	CBV-SIL	GC, GC-GM, GM	A-2	0-5	15-60	55-80	50-75	45-70	30-65	20-30	2-10
	3-15	CBX-SIL, CBV-SIL	GC, GC-GM, GM	A-2	0-5	15-60	40-60	35-55	30-50	25-35	20-30	2-10
	15-21	GR-SIC, GRX-SIC, GRV-SIC, GRV-SICL	GC, SC	A-2-7, A-7	0-5	5-30	45-70	20-65	20-50	20-45	50-70	30-40
	21-60	SIC, C, GRV-C, CBV-C	CH, CL	A-7	0	0-10	70-100	70-100	70-95	70-95	45-65	20-35
70011:												
GOSS----------	0-9	GR-SIL	GM, GC-GM, GC	A-2	0-5	0-40	40-60	35-55	30-50	25-45	20-30	2-10
	9-21	GRV-SICL, GRV-SIL	GC, GC-GM, GM	A-2	0-5	5-40	40-60	35-55	30-50	25-35	20-30	2-10
	21-27	CBV-C, GRX-SIC, GRV-SIC	GC, SC	A-2-7, A-7	0-5	5-45	45-70	20-65	20-50	20-45	50-70	30-40
	27-60	SIC, C, GR-C	CH, CL	A-7	0	0-10	70-100	70-100	70-95	70-95	45-65	20-35
MOKO----------	0-7	GRV-CL, GRV-SIL	GC	A-2	0-5	5-40	50-80	45-75	40-70	35-65	25-45	10-20
	7-12	CNX-SICL, CNV-CL, FLV-SIL, CNV-SIL	CL, GC, SC	A-6, A-7	0-10	40-80	65-90	60-85	55-80	40-80	25-45	10-20
	12-80	UWB			---	---	---	---	---	---	---	---
70012:												
HOBERG----------	0-7	SIL	CL, CL-ML	A-4, A-6	0	0-5	85-100	75-100	70-95	65-90	25-35	7-15
	7-22	SIL, SICL, GR-SICL	CL, GC, SC	A-6	0	0-10	60-95	50-90	45-85	40-80	30-40	11-20
	22-47	GRV-SICL, GRV-SIL, GR-SIL, GRX-SICL	CH, GC, MH, SC	A-2-6, A-6	0	0-40	40-85	30-65	20-50	20-45	30-40	11-20
	47-72	GRV-C, GRV-SIC, GRX-C	CH, GC, MH, SC	A-2-7, A-7	0	0-25	40-85	30-65	30-65	25-60	50-75	25-40
70013:												
MOKO----------	0-7	GRV-CL, GRV-SIL	GC	A-2	0-5	5-40	50-80	45-75	40-70	35-65	25-45	10-20
	7-12	CNX-SICL, CNV-CL, FLV-SIL, CNV-SIL	CL, GC, SC	A-6, A-7	0-10	40-80	65-90	60-85	55-80	40-80	25-45	10-20
	12-80	UWB			---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage Passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
70014:												
MOKO----------	0-7	GRV-CL, GRV-SIL	GC	A-2	0-5	5-40	50-80	45-75	40-70	30-65	25-45	8-20
	7-12	CNX-SICL, CNV-CL, FLV-SIL, CNV-SIL	CL, GC, SC	A-6, A-7	0-10	40-80	65-90	60-85	55-80	40-80	25-45	8-20
	12-80	UWB			---	---	---	---	---	---	---	---
ROCK OUTCROP.												
70015:												
PEMBROKE--------	0-9	SIL	CL, ML	A-6, A-4	0	0	95-100	90-100	80-100	70-100	25-35	3-11
	9-24	SICL	CL	A-6, A-7	0	0	95-100	90-100	85-100	75-100	30-50	11-25
	24-48	SICL, SIC	CL	A-7, A-6	0	0	95-100	90-100	85-100	75-100	30-53	11-29
	48-60	GR-SICL, GR-SIC, GRV-C	CH, CL, GC, SC	A-7	0	0-10	50-85	50-75	40-70	35-70	44-65	22-40
70016:												
GOODSON---------	0-8	SIL	CL	A-6	0	0	85-100	80-100	70-90	60-80	30-35	10-15
	8-13	SICL, GR-SICL, GR-SIL, SIL	CL, GC, SC	A-6	0	0	55-95	50-90	45-80	40-70	30-35	10-15
	13-31	SIC, C	CH, CL	A-7	0	0	90-100	85-100	75-95	70-90	40-65	20-40
	31-43	SICL, SIC	CL	A-7	0	0-20	80-100	75-100	70-95	65-95	35-55	15-30
	43-45	WB			---	---	---	---	---	---	---	---
70017:												
GOODSON---------	0-9	GR-SIL	CL	A-6	0	0	55-80	50-75	45-70	40-65	30-35	10-15
	9-15	SICL, GR-SICL, GR-SIL, SIL	CL, GC, SC	A-6	0	0	55-95	50-90	45-80	40-70	30-35	10-15
	15-32	SIC, C	CH, CL	A-7	0	0	90-100	85-100	75-95	70-90	40-65	20-40
	32-44	SICL, SIC	CL	A-7	0	0-20	80-100	75-100	70-95	65-85	35-55	15-30
	44-51	WB			---	---	---	---	---	---	---	---
70018:												
GOODSON---------	0-7	GR-SIL	CL	A-6	0	0	55-80	50-75	45-70	40-65	30-35	10-15
	7-12	SICL, GR-SICL, GR-SIL, SIL	CL, GC, SC	A-6	0	0	55-95	50-90	45-80	40-70	30-35	10-15
	12-31	SIC, C	CH, CL	A-7	0	0	90-100	85-100	75-95	70-90	40-65	20-40
	31-43	SICL, SIC	CL	A-7	0	0-20	80-100	75-100	70-95	65-85	35-55	15-30
	43-52	WB			---	---	---	---	---	---	---	---
70039:												
SACVILLE--------	0-7	SICL	CL	A-6, A-7	0	0	100	100	95-100	90-100	35-50	15-25
	7-46	SICL, SIC, C	CH	A-7	0	0-5	100	85-100	85-100	85-100	52-75	35-47
	46-60	CBV-C, GR-SIC, GRV-C, GR-SICL	CH	A-7	0	0-40	45-100	35-95	30-90	25-85	52-75	35-47
73000:												
POMME----------	0-7	SIL	CL, CL-ML	A-4, A-6	0	0-5	80-100	75-95	65-95	50-90	25-34	7-14
	7-19	SICL, GR-SIL, GR-SICL, CL	CL	A-4, A-6, A-7-6	0	0-10	70-95	65-90	50-85	50-75	32-43	13-21
	19-57	GRV-SICL, CBV-SICL	GC	A-2, A-6, A-7-6	0	0-30	25-50	25-45	25-45	20-40	37-48	16-25
	57-86	GRX-C, CBV-C	GC	A-2-7, A-7-6	0	0-45	15-45	15-45	15-45	15-40	48-66	28-39
73001:												
GLENSTED--------	0-8	SIL	CL	A-6	0	0	100	100	95-100	80-95	30-40	12-22
	8-17	SIL	CL	A-6	0	0	100	100	95-100	80-95	30-40	12-22
	17-60	SIC, C	CH	A-7	0	0	95-100	80-95	75-95	70-85	55-75	30-50

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage Passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
73002:												
OCIE	0-3	GR-SIL	CL, CL-ML, SC, SC-SM	A-1, A-2, A-4	0	0-15	55-80	50-75	45-65	40-60	0-25	4-10
	3-15	GRV-SIL, GRV-L, GR-SIL	GC, GC-GM	A-1-b, A-2-4, A-2-6	0-5	0-20	40-55	20-75	20-45	15-35	20-30	5-15
	15-19	GRV-SIL, GRV-CL, GRX-SIL, GRV-SICL	GC, GC-GM	A-1-b, A-2-4, A-2-6	0-5	0-20	40-55	20-50	20-45	15-35	20-30	5-15
	19-42	GR-C, C, SIC	CH	A-7	0-5	0-15	75-95	70-90	65-85	60-80	50-70	30-40
	42-80	UWB			---	---	---	---	---	---	---	---
GATEWOOD	0-2	GR-SIL	CL, GC, SC	A-2, A-4, A-6	0	0-15	55-80	50-75	45-70	40-65	25-35	7-15
	2-13	GR-SIL, GRV-SIL	CL, GC, SC	A-2, A-4, A-6	0	0-15	40-90	35-85	30-75	30-70	25-35	7-15
	13-27	GR-SIC, GR-C, C	CH	A-7	0-5	0-10	80-95	60-90	55-90	50-85	55-75	30-45
	27-80	UWB			---	---	---	---	---	---	---	---
73003:												
OCIE	0-2	GR-SIL, GRV-SIL	CL, CL-ML, SC, SC-SM	A-1, A-2, A-4	0	0-15	40-80	25-75	20-65	15-60	0-25	4-10
	2-14	GRV-SIL, GRV-L, GR-SIL	GC, GC-GM	A-1-b, A-2-4, A-2-6	0-5	0-20	40-55	20-75	20-45	15-35	20-30	5-15
	14-19	GRV-SIL, GRV-CL, GRX-SIL, GRV-SICL	GC, GC-GM	A-1-b, A-2-4, A-2-6	0-5	0-20	40-55	20-50	20-45	15-35	20-30	5-15
	19-44	GR-C, C, SIC	CH	A-7	0-5	0-15	75-95	70-90	65-85	60-80	50-70	30-40
	44-80	UWB			---	---	---	---	---	---	---	---
GATEWOOD	0-4	GR-SIL	CL, GC, SC	A-2, A-4, A-6	0	0-15	55-80	50-75	45-70	40-65	25-35	7-15
	4-7	GR-SIL, GRV-SIL	CL, GC, SC	A-2, A-4, A-6	0	0-15	40-90	35-85	30-75	30-70	25-35	7-15
	7-28	GR-SIC, GR-C, C	CH	A-7	0-5	0-10	80-95	60-90	55-90	50-85	55-75	30-45
	28-80	UWB			---	---	---	---	---	---	---	---
73004:												
OCIE	0-3	GRV-SIL	SC, SC-SM, CL-ML, CL	A-1, A-2, A-4	0-10	0-15	35-55	30-50	25-45	20-40	0-25	4-11
	3-10	GRV-SIL, GRV-L, GR-SIL	GC-GM, GC	A-1-b, A-2-4, A-2-6	0-5	0-20	40-55	20-75	20-45	15-35	20-30	5-15
	10-20	GRV-SIL, GRV-CL, GRX-SIL, GRV-SICL	GC, GC-GM	A-1-b, A-2-4, A-2-6	0-5	0-20	40-55	20-50	20-45	15-35	20-30	5-15
	20-45	GR-C, C, SIC	CH	A-7	0-5	0-15	75-95	70-90	65-85	60-80	50-70	30-40
	45-60	UWB			---	---	---	---	---	---	---	---
73005:												
OCIE	0-4	GR-SIL	CL-ML, CL, SC, SC-SM	A-1, A-2, A-4	0	0-15	55-80	50-75	45-65	40-60	0-25	4-10
	4-10	GRV-SIL, GRV-L, GR-SIL	GC-GM, GC	A-1-b, A-2-4, A-2-6	0-5	0-20	40-55	20-75	20-45	15-35	20-30	5-15
	10-19	GRV-SIL, GRV-CL, GRX-SIL, GRV-SICL	GC, GC-GM	A-1-b, A-2-4, A-2-6	0-5	0-20	40-55	20-50	20-45	15-35	20-30	5-15
	19-52	GR-C, C, SIC	CH	A-7	0-5	0-15	75-95	70-90	65-85	60-80	50-70	30-40
	52-60	UWB			---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage Passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
73006:												
PERIDGE---------	0-8	SIL	CL, CL-ML, ML	A-4	0	0	95-100	90-100	85-100	75-90	20-25	3-8
	8-19	SICL, SIL	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	85-100	75-95	23-38	7-15
	19-60	GR-SICL, SICL, GRV-SICL, SIC, C	CH, CL, GC	A-2, A-6, A-7	0	0	55-100	35-100	35-100	25-95	34-52	13-23
73007:												
PLATO-----------	0-6	SIL	CL-ML, ML	A-4	0	0	100	95-100	90-100	70-90	21-30	3-8
	6-29	SICL, SIC	CH, CL	A-7	0	0	85-100	80-100	75-95	65-85	35-52	15-28
	29-37	GRX-SIL, GRV-SIL, GRV-SICL	GC, GC-GM	A-2-4, A-4, A-6	0	0-15	25-55	20-50	15-45	15-40	25-40	5-20
	37-46	SIL, SICL, GR-SIL, CL	CL, GC, SC	A-6, A-7	0	0	60-90	55-85	50-80	45-75	30-45	15-20
	46-80	GRV-C, GR-C, GR-SICL	CH, CL, GC, SC	A-7	0	0-20	40-75	40-70	35-70	30-60	45-60	30-45
73008:												
VIRATON---------	0-6	SIL	CL, CL-ML	A-4, A-6	0	0	80-100	75-100	70-95	65-85	20-30	4-11
	6-24	SIL, GR-SICL, SICL	CL	A-4, A-6	0	0-5	60-100	55-100	50-95	50-90	25-35	8-15
	24-40	GRV-SIL, GRV-SICL, GR-SIL	GC	A-2, A-4, A-6	0	0-15	35-60	30-55	25-45	25-45	25-35	8-15
	40-60	GRV-C, GRX-C, GRX-SIC, GRX-SICL	GC	A-2, A-6, A-7	0	0-55	25-60	20-55	15-45	15-45	30-50	11-25
73009:												
VIRATON---------	0-3	SIL	CL, CL-ML	A-4, A-6	0	0	80-100	75-100	70-95	65-85	20-30	4-11
	3-9	SIL	CL, CL-ML	A-4, A-6	0	0	80-100	75-100	70-95	65-85	20-30	4-11
	9-24	SIL, GR-SICL, SICL	CL	A-4, A-6	0	0-5	60-100	55-100	50-95	50-90	25-35	8-15
	24-35	GRV-SIL, GRV-SICL, GR-SIL	GC	A-2, A-4, A-6	0	0-15	35-60	30-55	25-45	25-45	25-35	8-15
	35-60	GRV-C, GRX-C, GRX-SIC, GRX-SICL	GC	A-2, A-6, A-7	0	0-55	25-60	20-55	15-45	15-45	30-50	11-25
73010:												
WILDERNESS------	0-6	GR-SIL	CL-ML, GC, SC, SC-SM	A-2-4, A-4	0	0-10	55-85	50-75	45-70	40-65	20-30	5-10
	6-11	GR-SIL	CL-ML, GC, SC, SC-SM	A-4, A-2-4	0	0-10	55-85	50-75	45-70	40-65	20-30	5-10
	11-25	GRV-SICL, GRX-SICL, GRV-SIL	GC, SC	A-6, A-2-6	0-5	0-15	25-55	20-50	15-50	15-40	25-40	10-20
	25-32	GRV-SIL, GRV-SICL, GRX-SIL	GC, GC-GM, GP-GC	A-2-4, A-2-6, A-1	0-5	0-20	20-50	10-45	10-40	5-35	20-40	5-15
	32-60	GR-C, C, GRV-C	CL, CH	A-7	0	0-10	15-75	10-70	10-65	5-60	48-61	23-30
74625:												
HARTVILLE-------	0-7	SIL	CL, ML	A-4, A-6	0	0	95-100	95-100	80-95	70-90	30-40	7-15
	7-12	SIL, SICL	CL	A-6, A-7	0	0	95-100	95-100	90-98	85-95	35-45	20-25
	12-60	SIC, C, SICL	CH	A-7	0	0-5	95-100	95-100	90-98	85-95	50-60	30-40
75375:												
HORSECREEK------	0-9	SIL	CL, ML	A-4	0	0	95-100	95-100	85-100	70-98	21-34	4-15
	9-19	SIL	CL, ML	A-4	0	0	95-100	90-100	80-100	65-98	21-34	4-15
	19-60	SIL, SICL	CL, CL-ML	A-4, A-6, A-7	0	0	95-100	90-100	80-100	65-98	28-43	9-25

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage Passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
75376:												
CEDARGAP--------	0-11	GR-SIL	GM, SM	A-1, A-4, A-2-4	0	0-15	60-85	50-75	45-70	20-60	25-35	3-9
	11-20	GRV-CL, GRV-SIL, GRV-L, GRV-SCL	GM, ML, SM	A-2, A-4, A-1	0	0-15	35-80	25-75	20-70	15-60	25-35	3-9
	20-60	GRV-CL, GRX-L, GRV-L, GRV-SCL	GC, GC-GM	A-1-b, A-2-4, A-2-6	0-20	0-20	40-70	30-60	25-55	20-50	20-35	5-20
75377:												
RACKET----------	0-10	SIL	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	75-95	55-85	25-35	5-12
	10-38	SIL, L, SICL	CL, CL-ML	A-6, A-4	0	0	80-100	75-100	70-95	55-95	25-40	5-20
	38-60	SR- GRX-S GR-LS GRX-SL	GM, GP-GM, SM, SP-SM	A-1, A-2-4	0	0-15	30-65	20-65	10-50	5-20	15-30	3-9
75378:												
STURKIE---------	0-9	SIL	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	85-95	75-80	20-34	5-13
	9-19	SIL, SICL	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	85-95	75-80	23-38	7-15
	19-60	SIL, SICL	CL, CL-ML	A-6, A-4	0	0	95-100	90-100	80-90	70-75	23-38	7-15
99000. PITS, QUARRIES												
99001. WATER												
99003. MISCELLANEOUS WATER												

Table 18.--Physical and Chemical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
											Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	meq/100g	meq/100g	pH	Pct	Pct					
15000:															
BASEHOR---	0-6	5-12	1.30-1.45	14.00-42.00	0.16-0.19	5.0-10	---	4.5-6.5	0.1-2.9	1.0-2.0	.17	.24	1	3	86
	6-15	4-12	1.30-1.45	14.00-42.00	0.10-0.15	3.0-10	---	4.5-6.5	0.1-2.9	0.3-1.0	.24	.37			
	15-80	---	---	0.01-0.42	---	---	---	---	---	---	---	---			
15001:															
BASEHOR---	0-2	5-15	1.30-1.45	14.00-42.00	0.13-0.18	15-25	---	5.1-6.5	0.1-2.9	1.0-14	.10	.10	1	8	0
	2-10	5-15	1.30-1.45	14.00-42.00	0.12-0.17	5.0-15	---	4.0-5.5	0.1-2.9	1.0-2.0	.10	.17			
	10-16	5-22	1.30-1.45	14.00-42.00	0.08-0.12	5.0-15	---	4.5-5.5	0.1-2.9	0.5-1.5	.10	.17			
	16-80	---	---	0.01-0.42	---	---	---	---	---	---	---	---			
15002:															
MCGIRK---	0-4	15-27	1.30-1.45	4.00-14.00	0.22-0.24	8.0-16	8.0-16	5.1-7.3	0.1-2.9	1.0-2.0	.49	.49	3	6	48
	4-9	25-35	1.30-1.40	1.40-4.00	0.18-0.20	10-20	10-20	4.5-6.0	3.0-5.9	0.5-1.0	.37	.37			
	9-30	40-60	1.25-1.35	0.42-1.40	0.10-0.18	20-35	18-26	4.5-6.0	6.0-8.9	0.5-1.0	.24	.24			
	30-91	30-60	1.25-1.35	0.42-1.40	0.10-0.18	20-30	18-26	4.5-7.3	6.0-8.9	0.1-0.5	.24	.28			
40000:															
BARDEN---	0-8	15-27	1.40-1.50	4.00-14.00	0.21-0.24	8.0-18	---	5.1-7.3	0.1-2.9	1.0-3.0	.43	.43	3	6	48
	8-16	35-50	1.25-1.40	0.42-1.40	0.11-0.19	19-30	---	4.5-7.3	6.0-8.9	0.5-2.0	.24	.24			
	16-76	27-40	1.30-1.45	1.40-4.00	0.10-0.14	14-20	---	4.5-7.4	3.0-5.9	0.1-0.5	.37	.37			
40001:															
BOLIVAR---	0-9	6-22	1.20-1.40	4.00-14.00	0.19-0.21	4.0-10	4.0-10	5.1-6.6	0.1-2.9	0.5-2.0	.28	.28	3	5	56
	9-25	15-30	1.30-1.50	4.00-14.00	0.12-0.16	6.0-15	4.0-15	4.5-6.6	3.0-5.9	0.1-0.5	.28	.32			
	25-38	20-30	1.35-1.55	4.00-14.00	0.09-0.12	6.0-15	4.0-15	4.5-6.0	0.1-2.9	0.1-0.5	.18	.24			
	38-42	---	---	0.42-1.40	---	---	---	---	---	---	---	---			
	42-80	---	---	0.01-0.42	---	---	---	---	---	---	---	---			
40002:															
LIBERAL---	0-9	15-27	1.35-1.50	4.00-14.00	0.20-0.24	12-18	7.0-16	4.5-6.0	0.1-2.9	1.0-4.0	.37	.37	4	6	48
	9-23	27-50	1.35-1.45	1.40-4.00	0.11-0.20	14-26	7.0-16	4.5-6.5	3.0-5.9	0.5-1.0	.37	.37			
	23-40	27-50	1.25-1.40	0.42-1.40	0.11-0.20	14-30	10-25	4.5-6.5	6.0-8.9	0.2-0.5	.28	.28			
	40-50	27-50	1.25-1.40	0.42-1.40	0.08-0.12	12-26	10-25	5.1-7.3	6.0-8.9	0.2-0.5	.49	.49			
	50-55	---	---	0.01-0.42	---	---	---	---	---	---	---	---			
	55-80	---	---	0.01-0.42	---	---	---	---	---	---	---	---			
46000:															
HUMANSVILLE---	0-7	18-27	1.30-1.55	4.00-14.00	0.18-0.22	20-30	---	5.5-7.3	0.1-2.9	2.0-8.0	.37	.37	5	6	48
	7-24	18-35	1.40-1.60	1.40-4.00	0.17-0.22	20-30	---	6.1-7.3	0.1-2.9	1.0-5.0	.55	.55			
	24-60	27-50	1.40-1.60	0.42-4.00	0.12-0.18	20-30	---	6.1-7.3	3.0-5.9	0.5-2.0	.43	.43			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
											Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	meq/100g	meq/100g	pH	Pct	Pct					
66000:															
MONITEAU--------	0-6	15-27	1.20-1.40	4.00-14.00	0.21-0.23	10-14	7.0-12	5.1-6.5	0.1-2.9	1.0-2.0	.55	.55	5	6	48
	6-18	12-25	1.20-1.40	4.00-14.00	0.18-0.22	6.0-12	4.0-10	5.1-6.5	0.1-2.9	0.5-1.0	.55	.55			
	18-60	22-35	1.30-1.50	1.40-4.00	0.17-0.20	12-20	10-18	4.5-6.0	3.0-5.9	0.1-0.8	.47	.47			
66001:															
DAMERON---------	0-9	20-27	1.25-1.40	4.00-14.00	0.22-0.24	12-22	---	5.1-7.3	0.1-2.9	2.0-4.0	.32	.32	4	6	48
	9-15	20-32	1.25-1.40	4.00-14.00	0.18-0.24	12-22	---	5.1-7.3	3.0-5.9	2.0-4.0	.28	.28			
	15-24	27-32	1.20-1.55	4.00-14.00	0.04-0.10	15-22	---	5.6-7.3	0.1-2.9	0.5-2.0	.10	.28			
	24-72	20-32	1.25-1.40	4.00-14.00	0.18-0.24	12-22	---	5.1-7.3	3.0-5.9	0.5-2.0	.20	.32			
	72-80	20-32	1.25-1.40	4.00-14.00	0.06-0.10	12-25	---	5.1-7.3	0.1-2.9	0.5-2.0	.05	.24			
70000:															
BONA------------	0-6	12-27	1.30-1.50	4.00-14.00	0.12-0.22	10-18	8.0-18	5.1-6.5	0.1-2.9	1.0-4.0	.20	.37	3	8	0
	6-18	18-27	1.35-1.45	4.00-14.00	0.06-0.18	10-18	8.0-18	5.1-6.5	0.1-2.9	1.0-4.0	.10	.37			
	18-24	20-40	1.35-1.45	4.00-14.00	0.03-0.12	8.0-16	6.0-16	5.1-6.5	3.0-5.9	0.5-2.0	.10	.43			
	24-30	50-70	1.35-1.50	1.40-4.00	0.06-0.12	10-20	8.0-18	4.5-6.5	3.0-5.9	0.5-1.0	.05	.20			
	30-72	50-80	1.35-1.55	1.40-4.00	0.10-0.18	15-30	12-25	4.5-6.5	3.0-5.9	0.5-1.0	.05	.10			
	72-80	---	---	0.01-0.42	---	---	---	---	---	---	---	---			
70001:															
BONA------------	0-7	12-27	1.30-1.50	4.00-14.00	0.12-0.22	10-25	8.0-18	5.1-6.5	0.1-2.9	1.0-7.0	.17	.32	3	8	0
	7-12	18-27	1.35-1.45	4.00-14.00	0.06-0.18	10-21	8.0-18	5.1-6.5	0.1-2.9	1.0-5.0	.15	.32			
	12-19	20-40	1.35-1.45	4.00-14.00	0.03-0.12	8.0-24	6.0-16	5.1-6.5	3.0-5.9	0.5-3.0	.15	.32			
	19-45	50-70	1.35-1.50	1.40-4.00	0.06-0.12	10-37	8.0-18	4.5-6.5	3.0-5.9	0.5-2.0	.05	.15			
	45-62	50-81	1.35-1.55	1.40-4.00	0.10-0.18	15-44	12-25	4.5-7.1	3.0-5.9	0.5-1.0	.05	.10			
	62-80	---	---	0.01-0.42	---	---	---	---	---	---	---	---			
70002:															
ALSUP-----------	0-4	3-24	1.20-1.40	4.00-14.00	0.12-0.18	6.0-35	2.0-40	4.5-7.3	0.1-2.9	1.0-12	.37	.55	4	8	0
	4-13	5-24	1.20-1.40	4.00-14.00	0.12-0.17	3.0-12	2.0-12	4.5-7.3	0.1-2.9	0.5-2.0	.37	.55			
	13-23	35-70	1.20-1.50	1.40-4.00	0.12-0.21	15-30	18-30	4.5-6.0	3.0-5.9	0.5-1.0	.37	.37			
	23-39	35-55	1.30-1.50	1.40-4.00	0.12-0.21	9.0-25	18-31	5.0-6.0	6.0-8.9	0.1-0.5	.24	.24			
	39-44	35-50	1.40-1.70	1.40-4.00	0.06-0.17	9.0-20	9.0-20	5.1-8.0	6.0-8.9	---	.24	.43			
	44-60	---	---	0.01-0.42	---	---	---	---	---	---	---	---			
70003:															
ALSUP-----------	0-7	5-24	1.20-1.40	4.00-14.00	0.12-0.16	6.0-16	2.0-8.0	4.5-7.3	0.1-2.9	1.0-4.0	.24	.55	4	8	0
	7-12	5-24	1.20-1.40	4.00-14.00	0.12-0.16	3.0-12	2.0-8.0	5.1-7.3	0.1-2.9	0.5-2.0	.20	.64			
	12-40	35-70	1.20-1.50	1.40-4.00	0.12-0.17	20-30	18-30	4.5-6.0	3.0-5.9	0.5-1.0	.20	.24			
	40-56	27-50	1.40-1.70	1.40-4.00	0.06-0.12	9.0-20	9.0-20	6.6-8.0	6.0-8.9	0.1-0.5	.15	.43			
	56-66	---	---	0.01-0.42	---	---	---	---	---	---	---	---			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
											Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	meq/100g	meq/100g	pH	Pct	Pct					
70004:															
ALSUP----------	0-4	5-24	1.20-1.40	4.00-14.00	0.12-0.19	6.0-18	2.0-23	4.5-7.3	0.1-2.9	1.0-6.7	.28	.37	4	8	0
	4-9	5-24	1.20-1.40	4.00-14.00	0.12-0.19	3.0-12	2.0-8.0	5.1-7.3	0.1-2.9	0.5-2.0	.49	.64			
	9-27	35-70	1.20-1.50	1.40-4.00	0.12-0.19	13-30	16-30	4.5-6.0	6.0-8.9	0.5-1.0	.28	.37			
	27-41	27-50	1.40-1.70	1.40-4.00	0.06-0.13	8.6-20	9.0-20	5.0-8.0	3.0-5.9	0.1-0.5	.20	.49			
	41-46	---	---	0.01-0.42	---	---	---	---	---	---	---	---			
70005:															
BLUEYE----------	0-9	15-27	1.20-1.30	4.00-14.00	0.10-0.16	12-25	---	6.1-7.8	0.1-2.9	2.0-4.0	.15	.20	2	8	0
	9-15	15-35	1.25-1.40	4.00-14.00	0.08-0.14	12-25	---	6.1-8.4	0.1-2.9	1.0-3.0	.10	.17			
	15-21	40-65	1.20-1.45	0.42-1.40	0.04-0.09	25-40	---	6.6-8.4	6.0-8.9	1.0-3.0	.10	.20			
	21-35	55-80	1.20-1.40	0.42-1.40	0.03-0.08	25-40	---	7.3-8.4	6.0-8.9	0.5-2.0	.17	.17			
	35-80	---	---	0.00-0.01	---	---	---	---	---	---	---	---			
MOKO----------	0-7	18-35	1.25-1.50	4.00-14.00	0.08-0.13	15-30	---	6.6-7.8	0.1-2.9	4.0-10	.10	.28	1	8	0
	7-12	18-35	1.25-1.60	4.00-14.00	0.03-0.14	15-30	---	6.6-7.8	0.1-2.9	3.0-8.0	.10	.37			
	12-80	---	---	0.00-0.01	---	---	---	---	---	---	---	---			
70006:															
CRELDON---------	0-10	10-25	1.20-1.40	4.00-14.00	0.22-0.24	12-18	10-18	4.5-7.3	0.1-2.9	1.0-3.0	.27	.37	4	5	56
	10-14	27-40	1.30-1.50	1.40-4.00	0.17-0.20	15-24	12-24	4.5-6.5	3.0-5.9	1.0-2.0	.37	.37			
	14-26	35-50	1.30-1.50	1.40-4.00	0.12-0.17	15-24	12-24	4.5-6.5	3.0-5.9	0.5-1.0	.32	.32			
	26-41	25-35	1.60-1.90	0.01-0.42	0.07-0.12	9.0-15	6.0-14	3.6-5.5	0.1-2.9	0.1-0.5	.24	.43			
	41-51	15-35	1.60-1.85	0.01-0.42	0.05-0.12	6.0-10	5.0-10	3.6-6.0	0.1-2.9	0.1-0.5	.10	.43			
	51-60	40-70	1.30-1.55	4.00-14.00	0.04-0.10	25-40	20-40	4.5-6.5	6.0-8.9	0.1-0.5	.10	.15			
70007:															
CLIQUOT---------	0-4	8-18	1.30-1.50	4.00-14.00	0.14-0.19	8.0-16	5.0-15	4.5-6.0	0.1-2.9	4.0-8.0	.15	.32	4	8	0
	4-10	15-27	1.40-1.55	4.00-14.00	0.14-0.19	5.0-10	2.0-10	4.5-6.0	0.1-2.9	0.5-1.0	.15	.49			
	10-41	50-70	1.30-1.55	0.42-1.40	0.07-0.16	15-25	10-20	4.5-5.5	6.0-8.9	0.5-1.0	.17	.20			
	41-48	45-60	1.30-1.55	0.42-1.40	0.07-0.12	15-25	10-20	4.5-5.5	6.0-8.9	0.2-0.5	.15	.28			
	48-55	40-60	1.30-1.55	0.42-1.40	0.07-0.12	15-25	5.0-20	4.5-5.5	3.0-5.9	0.2-0.5	.10	.32			
	55-80	---	---	0.01-0.42	---	---	---	---	---	---	---	---			
70008:															
GOSS----------	0-6	12-27	1.10-1.30	14.00-42.00	0.06-0.10	10-31	10-31	4.5-6.5	0.1-2.9	1.0-4.0	.28	.49	2	8	0
	6-10	10-24	1.10-1.30	14.00-42.00	0.06-0.10	6.0-12	3.7-12	4.5-6.5	0.1-2.9	0.1-2.0	.17	.49			
	10-14	35-50	1.30-1.50	4.00-14.00	0.04-0.09	9.0-25	7.0-25	4.5-7.3	3.0-5.9	0.1-1.0	.10	.43			
	14-80	50-85	1.40-1.60	4.00-14.00	0.06-0.10	25-58	21-58	4.5-7.3	3.0-5.9	0.1-1.0	.05	.05			
70009:															
GOSS----------	0-4	12-27	1.10-1.30	14.00-42.00	0.06-0.10	10-31	10-31	4.5-6.5	0.1-2.9	1.0-4.0	.20	.37	2	8	0
	4-10	10-24	1.10-1.30	14.00-42.00	0.06-0.10	6.0-12	3.7-12	4.5-6.5	0.1-2.9	0.1-2.0	.10	.55			
	10-16	35-50	1.30-1.50	4.00-14.00	0.04-0.09	9.0-25	7.0-25	4.5-7.3	3.0-5.9	0.1-1.0	.10	.49			
	16-60	50-85	1.40-1.60	4.00-14.00	0.06-0.10	25-58	21-58	4.5-7.3	3.0-5.9	0.1-1.0	.02	.10			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
											Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	meq/100g	meq/100g	pH	Pct	Pct					
70010:															
GOSS----------	0-3	12-27	1.10-1.30	14.00-42.00	0.06-0.10	10-31	10-31	4.5-6.5	0.1-2.9	1.0-4.0	.10	.32	2	8	0
	3-15	10-24	1.10-1.30	14.00-42.00	0.06-0.10	6.0-12	3.7-12	4.5-6.5	0.1-2.9	0.1-2.0	.10	.43			
	15-21	35-50	1.30-1.50	4.00-14.00	0.04-0.09	9.0-25	7.0-25	4.5-7.3	3.0-5.9	0.1-1.0	.10	.43			
	21-60	50-85	1.40-1.60	4.00-14.00	0.06-0.10	25-58	21-58	4.5-7.3	3.0-5.9	0.1-1.0	.05	.15			
70011:															
GOSS----------	0-9	12-27	1.10-1.30	14.00-42.00	0.06-0.10	10-31	10-31	4.5-6.5	0.1-2.9	1.0-4.0	.17	.43	2	8	0
	9-21	10-24	1.10-1.30	14.00-42.00	0.06-0.10	6.0-12	3.7-12	4.5-6.5	0.1-2.9	0.1-2.0	.10	.49			
	21-27	35-50	1.30-1.50	4.00-14.00	0.04-0.09	16-24	7.0-25	4.5-7.3	3.0-5.9	0.1-1.0	.05	.24			
	27-60	50-80	1.40-1.60	4.00-14.00	0.06-0.10	25-58	21-58	4.5-7.3	3.0-5.9	0.1-1.0	.05	.10			
MOKO----------	0-7	18-35	1.25-1.50	4.00-14.00	0.08-0.13	15-30	---	6.6-7.8	0.1-2.9	4.0-10	.10	.28	1	8	0
	7-12	18-35	1.25-1.60	4.00-14.00	0.03-0.14	15-30	---	6.6-7.8	0.1-2.9	3.0-8.0	.10	.37			
	12-80	---	---	0.00-0.01	---	---	---	---	---	---	---	---			
70012:															
HOBERG----------	0-7	15-25	1.30-1.60	4.00-14.00	0.13-0.18	12-18	5.0-18	5.1-7.3	0.1-2.9	1.0-3.0	.43	.43	4	6	48
	7-22	20-30	1.50-1.70	4.00-14.00	0.08-0.14	12-18	5.0-10	5.1-6.5	0.1-2.9	0.5-2.0	.37	.43			
	22-47	20-30	1.60-1.90	0.42-1.40	0.01-0.05	12-18	5.0-13	3.6-6.0	0.1-2.9	0.2-1.0	.28	.47			
	47-72	40-75	1.10-1.40	1.40-4.00	0.04-0.10	30-40	20-36	3.6-6.0	3.0-5.9	0.1-0.5	.05	.11			
70013:															
MOKO----------	0-7	18-35	1.25-1.50	4.00-14.00	0.08-0.13	15-30	---	6.6-7.8	0.1-2.9	4.0-10	.10	.28	1	8	0
	7-12	18-35	1.25-1.60	4.00-14.00	0.03-0.14	15-30	---	6.6-7.8	0.1-2.9	3.0-8.0	.10	.37			
	12-80	---	---	0.00-0.01	---	---	---	---	---	---	---	---			
70014:															
MOKO----------	0-7	18-35	1.25-1.50	4.00-14.00	0.08-0.13	15-30	---	6.6-7.8	0.1-2.9	4.0-10	.10	.28	1	8	0
	7-12	18-35	1.25-1.60	4.00-14.00	0.03-0.14	15-30	---	6.6-7.8	0.1-2.9	3.0-8.0	.10	.37			
	12-80	---	---	0.00-0.01	---	---	---	---	---	---	---	---			
ROCK OUTCROP.															
70015:															
PEMBROKE---------	0-9	12-27	1.10-1.30	4.00-14.00	0.18-0.23	10-18	10-18	4.5-7.3	0.1-2.9	2.0-5.0	.43	.43	4	6	48
	9-24	27-35	1.20-1.40	4.00-14.00	0.14-0.19	8.0-16	8.0-16	4.5-7.3	0.1-2.9	0.5-2.0	.43	.43			
	24-48	27-45	1.20-1.40	4.00-14.00	0.14-0.19	8.0-16	8.0-16	4.5-7.3	0.1-2.9	0.5-1.2	.28	.28			
	48-60	35-60	1.30-1.50	4.00-14.00	0.08-0.13	12-22	12-22	4.5-6.5	3.0-5.9	0.5-1.0	.02	.15			
70016:															
GOODSON---------	0-8	18-27	1.20-1.50	4.00-14.00	0.17-0.20	15-25	15-25	5.6-7.3	0.1-2.9	2.0-5.0	.37	.43	3	5	56
	8-13	18-40	1.20-1.40	4.00-14.00	0.12-0.20	15-41	15-25	5.1-7.3	0.1-2.9	2.0-4.0	.10	.37			
	13-31	45-65	1.30-1.55	1.40-4.00	0.10-0.15	15-45	15-30	5.1-8.4	6.0-8.9	0.1-2.0	.20	.24			
	31-43	27-45	1.40-1.71	4.00-14.00	0.12-0.20	15-45	12-20	6.1-7.9	3.0-8.9	0.1-0.5	.28	.28			
	43-45	---	---	0.01-0.42	---	---	---	---	---	---	---	---			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
											Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	meq/100g	meq/100g	pH	Pct	Pct					
70017:															
GOODSON---	0-9	18-27	1.20-1.50	4.00-14.00	0.17-0.20	15-25	15-25	5.6-7.3	0.1-2.9	2.0-5.0	.24	.37	3	8	0
	9-15	18-40	1.20-1.40	4.00-14.00	0.12-0.20	15-41	15-25	5.1-7.3	0.1-2.9	2.0-4.0	.24	.28			
	15-32	45-65	1.30-1.55	1.40-4.00	0.10-0.15	15-45	15-30	5.1-8.4	6.0-8.9	0.1-2.0	.20	.24			
	32-44	27-45	1.40-1.71	4.00-14.00	0.12-0.20	15-45	12-20	6.1-7.9	3.0-8.9	0.1-0.5	.37	.43			
	44-51	---	---	---	---	---	---	---	---	---	---	---			
70018:															
GOODSON---	0-7	18-27	1.20-1.50	4.00-14.00	0.17-0.20	15-25	15-25	5.6-7.3	0.1-2.9	2.0-5.0	.24	.32	3	8	0
	7-12	18-40	1.20-1.40	4.00-14.00	0.12-0.20	15-41	15-25	5.1-7.3	0.1-2.9	2.0-4.0	.24	.32			
	12-31	45-65	1.30-1.55	1.40-4.00	0.10-0.15	15-45	15-30	5.1-8.4	6.0-8.9	0.1-2.0	.28	.28			
	31-43	27-45	1.40-1.71	4.00-14.00	0.12-0.20	15-45	12-20	6.1-7.9	3.0-8.9	0.1-0.5	.28	.37			
	43-52	---	---	---	---	---	---	---	---	---	---	---			
70039:															
SACVILLE---	0-7	27-40	1.30-1.50	1.40-4.00	0.21-0.24	18-40	---	5.6-7.3	3.0-5.9	3.0-8.0	.32	.32	4	7	38
	7-46	35-60	1.40-1.60	0.42-1.40	0.11-0.13	18-40	---	5.6-7.8	6.0-8.9	0.5-2.0	.22	.24			
	46-80	35-60	1.40-1.60	0.42-1.40	0.08-0.12	18-35	---	5.6-7.8	6.0-8.9	0.1-2.0	.10	.24			
73000:															
POMME---	0-7	15-25	1.35-1.45	4.00-14.00	0.16-0.21	5.0-12	---	5.6-7.3	0.1-2.9	1.0-2.0	.32	.37	5	5	56
	7-19	22-35	1.30-1.45	4.00-14.00	0.14-0.21	8.0-16	---	5.6-7.3	0.1-2.9	0.2-1.0	.32	.37			
	19-57	28-40	1.30-1.45	4.00-14.00	0.08-0.14	8.0-16	---	5.1-7.3	0.1-2.9	0.1-1.0	.28	.32			
	57-86	45-75	1.25-1.40	4.00-14.00	0.04-0.14	10-30	---	4.5-7.3	3.0-5.9	0.1-1.0	.05	.10			
73001:															
GLENSTED---	0-8	15-27	1.30-1.50	4.00-14.00	0.22-0.24	11-17	---	5.1-7.3	3.0-5.9	2.0-3.0	.49	.49	3	6	48
	8-17	12-24	1.30-1.50	4.00-14.00	0.20-0.24	6.0-14	---	5.1-7.3	3.0-5.9	0.5-1.5	.64	.64			
	17-60	40-55	1.30-1.45	0.42-1.40	0.10-0.20	25-36	---	5.1-6.5	6.0-8.9	0.5-1.0	.20	.24			
73002:															
OCIE---	0-3	10-20	1.10-1.40	4.00-14.00	0.12-0.17	10-25	14-20	4.5-6.5	0.1-2.9	2.0-12	.20	.37	3	8	0
	3-15	15-20	1.10-1.35	4.00-14.00	0.12-0.15	4.0-8.0	4.0-8.0	4.5-6.0	0.1-2.9	0.5-2.0	.10	.49			
	15-19	15-35	1.10-1.35	4.00-14.00	0.12-0.15	6.0-12	4.0-8.0	4.5-6.0	0.1-2.9	0.1-1.0	.10	.43			
	19-42	50-86	1.10-1.30	0.42-1.40	0.07-0.10	15-40	15-35	5.1-7.3	6.0-8.9	0.1-1.0	.10	.15			
	42-80	---	---	0.00-0.01	---	---	---	---	---	---	---	---			
GATEWOOD---	0-2	15-25	1.10-1.40	4.00-14.00	0.12-0.17	10-18	---	5.1-7.3	0.1-2.9	2.0-8.0	.24	.37	2	8	0
	2-13	15-25	1.10-1.40	4.00-14.00	0.12-0.17	5.0-15	---	5.1-7.3	0.1-2.9	0.5-2.0	.10	.43			
	13-27	55-85	1.10-1.30	0.42-1.40	0.09-0.12	20-35	---	4.5-7.3	6.0-8.9	0.5-1.0	.10	.17			
	27-80	---	---	0.00-0.01	---	---	---	---	---	---	---	---			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
											Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	meq/100g	meq/100g	pH	Pct	Pct					
73003:															
OCIE	0-2	10-20	1.10-1.40	4.00-14.00	0.12-0.17	10-25	14-20	4.5-6.5	0.1-2.9	2.0-12	.10	.37	3	8	0
	2-14	15-20	1.10-1.35	4.00-14.00	0.12-0.15	4.0-8.0	4.0-8.0	4.5-6.0	0.1-2.9	0.5-2.0	.10	.55			
	14-19	15-35	1.10-1.35	4.00-14.00	0.12-0.15	6.0-12	4.0-8.0	4.5-6.0	0.1-2.9	0.1-1.0	.10	.37			
	19-44	50-86	1.10-1.30	0.42-1.40	0.07-0.10	15-40	15-35	5.1-7.3	6.0-8.9	0.1-1.0	.10	.15			
	44-80	---	---	0.00-0.01	---	---	---	---	---	---	---	---			
GATEWOOD	0-4	15-25	1.10-1.40	4.00-14.00	0.12-0.17	10-18	---	5.1-7.3	0.1-2.9	2.0-8.0	.20	.43	2	8	0
	4-7	15-25	1.10-1.40	4.00-14.00	0.12-0.17	5.0-15	---	5.1-7.3	0.1-2.9	0.5-2.0	.15	.37			
	7-28	55-85	1.10-1.30	0.42-1.40	0.09-0.12	20-35	---	4.5-7.3	6.0-8.9	0.5-1.0	.15	.20			
	28-80	---	---	0.00-0.01	---	---	---	---	---	---	---	---			
73004:															
OCIE	0-3	10-20	1.10-1.40	4.00-14.00	0.12-0.17	10-25	14-20	4.5-6.5	0.1-2.9	2.0-12	.17	.37	3	8	0
	3-10	15-20	1.10-1.35	4.00-14.00	0.12-0.15	4.0-8.0	4.0-8.0	4.5-6.0	0.1-2.9	0.5-2.0	.20	.55			
	10-20	15-35	1.10-1.35	4.00-14.00	0.12-0.15	6.0-12	4.0-8.0	4.5-6.0	0.1-2.9	0.1-1.0	.15	.55			
	20-45	50-86	1.10-1.30	0.42-1.40	0.07-0.10	15-40	15-35	5.1-7.3	6.0-8.9	0.1-1.0	.10	.20			
	45-53	---	---	0.00-0.01	---	---	---	---	---	---	---	---			
	53-60	---	---	0.00-0.01	---	---	---	---	---	---	---	---			
73005:															
OCIE	0-4	10-20	1.10-1.40	4.00-14.00	0.12-0.17	10-25	14-20	4.5-6.5	0.1-2.9	2.0-12	.15	.37	3	8	0
	4-10	15-20	1.10-1.35	4.00-14.00	0.12-0.15	4.0-8.0	4.0-8.0	4.5-6.0	0.1-2.9	0.5-2.0	.17	.49			
	10-19	15-35	1.10-1.35	4.00-14.00	0.12-0.15	6.0-12	4.0-8.0	4.5-6.0	0.1-2.9	0.1-1.0	.20	.49			
	19-52	50-86	1.10-1.30	0.42-1.40	0.07-0.10	15-40	15-35	5.1-7.3	6.0-8.9	0.1-1.0	.10	.20			
	52-60	---	---	0.06-0.42	---	---	---	---	---	---	---	---			
73006:															
PERIDGE	0-8	10-20	1.35-1.45	4.00-14.00	0.16-0.20	5.0-15	5.0-15	4.5-6.0	0.1-2.9	1.0-3.0	.43	.43	5	5	56
	8-19	18-35	1.30-1.45	4.00-14.00	0.16-0.20	10-20	10-20	4.5-6.0	0.1-2.9	0.5-1.0	.49	.49			
	19-60	30-50	1.30-1.45	4.00-14.00	0.10-0.20	10-20	10-20	4.5-6.0	3.0-5.9	0.1-0.5	.28	.32			
73007:															
PLATO	0-6	10-20	1.20-1.50	4.00-14.00	0.20-0.22	10-20	5.0-15	4.5-7.3	0.1-2.9	1.0-4.0	.55	.55	4	5	56
	6-29	27-45	1.30-1.50	1.40-4.00	0.10-0.18	10-20	5.0-15	3.5-5.5	6.0-8.9	0.2-1.0	.43	.43			
	29-37	20-40	1.60-1.90	0.01-0.42	0.01-0.05	20-30	15-25	3.5-5.5	3.0-5.9	0.1-0.5	.10	.55			
	37-46	20-40	1.60-1.90	0.01-0.42	0.01-0.05	5.0-15	6.0-20	4.5-5.5	3.0-5.9	0.1-0.5	.32	.49			
	46-80	20-45	1.40-1.60	4.00-14.00	0.02-0.06	5.0-15	4.0-23	4.5-6.0	6.0-8.9	0.1-0.5	.10	.28			
73008:															
VIRATON	0-6	8-25	1.30-1.50	4.00-14.00	0.18-0.22	6.0-14	3.0-10	4.5-7.3	0.1-2.9	0.5-2.0	.43	.43	4	6	48
	6-24	18-35	1.30-1.50	4.00-14.00	0.08-0.16	8.0-15	6.0-18	4.5-6.0	0.1-2.9	0.5-1.0	.37	.43			
	24-40	18-30	1.60-1.90	0.01-0.42	0.01-0.05	8.0-15	6.0-16	4.5-5.5	0.1-2.9	0.1-0.5	.24	.43			
	40-60	27-60	1.10-1.40	1.40-4.00	0.06-0.10	15-30	10-20	4.5-7.3	3.0-5.9	0.1-0.5	.10	.37			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
											Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	meq/100g	meq/100g	pH	Pct	Pct					
73009:															
VIRATON---	0-3	8-25	1.30-1.50	4.00-14.00	0.18-0.22	6.0-14	3.0-11	4.5-7.3	0.1-2.9	0.5-3.5	.32	.32	4	6	48
	3-9	8-25	1.30-1.50	4.00-14.00	0.18-0.22	6.0-14	3.0-10	4.5-7.3	0.1-2.9	0.5-2.0	.43	.43			
	9-24	18-35	1.30-1.50	4.00-14.00	0.17-0.21	8.0-16	6.0-18	4.5-6.0	0.1-2.9	0.5-1.0	.32	.37			
	24-35	18-30	1.60-1.90	0.01-0.42	0.01-0.05	8.0-15	6.0-16	4.5-5.5	0.1-2.9	0.1-0.5	.17	.43			
	35-60	27-60	1.10-1.40	1.40-4.00	0.06-0.10	15-30	10-20	4.5-7.3	3.0-5.9	0.1-0.5	.10	.32			
73010:															
WILDERNESS---	0-6	7-27	1.20-1.45	14.00-42.00	0.07-0.12	10-15	6.0-10	4.5-6.5	0.1-2.9	1.0-4.0	.32	.49	3	8	0
	6-11	7-18	1.20-1.45	14.00-42.00	0.07-0.12	6.0-12	5.0-10	4.5-6.5	0.1-2.9	0.5-2.0	.37	.55			
	11-25	22-35	1.30-1.50	4.00-14.00	0.03-0.10	10-15	8.0-15	4.5-6.0	0.1-2.9	0.5-1.0	.10	.43			
	25-32	20-35	1.70-2.00	0.42-1.40	0.01-0.05	10-15	8.0-15	3.5-5.5	0.1-2.9	0.1-0.5	.10	.43			
	32-60	50-70	1.40-1.60	4.00-14.00	0.07-0.12	25-35	25-35	4.5-6.0	3.0-5.9	0.1-0.5	.05	.10			
74625:															
HARTVILLE---	0-7	12-27	1.10-1.30	4.00-14.00	0.22-0.24	10-16	10-16	4.5-7.3	0.1-2.9	1.0-3.0	.49	.49	5	6	48
	7-12	24-40	1.20-1.40	0.42-1.40	0.18-0.21	12-20	12-20	5.1-7.3	3.0-5.9	0.5-1.0	.49	.49			
	12-60	35-60	1.20-1.50	0.42-1.40	0.10-0.12	18-30	18-30	5.1-7.3	6.0-8.9	0.1-0.5	.32	.32			
75375:															
HORSECREEK---	0-9	10-25	1.20-1.40	4.00-14.00	0.18-0.23	8.0-16	8.0-16	5.6-7.3	0.1-2.9	2.0-4.0	.43	.43	5	5	56
	9-19	10-25	1.20-1.40	4.00-14.00	0.18-0.23	8.0-16	8.0-16	5.6-7.3	0.1-2.9	1.0-2.0	.55	.55			
	19-60	18-34	1.20-1.50	4.00-14.00	0.16-0.23	8.0-16	8.0-16	5.6-7.3	0.1-2.9	0.5-2.0	.49	.49			
75376:															
CEDARGAP---	0-11	12-25	1.20-1.45	4.00-14.00	0.11-0.18	12-30	12-30	5.6-7.8	0.1-2.9	2.0-8.0	.17	.28	5	8	0
	11-20	12-35	1.30-1.50	4.00-14.00	0.10-0.15	12-30	12-30	5.6-7.8	0.1-2.9	2.0-6.0	.05	.20			
	20-60	18-35	1.40-1.55	4.00-14.00	0.04-0.12	12-25	12-25	5.6-7.8	0.1-2.9	0.5-3.0	.05	.20			
75377:															
RACKET---	0-10	15-27	1.25-1.45	4.00-14.00	0.18-0.24	8.0-18	8.0-18	6.1-7.3	0.1-2.9	1.0-4.0	.28	.32	5	6	48
	10-38	15-30	1.25-1.45	4.00-14.00	0.16-0.20	10-20	10-20	6.1-7.3	3.0-5.9	1.0-3.0	.28	.37			
	38-60	5-18	1.35-1.55	42.00-141.0	0.02-0.08	6.0-16	6.0-16	6.1-7.3	0.1-2.9	0.5-2.0	.10	.20			
75378:															
STURKIE---	0-9	15-25	1.30-1.40	4.00-14.00	0.20-0.24	12-25	12-25	5.6-7.3	0.1-2.9	2.0-4.0	.37	.37	5	5	56
	9-19	18-30	1.30-1.40	4.00-14.00	0.20-0.22	12-25	12-25	5.6-7.3	0.1-2.9	1.0-3.0	.32	.32			
	19-60	18-30	1.35-1.45	4.00-14.00	0.18-0.20	12-25	12-25	5.6-7.3	0.1-2.9	0.5-2.0	.37	.37			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
											Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	meq/100g	meq/100g	pH	Pct	Pct					
99000. PITS, QUARRIES															
99001. WATER															
99003. MISCELLANEOUS WATER															

Table 19.--Soil Features

(Absence of an entry indicates that the feature is not a concern or that data were not available or were not estimated)

Map symbol and soil name	Restrictions				Potential frost action	Risk of corrosion	
	Depth	Kind	Thickness	Hardness		Uncoated steel	Concrete
	In		In				
15000:							
BASEHOR	10-20	Bedrock (lithic)	---	Very strongly cemented	Moderate	Low	Moderate
15001:							
BASEHOR	16-26	Bedrock (lithic)	---	Very strongly cemented	Moderate	Low	Moderate
15002:							
MCGIRK	---	---	---	---	High	High	High
40000:							
BARDEN	---	---	---	---	None	High	Moderate
40001:							
BOLIVAR	20-40	Bedrock (paralithic)	4-8	Strongly cemented	None	Low	Moderate
	40-48	Bedrock (lithic)		Very strongly cemented			
40002:							
LIBERAL	50-55	Bedrock (paralithic)	0-31	Moderately cemented	None	High	High
	47-63	Bedrock (lithic)		Very strongly cemented			
46000:							
HUMANSVILLE	---	---	---	---	None	High	Low
66000:							
MONITEAU	---	---	---	---	High	High	High
66001:							
DAMERON	---	---	---	---	Moderate	Low	Low
70000, 70001:							
BONA	60-80	Bedrock (lithic)	---	Very strongly cemented	Moderate	High	Moderate
70002, 70003, 70004:							
ALSUP	40-80	Bedrock (paralithic)	---	Weakly cemented	Moderate	High	Moderate
70005:							
BLUEYE	20-40	Bedrock (lithic)	---	Indurated	Moderate	High	Moderate
MOKO	6-20	Bedrock (lithic)	60-74	Indurated	None	Low	Low
70006:							
CRELDON	19-32	Fragipan	6-30	Noncemented	Moderate	High	High
70007:							
CLIQUOT	40-80	Bedrock (paralithic)	---	Moderately cemented	Moderate	High	High

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictions				Potential frost action	Risk of corrosion	
	Depth	Kind	Thickness	Hardness		Uncoated steel	Concrete
	In		In				
70008, 70009, 70010:							
GOSS	---	---	---	---	Moderate	Moderate	Moderate
70011:							
GOSS	---	---	---	---	Moderate	Moderate	Moderate
MOKO	6-20	Bedrock (lithic)	60-74	Indurated	None	Low	Low
70012:							
HOBERG	16-36	Fragipan	6-36	Noncemented	Moderate	Moderate	High
70013:							
MOKO	6-20	Bedrock (lithic)	60-74	Indurated	None	Low	Low
70014:							
MOKO	6-20	Bedrock (lithic)	---	Indurated	None	Low	Low
ROCK OUTCROP.							
70015:							
PEMBROKE	---	---	---	---	High	Low	Moderate
70016:							
GOODSON	40-60	Bedrock (paralithic) Bedrock (lithic)	---	Weakly cemented Strongly cemented	Moderate	High	Moderate
70017, 70018:							
GOODSON	40-60	Bedrock (paralithic) Bedrock (lithic)	0-20	Weakly cemented Strongly cemented	Moderate	High	Moderate
70039:							
SACVILLE	---	---	---	---	High	High	Low
73000:							
POMME	---	---	---	---	Low	Moderate	Moderate
73001:							
GLENSTED	6-20	Abrupt textural change	---	Noncemented	High	High	Moderate
73002, 73003:							
OCIE	40-60	Bedrock (lithic)	---	Indurated	Moderate	High	Moderate
GATEWOOD	20-40	Bedrock (lithic)	---	Very strongly cemented	Moderate	High	Moderate
73004, 73005:							
OCIE	40-60	Bedrock (lithic)	---	Indurated	Moderate	High	Moderate
73006:							
PERIDGE	---	---	---	---	None	Moderate	Moderate
73007:							
PLATO	24-36	Fragipan	6-36	Noncemented	Moderate	High	High
73008, 73009:							
VIRATON	20-30	Fragipan	6-36	Noncemented	Moderate	Moderate	High

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictions				Potential frost action	Risk of corrosion	
	Depth	Kind	Thickness	Hardness		Uncoated steel	Concrete
	In		In				
73010:							
WILDERNESS------	---	Fragipan	6-36	Noncemented	Moderate	Moderate	High
74625:							
HARTVILLE-------	---	---	---	---	High	Moderate	Moderate
75375:							
HORSECREEK------	---	---	---	---	None	Low	Low
75376:							
CEDARGAP--------	---	---	---	---	Moderate	Low	Low
75377:							
RACKET----------	---	---	---	---	Moderate	Moderate	Low
75378:							
STURKIE---------	---	---	---	---	None	Low	Low
99000. PITS, QUARRIES							
99001. WATER							
99003. MISCELLANEOUS WATER							

Table 20.--Water Features

(The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
15000:							
BASEHOR	D	None	---	---	>6.0	---	---
15001:							
BASEHOR	D	None	---	---	>6.0	---	---
15002:							
MCGIRK	C	None	---	---	0.5-2.0	Apparent	Nov-May
40000:							
BARDEN	C	None	---	---	2.0-3.0	Perched	Nov-Mar
40001:							
BOLIVAR	B	None	---	---	>6.0	---	---
40002:							
LIBERAL	D	None	---	---	2.0-3.0	Perched	Nov-Mar
46000:							
HUMANSVILLE	D	Frequent	Very brief	Dec-Apr	1.0-2.0	Apparent	Dec-May
66000:							
MONITEAU	C	Occasional	Very brief	Nov-May	0-1.0	Apparent	Nov-May
66001:							
DAMERON	B	Frequent	Very brief	Dec-Apr	>6.0	---	---
70000, 70001:							
BONA	B	None	---	---	>6.0	---	---
70002, 70003, 70004:							
ALSUP	C	None	---	---	2.5-4.0	Perched	Dec-Mar
70005:							
BLUEYE	C	None	---	---	>6.0	---	---
MOKO	D	None	---	---	>6.0	---	---
70006:							
CRELDON	C	None	---	---	1.5-3.0	Perched	Dec-Apr
70007:							
CLIQUOT	C	None	---	---	3.5-4.5	Perched	Dec-Mar
70008, 70009, 70010:							
GOSS	B	None	---	---	>6.0	---	---
70011:							
GOSS	B	None	---	---	>6.0	---	---
MOKO	D	None	---	---	>6.0	---	---

Table 20.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
70012:							
HOBERG	C	None	---	---	1.0-3.0	Perched	Dec-Mar
70013:							
MOKO	D	None	---	---	>6.0	---	---
70014:							
MOKO	D	None	---	---	>6.0	---	---
ROCK OUTCROP.							
70015:							
PEMBROKE	B	None	---	---	>6.0	---	---
70016:							
GOODSON	C	None	---	---	2.5-4.0	Perched	Dec-Mar
70017, 70018:							
GOODSON	C	None	---	---	2.5-4.0	Perched	Dec-Mar
70039:							
SACVILLE	D	None	---	---	0-1.5	Perched	Nov-May
73000:							
POMME	B	None	---	---	>6.0	---	---
73001:							
GLENSTED	D	None	---	---	0.5-1.5	Perched	Nov-May
73002, 73003:							
OCIE	C	None	---	---	1.5-5.0	Perched	Feb-Mar
GATEWOOD	C	None	---	---	1.5-3.0	Perched	Feb-Mar
73004, 73005:							
OCIE	C	None	---	---	1.5-5.0	Perched	Feb-Mar
73006:							
PERIDGE	B	None	---	---	>6.0	---	---
73007:							
PLATO	C	None	---	---	1.0-2.0	Perched	Dec-Apr
73008, 73009:							
VIRATON	C	None	---	---	1.5-2.5	Perched	Jan-Apr
73010:							
WILDERNESS	C	None	---	---	1.0-2.0	Perched	Dec-Mar
74625:							
HARTVILLE	C	None	---	---	1.5-3.0	Perched	Jan-Apr
75375:							
HORSECREEK	B	Occasional	Very brief	Nov-May	>6.0	---	---
75376:							
CEDARGAP	B	Frequent	Very brief	Nov-May	>6.0	---	---

Table 20.--Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
75377:							
RACKET----------	B	Frequent----	Very brief	Nov-May	>6.0	---	---
75378:							
STURKIE----------	B	Frequent----	Very brief	Nov-May	>6.0	---	---
99000.							
PITS, QUARRIES							
99001.							
WATER							
99003.							
MISCELLANEOUS WATER							

Table 21.--Classification of the Soils

Soil name	Family or higher taxonomic class
ALSUP	Fine, mixed, active, mesic Oxyaquic Hapludalfs
BARDEN	Fine, mixed, active, thermic Aquollic Hapludalfs
BASEHOR	Loamy, siliceous, superactive, mesic Lithic Dystrochrepts
BLUEYE	Fine, mixed, active, mesic Typic Argiudolls
BOLIVAR	Fine-loamy, mixed, active, thermic Ultic Hapludalfs
BONA	Clayey-skeletal, mixed, semiactive, mesic Typic Paleudolls
CEDARGAP	Loamy-skeletal, mixed, superactive, mesic Cumulic Hapludolls
CLIQUOT	Fine, mixed, semiactive, mesic Oxyaquic Hapludults
CRELDON	Fine, mixed, active, mesic Oxyaquic Fragiudalfs
DAMERON	Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls
GATEWOOD	Very-fine, mixed, active, mesic Oxyaquic Hapludalfs
GLENSTED	Fine, smectitic, mesic Vertic Albaqualfs
GOODSON	Fine, mixed, active, mesic Oxyaquic Hapludalfs
GOSS	Clayey-skeletal, mixed, active, mesic Typic Paleudalfs
HARTVILLE	Fine, mixed, active, mesic Aquic Hapludalfs
HOBERG	Fine-loamy, siliceous, active, mesic Oxyaquic Fragiudalfs
HORSECREEK	Fine-silty, mixed, active, mesic Mollic Hapludalfs
HUMANSVILLE	Fine-silty, mixed, superactive, mesic Cumulic Endoaquolls
LIBERAL	Fine, mixed, active, thermic Aquollic Hapludalfs
MCGIRK	Fine, smectitic, mesic Chromic Vertic Endoaqualfs
MOKO	Loamy-skeletal, mixed, superactive, mesic Lithic Hapludolls
MONITEAU	Fine-silty, mixed, superactive, mesic Typic Endoaqualfs
OCIE	Loamy-skeletal over clayey, mixed, semiactive, mesic Oxyaquic Hapludalfs
PEMBROKE	Fine-silty, mixed, active, mesic Mollic Paleudalfs
PERIDGE	Fine-silty, mixed, active, mesic Typic Paleudalfs
PLATO	Fine, mixed, active, mesic Aquic Fragiudalfs
POMME	Fine-loamy, mixed, semiactive, mesic Typic Paleudalfs
RACKET	Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls
SACVILLE	Fine, smectitic, mesic Vertic Argiaquolls
STURKIE	Fine-silty, mixed, superactive, mesic Cumulic Hapludolls
VIRATON	Fine-loamy, siliceous, active, mesic Oxyaquic Fragiudalfs
WILDERNESS	Loamy-skeletal, siliceous, active, mesic Oxyaquic Fragiudalfs

Accessibility Statement

The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The USDA Target Center can convert USDA information and documents into alternative formats, including Braille, large print, video description, diskette, and audiotape. For more information, visit the TARGET Center's Web site (http://www.targetcenter.dm.usda.gov/) or call (202) 720-2600 (Voice/TTY).

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).