United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
Illinois Agricultural
Experiment Station

Soil Survey of Macoupin County, Illinois

How To Use This Soil Survey

General Soil Map

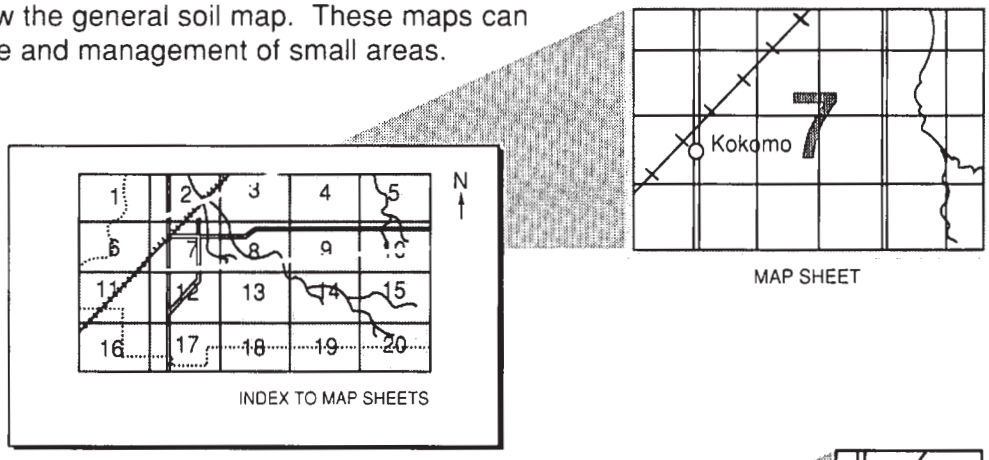
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Maps

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

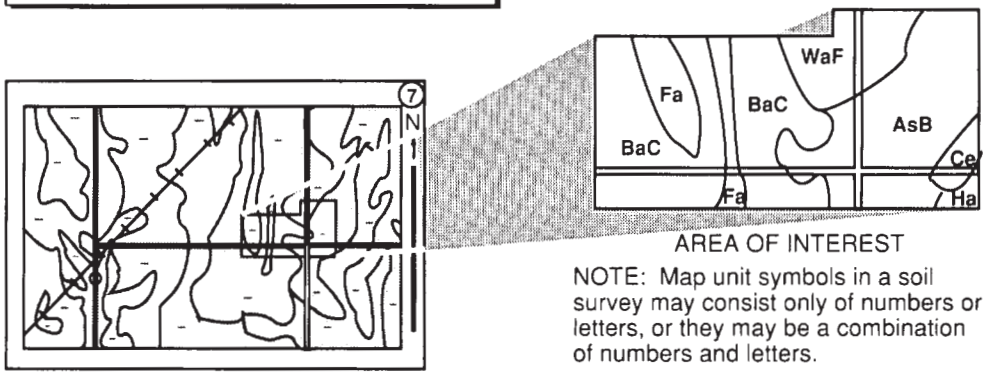
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

MAP SHEET

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



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.

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

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 Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in January 1986. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This survey was made cooperatively by the Soil Conservation Service and the Illinois Agricultural Experiment Station. It is part of the technical assistance furnished to the Macoupin County Soil and Water Conservation District. The cost of the survey was shared by the Macoupin County Board.

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.

This soil survey is Illinois Agricultural Experiment Station Soil Report No. 131. This survey supersedes the first soil survey of Macoupin County, published in 1932.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

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Foreword

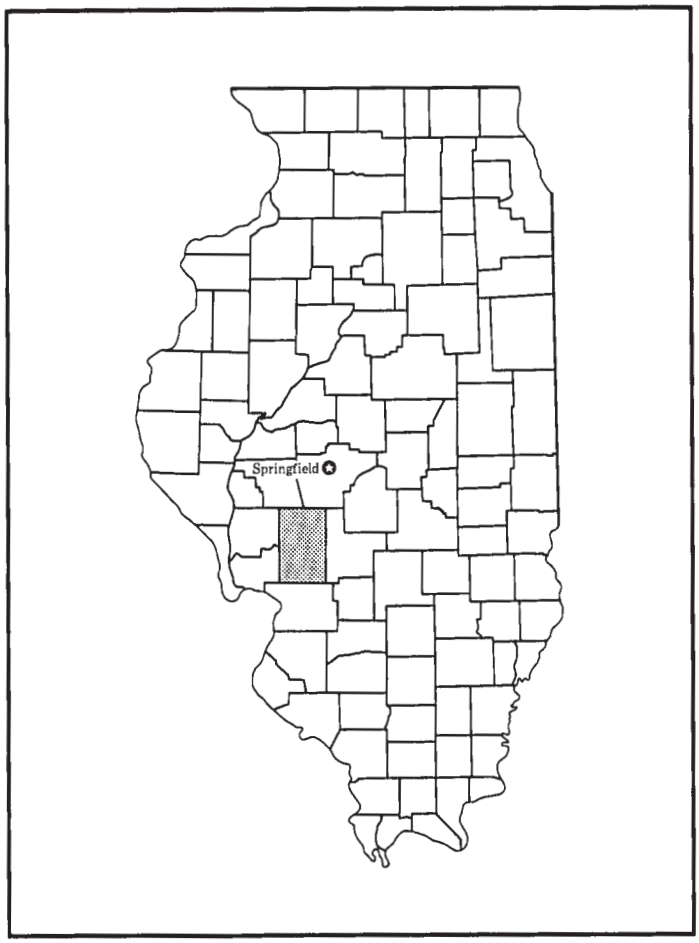
This soil survey contains information that can be used in land-planning programs in Macoupin County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, 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.

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 Soil Conservation Service or the Cooperative Extension Service.

John J. Eckes
State Conservationist
Soil Conservation Service



Location of Macoupin County in Illinois.

Soil Survey of Macoupin County, Illinois

By Mack S. Hodges, Soil Conservation Service

Fieldwork by Mack S. Hodges, Steve Fischer, Bruce Houghtby, Randy Moore, James Ritterbusch, and Larry Sabata, Soil Conservation Service, and Dennis Keene and Randy Leeper, Macoupin County

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

MACOUPIN COUNTY is in the southwestern part of Illinois. It has an area of 558,720 acres, or about 864 square miles. It is bordered on the north by Sangamon and Morgan Counties, on the east by Montgomery County, on the south by Madison County, and on the west by Jersey and Greene Counties. In 1980, the population of Macoupin County was 49,111 *(10)*. Carlinville, the county seat and the largest city, had a population of 5,439.

This soil survey updates the soil survey of Macoupin County published in 1932 *(5)*. It has larger maps that show the soils in greater detail, and it provides more recent information about the soils in the county.

General Nature of the County

The following paragraphs provide general information about the county. They describe the history and development; the natural resources; the relief, physiography, and drainage; and the climate.

History and Development

The area now known as Macoupin County was part of the Northwest Territory, which was organized by Congress in 1787. This area was once the northern part of Madison County, which was established in 1810. The area became the eastern part of Greene County in 1821, when that county was established. On January 17, 1829, Macoupin County was established. It covered 36 miles north to south and 24 miles east to west. It was made up of 24 congressional townships *(6)*.

In 1852, the Chicago and Alton Railroad was completed across the county. The completion of the railroad greatly improved communications, mail delivery, and transportation of farm produce. Towns along the railroad prospered, while those a few miles away declined.

Farming is the most important enterprise in the county. During the period 1879 to 1929, coal mining was the most important economic enterprise. It currently is of secondary importance.

The transportation facilities in Macoupin County consist of railroads, an interstate highway, and other highways. Interstate 55 runs through the southeast corner of the county, and U.S. Highway 67 runs through the southwestern part. State Highways 4, 16, 108, 111, and 159 are important transportation links. Most of the township and county roads are blacktopped. Railroads provide both passenger and freight service. They pass through the more populated areas. The county has no commercial passenger air service.

Natural Resources

Soil is the chief natural resource in Macoupin County. An estimated 3,600 farms make up about 90 percent of the total acreage *(10)*. Corn and soybeans are the major crops. Secondary farm products include wheat, hay, cattle, hogs, orchards, and timber. Most of the

soils are nearly level, but the acreage of steeper soils is considerable. Some of the most productive farmland in the state is in this county.

Woodland makes up about 78,000 acres in the county. Much of this acreage is unimproved land along the major drainageways. This land provides suitable habitat for the plentiful wildlife. More than 1,200 acres of manmade lakes and about 150 miles of streams provide opportunities for fishing and boating.

Subsurface natural resources include water, sand and gravel, and coal. Most farms are provided with water from wells drilled into aquifers. Sand and gravel are in small quantities. Coal is mined from several large underground mines.

Relief, Physiography, and Drainage

During the Pleistocene, the Illinoian glacier covered all of Macoupin County. In most areas of the county, deposits of glacial drift average 50 feet thick *(12)*. In a small area, however, the drift is as much as 200 feet thick. The loess or silt covering the drift is 50 to 100 inches thick.

After the glacier receded, the county was nearly level. As a result of geologic erosion, stream valleys and drainageways dissect the landscape. The highest elevation in the county, about 700 feet, is in Scottville Township. The lowest elevation, about 487 feet, is where Macoupin Creek leaves the county.

Macoupin Creek, Otter Creek, Cahokia Creek, Apple Creek, Sugar Creek, and their tributaries drain most of the county. About 40,000 acres adjacent to drainageways is frequently flooded for very brief or brief periods. In the flatter areas, drainage systems have been installed. These include surface ditches, waterways, and tile drains.

Climate

Prepared by the Illinois State Water Survey, Champaign, Illinois.

Table 1 gives data on temperature and precipitation for the survey area as recorded at White Hall in the period 1951 to 1980. White Hall is in Greene County, which is adjacent to Macoupin County. 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 January the average temperature is 26.8 degrees F, and the average January minimum temperature is 17.4 degrees. The lowest temperature on record, which occurred at White Hall on January 28, 1963, is -17 degrees. In summer the average temperature is 74.9 degrees, and the average summer maximum temperature is 86.3 degrees. The highest recorded temperature, which occurred at White Hall on July 14, 1954, is 111 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 33.71 inches. Of this, 22.66 inches, or about 67 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 16.7 inches. The heaviest 1-day rainfall during the period of record was 4.44 inches at White Hall on August 10, 1961.

The average seasonal snowfall is 12.9 inches. The greatest snow depth at any one time during the period of record was 18 inches.

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 in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the 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 considerable 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, soil 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 generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were 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 were 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 state with a fairly high degree of probability 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 several 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. 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 named and described 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 soil 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 the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association 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 building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

1. Ipava-Virden Association

Nearly level to gently sloping, somewhat poorly drained and poorly drained, moderately slowly permeable soils formed in loess; on uplands

This association consists of nearly level to gently sloping soils on broad ridges and broad flats in the loess-covered uplands. Slopes generally range from 0 to 5 percent.

This association makes up about 12 percent of the county. It is about 51 percent Ipava soils, 34 percent Virden soils, and 15 percent minor soils (fig. 1).

Ipava soils are somewhat poorly drained and are on broad ridges. Typically, the surface layer is very dark gray, friable silt loam about 7 inches thick. The subsurface layer is very dark gray, friable silty clay loam about 7 inches thick. The subsoil is mottled silty clay loam about 40 inches thick. The upper part is yellowish brown and firm. The next part is grayish brown, yellowish brown, and strong brown and is firm. The lower part is light brownish gray and friable. The underlying material to a depth of 60 inches or more is light brownish gray, mottled, friable silt loam.

Virden soils are poorly drained and are on broad flats below Ipava soils. Typically, the surface layer is black, friable silty clay loam about 10 inches thick. The subsurface layer is black, mottled, friable silty clay loam about 8 inches thick. The subsoil to a depth of 60 inches or more is firm, mottled silty clay loam. The upper part is dark gray. The lower part is gray.

The minor soils in this association are Assumption and Keller soils. Assumption soils are moderately well drained and are on the higher ridges. Keller soils are somewhat poorly drained and are on side slopes along drainageways below the major soils.

In most areas the major soils are used for cultivated crops. They are well suited to the cultivated crops commonly grown in the county. Organic matter content is high in both soils. Available water capacity also is high. The main management needs are measures that maintain the drainage system.

The major soils generally are poorly suited to use as sites for dwellings and septic tank absorption fields because of the seasonal high water table, a high shrink-swell potential, and the moderately slow permeability. The minor soils in the higher positions are better suited to urban development.

2. Herrick-Virden Association

Nearly level, somewhat poorly drained and poorly drained, moderately slowly permeable soils formed in loess; on uplands

This association consists of soils on low, broad ridges and broad flats in the loess-covered uplands. Slopes generally range from 0 to 2 percent.

This association makes up about 21 percent of the county. It is about 50 percent Herrick soils, 32 percent Virden soils, and 18 percent minor soils (fig. 2).

Herrick soils are somewhat poorly drained and are on broad ridges. Typically, the surface layer is very dark

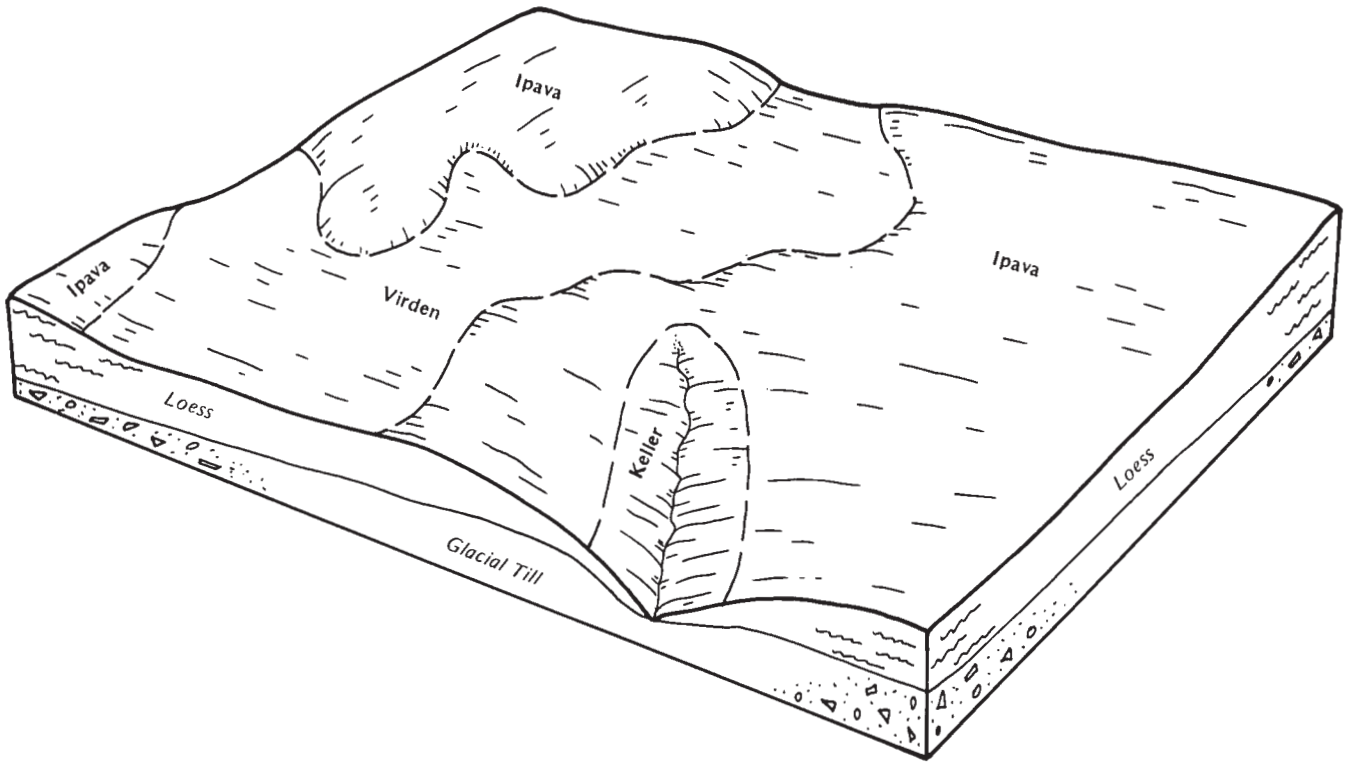


Figure 1.—Typical pattern of soils and parent material in the Ipava-Virden association.

gray, friable silt loam about 8 inches thick. The subsurface layer is very dark gray and dark grayish brown, friable silt loam about 12 inches thick. The subsoil to a depth of 60 inches or more is mottled silty clay loam. The upper part is brown and firm, the next part is grayish brown and firm, and the lower part is grayish brown and yellowish brown and is friable.

Virden soils are poorly drained and on broad flats below Herrick soils. Typically, the surface layer is black, friable silty clay loam about 10 inches thick. The subsurface layer is black, mottled, friable silty clay loam about 8 inches thick. The subsoil to a depth of 60 inches or more is firm, mottled silty clay loam. The upper part is dark gray, and the lower part is gray.

The minor soils in this association are Assumption, Harrison, and Keller soils. Assumption soils are moderately well drained, and Keller soils are somewhat poorly drained. Both of these soils are on side slopes along drainageways below Herrick soils. Harrison soils are moderately well drained and are on the higher ridges.

In most areas the major soils are used for cultivated crops. They are well suited to the cultivated crops commonly grown in the county. Organic matter content is high in Virden soils and moderate in Herrick soils. Available water capacity is high in both soils. The main management needs are measures that maintain the drainage system.

The major soils generally are poorly suited to use as sites for dwellings and septic tank absorption fields because of the seasonal high water table, a high shrink-swell potential, and the moderately slow permeability. The minor soils in the higher positions are better suited to urban development.

3. Herrick-Piasa-Virden Association

Nearly level, somewhat poorly drained and poorly drained, moderately slowly permeable or very slowly permeable soils formed in loess; on uplands

This association consists of soils on low, broad ridges and on broad flats. Herrick and Virden soils have an acid subsoil, and Piasa soils have a high content of sodium in the subsoil. Slopes generally range from 0 to 2 percent.

This association makes up about 17 percent of the

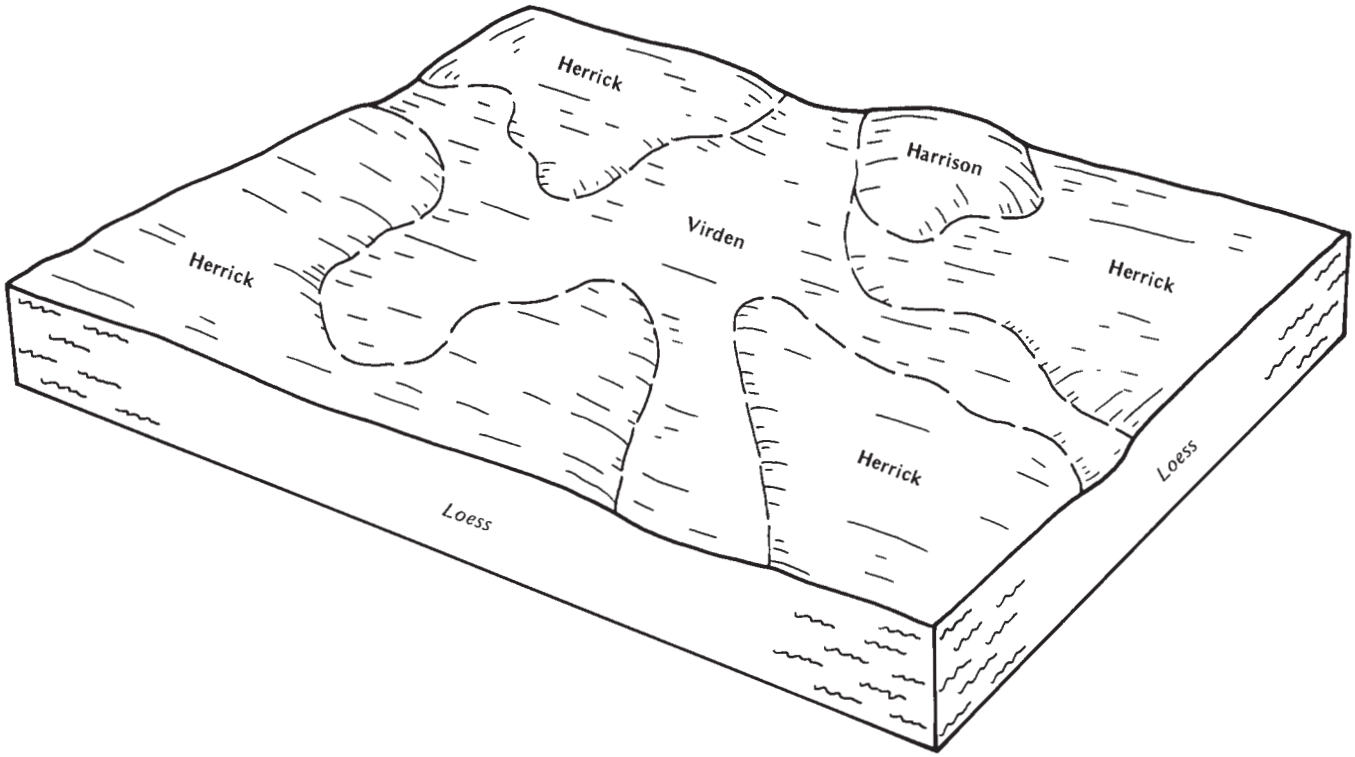


Figure 2.—Typical pattern of soils and parent material in the Herrick-Virden association.

county. It is about 45 percent Herrick soils, 16 percent Piasa soils, 15 percent Virden soils, and 24 percent minor soils (fig. 3).

Herrick soils are somewhat poorly drained and are on broad ridges. In places they are closely intermingled with areas of Piasa soils. Typically, the surface layer is very dark gray, friable silt loam about 8 inches thick. The subsurface layer is very dark gray and dark grayish brown, friable silt loam about 12 inches thick. The subsoil to a depth of 60 inches or more is mottled silty clay loam. The upper part is brown and grayish brown and is firm. The lower part is grayish brown and yellowish brown and is friable.

Piasa soils are poorly drained and are on broad flats intermingled with areas of Herrick and Virden soils. Typically, the surface layer is very dark grayish brown, friable silt loam about 7 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. It is mottled. In sequence downward, it is dark grayish brown, firm silty clay loam; grayish brown, firm silty clay loam; grayish brown and yellowish brown, firm silty clay loam; and gray, friable silt loam.

Virden soils are poorly drained and are on broad flats below Herrick soils. In places they are intermingled with areas of Piasa soils. Typically, the surface layer is black, friable silty clay loam about 10 inches thick. The subsurface layer is black, mottled, friable silty clay loam about 8 inches thick. The subsoil to a depth of 60 inches or more is firm, mottled silty clay loam. The upper part is dark gray, and the lower part is gray.

The minor soils in this association are Assumption, Cowden, and Keller soils and Orthents. Assumption soils are moderately well drained and are on ridges above the major soils. Cowden soils are poorly drained and are closely intermingled with areas of Piasa soils. Keller soils are somewhat poorly drained and are on side slopes along drainageways below the major soils. Orthents are more sloping than the major soils. They are in areas of coal mines.

In most areas the major soils are used for cultivated crops. Herrick and Virden soils are well suited to the crops commonly grown in the county, and Piasa soils are moderately suited. Organic matter content is high in Virden soils and moderate in Herrick and Piasa soils. Available water capacity is high in Herrick and Virden

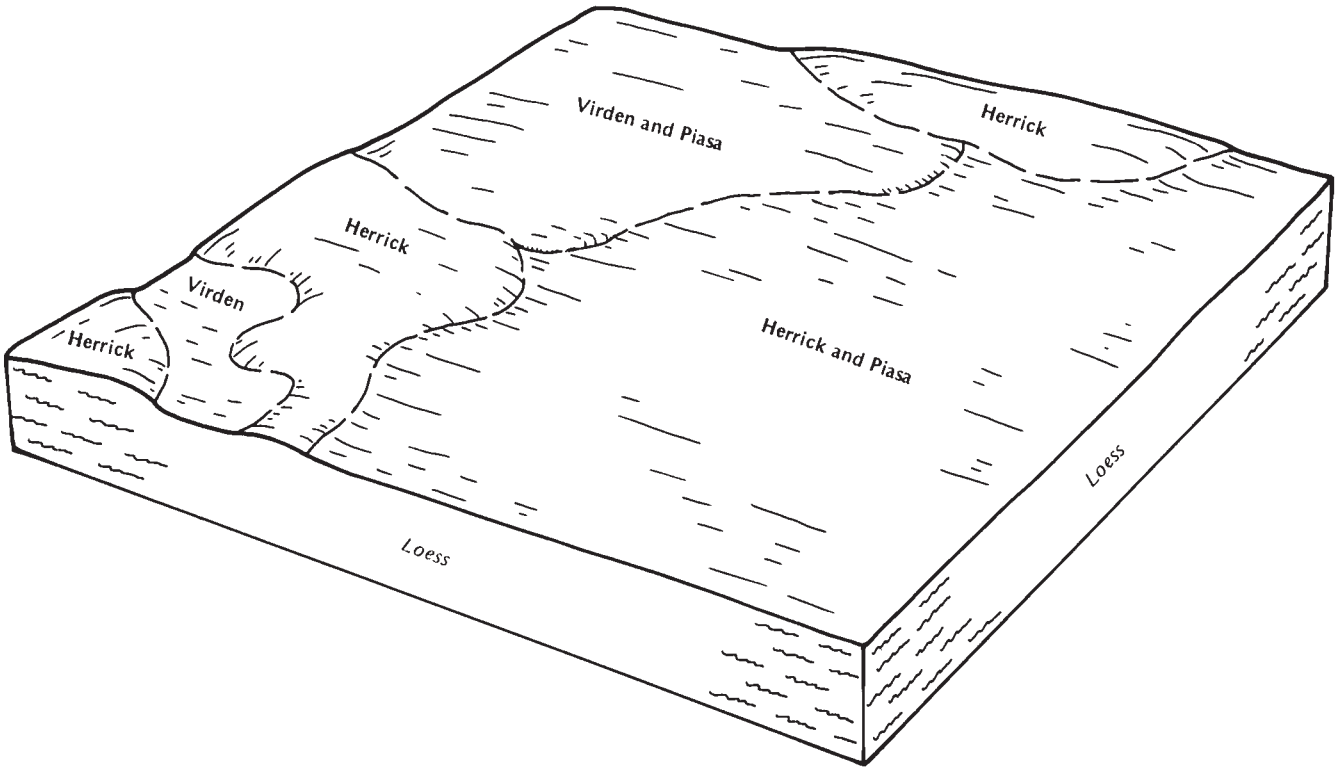


Figure 3.—Typical pattern of soils and parent material in the Herrick-Piasa-Virden association.

soils and moderate in Piasa soils. The main management needs are measures that maintain the drainage system and fertility. The high content of sodium in the subsoil of Piasa soils interferes with the uptake of some plant nutrients and causes moisture stress during dry periods.

The major soils generally are poorly suited to use as sites for dwellings and septic tank absorption fields because of the seasonal high water table, a high shrink-swell potential, and the moderately slow or very slow permeability. The minor soils in the higher positions are better suited to urban development.

4. Coffeen-Lawson-Wakeland Association

Nearly level and very gently sloping, somewhat poorly drained, moderately permeable soils formed in alluvium; on flood plains

This association consists of silty soils on flood plains along the major streams and their tributaries. The soils are subject to frequent flooding for brief periods from March through May. Slopes generally range from 0 to 3 percent.

This association makes up about 6 percent of the county. It is about 32 percent Coffeen soils, 30 percent Lawson soils, 25 percent Wakeland soils, and 13 percent minor soils.

Coffeen soils are nearly level and very gently sloping. Typically, the surface layer is very dark grayish brown, mottled silt loam about 8 inches thick. The subsurface layer is very dark grayish brown, friable silt loam about 10 inches thick. The subsoil is about 18 inches thick. It is grayish brown, mottled, friable silt loam. The underlying material to a depth of 60 inches or more is grayish brown, mottled, friable silt loam.

Lawson soils are nearly level. Typically, the surface layer is very dark gray, friable silt loam about 7 inches thick. The subsurface layer is very dark gray, dark brown, and very dark grayish brown, friable silt loam about 28 inches thick. The underlying material to a depth of 60 inches or more is grayish brown, mottled, friable silt loam.

Wakeland soils are nearly level. Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The underlying material extends to a depth of 60 inches or more. It is stratified dark grayish

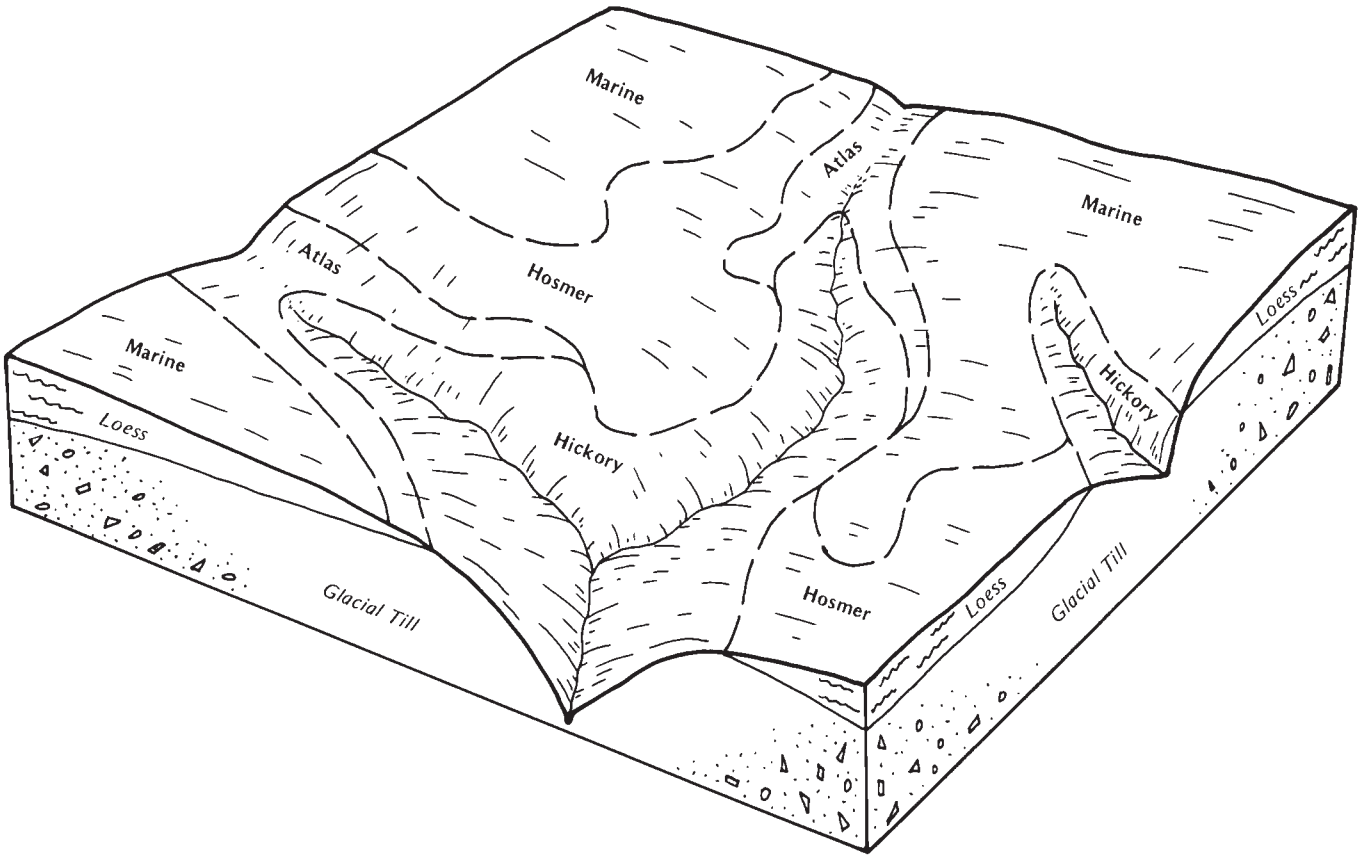


Figure 4.—Typical pattern of soils and parent material in the Hickory-Marine-Hosmer association.

brown, brown, grayish brown, and dark gray, mottled silt loam.

The minor soils in this association are Colo, Hickory, Otter, and Ross soils. Hickory soils are well drained and are on side slopes above flood plains. Colo and Otter soils are poorly drained and are in the lower positions on flood plains. Ross soils are well drained and are in the slightly higher positions or in positions similar to those of the major soils.

This association commonly is used for cultivated crops. It is subject to only occasional flooding during the growing season. The soils are well suited to the cultivated crops commonly grown in the county. Organic matter content is moderately low in Wakeland soils, moderate in Coffeen soils, and high in Lawson soils. Available water capacity is very high in all the major soils. The main management needs are measures that protect crops from the damage caused by floodwater, maintain the drainage system, and maintain fertility.

The major soils generally are unsuited to use as sites for dwellings and septic tank absorption fields because flooding is a hazard.

5. Hickory-Marine-Hosmer Association

Nearly level to very steep, well drained to somewhat poorly drained, moderately permeable, slowly permeable, or very slowly permeable soils formed in glacial till or in loess; on uplands

This association consists of nearly level to gently sloping soils on ridgetops and gently sloping to very steep soils on side slopes. Small drainageways are common. Slopes generally range from 0 to 60 percent.

This association makes up about 20 percent of the county. It is about 36 percent Hickory soils, 27 percent Marine soils, 17 percent Hosmer soils, and 20 percent minor soils (fig. 4).

Hickory soils are well drained and are strongly sloping to very steep. They formed in glacial till on side slopes. Typically, the surface layer is very dark grayish

brown, friable silt loam or loam about 4 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 5 inches thick. The subsoil is about 36 inches thick. In sequence downward, it is yellowish brown, friable silt loam; yellowish brown, firm clay loam; and mottled light brownish gray and strong brown, firm clay loam. The underlying material to a depth of 60 inches or more is mottled grayish brown and strong brown, firm gravelly sandy clay loam.

Marine soils are somewhat poorly drained and nearly level. They formed in loess on broad ridgetops. Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is light brownish gray, mottled, friable silt loam about 3 inches thick. The subsoil extends to a depth of 60 inches or more. In sequence downward, it is brown, mottled, friable silty clay loam; pale brown and light yellowish brown, mottled, firm silty clay; pale brown, mottled, firm silty clay loam; and light brownish gray, mottled, friable silt loam.

Hosmer soils are moderately well drained and gently sloping. They formed in loess on ridgetops and side slopes above Hickory soils. Typically, the surface layer is dark grayish brown, friable silt loam about 6 inches thick. The subsurface layer is dark grayish brown and brown, friable silt loam about 9 inches thick. The subsoil is about 35 inches of brown silt loam and silty clay loam. The upper part is friable. The lower part is mottled and is firm and brittle. The underlying material to a depth of 60 inches or more is light brownish gray, mottled, friable silt loam.

The minor soils in this association are Atlas, Fishhook, Lawson, and Wakeland soils. Atlas and Fishhook soils are somewhat poorly drained. They are on side slopes. Lawson and Wakeland soils are on narrow flood plains below the major soils.

The nearly level and gently sloping ridgetops and the gently sloping and moderately sloping side slopes generally have been cleared of trees and are used for cultivated crops. The steeper side slopes are used as woodland or pasture.

The major soils generally are suited to woodland. The nearly level and gently sloping areas are well suited to cultivated crops, pasture, and hay. Organic matter content is moderately low in all the major soils. Available water capacity is high in Hickory and Marine soils and moderate in Hosmer soils. The main management needs in the nearly level and gently sloping areas used as cropland are measures that control erosion or maintain the drainage system and measures that maintain fertility. The main management needs in the moderately sloping to very steep areas are measures that control erosion and maintain fertility. In areas used as woodland, the steep and very steep slopes limit the use of equipment.

The strongly sloping Hickory soils are only moderately suited to use as sites for dwellings and septic tank absorption fields because of a high shrink-swell potential, the moderate permeability, and the slope, and the moderately steep to very steep Hickory soils are poorly suited because of the slope. Marine soils are poorly suited to these uses because of the slow permeability, a high shrink-swell potential, and the seasonal high water table. Hosmer soils are poorly suited to use as sites for septic tank absorption fields and only moderately suited to use as sites for dwellings because of the seasonal high water table, the very slow permeability, and a moderate shrink-swell potential.

6. Hickory-Rozetta-Keomah Association

Nearly level to very steep, well drained to somewhat poorly drained, moderately permeable or moderately slowly permeable soils formed in glacial till or in loess; on uplands

This association consists of nearly level and gently sloping soils on ridgetops and gently sloping to very steep soils on side slopes. Small drainageways are common. Slopes generally range from 0 to 60 percent.

This association makes up about 24 percent of the county. It is about 35 percent Hickory soils, 26 percent Rozetta soils, 19 percent Keomah soils, and 20 percent minor soils.

Hickory soils are well drained and are strongly sloping to very steep. They formed in glacial till on side slopes. Typically, the surface layer is very dark grayish brown, friable silt loam or loam about 4 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 5 inches thick. The subsoil is about 36 inches thick. In sequence downward, it is yellowish brown, friable silt loam; yellowish brown, firm clay loam; and mottled light brownish gray and strong brown, firm clay loam. The underlying material to a depth of 60 inches or more is mottled grayish brown and strong brown, firm gravelly sandy clay loam.

Rozetta soils are moderately well drained and are gently sloping on ridgetops and gently sloping and moderately sloping on side slopes above Hickory soils. They formed in loess. Typically, the surface layer is dark grayish brown, friable loam about 6 inches thick. The subsurface layer is yellowish brown, friable silt loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown, mottled, friable silty clay loam. The next part is

yellowish brown and strong brown, mottled, firm silty clay loam. The lower part is multicolored, friable silty clay loam and silt loam.

Keomah soils are somewhat poorly drained and nearly level. They formed in loess on ridges above Hickory and Rozetta soils. Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is grayish brown, friable silt loam about 8 inches thick. The subsoil is about 34 inches thick. It is mottled. The upper part is brown, friable silt loam. The next part is brown, dark grayish brown, light yellowish brown, and yellowish brown, firm silty clay loam. The lower part is light brownish gray, firm silty clay loam. The underlying material to a depth of 60 inches or more is light gray, mottled, friable silt loam.

The minor soils in this association are Atlas, Fishhook, Lawson, and Wakeland soils. Atlas and Fishhook soils are somewhat poorly drained and are on side slopes below Rozetta soils and above Hickory soils. Lawson and Wakeland soils are somewhat poorly drained and are on narrow flood plains below the major soils.

The nearly level and gently sloping ridgetops and the gently sloping and moderately sloping side slopes generally have been cleared of trees and are used for cultivated crops or pasture. The steeper side slopes mainly are used as woodland.

The major soils are well suited to woodland. The nearly level and gently sloping areas are well suited to the cultivated crops commonly grown in the county. Organic matter content is moderately low in all the major soils. Available water capacity is very high in Rozetta soils and moderate in Hickory and Keomah soils. In the nearly level and gently sloping areas used as cropland, the main management needs are measures that control erosion or maintain the drainage system and measures that maintain fertility. In the moderately sloping to very steep areas, the main management needs are measures that control erosion and maintain fertility. In areas used as woodland, the steep and very steep slopes restrict the use of equipment.

The strongly sloping Hickory soils are only moderately suited to use as sites for dwellings and septic tank absorption fields because of the shrink-swell potential, the moderate permeability, and the slope, and the steep and very steep Hickory soils generally are unsuited because of the slope. Rozetta soils are only moderately suited to these uses because of the seasonal high water table, the moderate permeability, and the shrink-swell potential, and Keomah soils are poorly suited because of the slow permeability, a high shrink-swell potential, and the seasonal high water table.

Broad Land Use Considerations

The soils in Macoupin County vary widely in their suitability for major land uses. About 71 percent of the acreage is used for cultivated crops, 10 percent is used for hay and pasture, and 14 percent is used as woodland. About 5 percent is in towns, villages, and suburbs or in areas covered by industrial buildings or highways *(10, 11)*.

Soybeans, corn, and wheat are grown most extensively in associations 1 to 4. These associations generally are moderately suited or well suited to cultivated crops. The main limitation is the seasonal high water table in Ipava, Herrick, Virden, Piasa, Coffeen, and other soils in these associations. Also, flooding may occasionally damage crops on soils in association 4. Piasa soils have a high content of sodium in the subsoil. The sodium lowers yields and increases the hazard of erosion.

Much of the acreage used for hay and pasture in the county is in associations 5 and 6. The Keomah, Marine, Rozetta, and Hosmer soils in these associations are well suited to hay and pasture. The slope limits the suitability of Hickory soils.

Most of the woodland in the county is in associations 4 to 6. The soils in these associations are moderately suited or well suited to woodland. The main management concerns are controlling erosion and plant competition. In moderately steep to very steep areas of Hickory soils, the equipment limitation is moderate or severe because of the slope.

A few areas in the county are developed or built up for urban uses. In general, the gently sloping Rozetta soils and the strongly sloping Hickory soils have the best potential for these uses. These soils are mainly in association 6. Most of the other major soils in the county are limited by the slope, a seasonal high water table, restricted permeability, a high shrink-swell potential, a high potential for frost action, or low strength. The soils in association 4 are on flood plains and are generally unsuitable for urban development because of flooding.

The suitability of the associations for recreational uses ranges from good to poor, depending on the intensity of the expected use. Association 4 is poorly suited to many recreational uses because of flooding. Virden and Piasa soils are poorly suited to most recreational uses because of ponding. These soils are

mainly in associations 1 to 3. Small areas that are suitable for intensive recreational uses generally are available in associations that generally are poorly suited to these uses.

The suitability for the development of wildlife habitat is generally good throughout the county. Associations 1, 2, 4, 5, and 6 are well suited to both openland and woodland wildlife habitat. Piasa soils, which are mainly in association 3, are poorly suited to openland and woodland wildlife habitat, but the other major soils in this association are well suited to these kinds of wildlife habitat. Associations 2 and 3 are well suited to the development of habitat for wetland wildlife.

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 "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, Atlas silt loam, 5 to 10 percent slopes, eroded, is a phase of the Atlas 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, or one or more soils and a miscellaneous area, 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. Virden-Piasa complex 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. Dumps, mine, 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.

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

6B2—Fishhook silt loam, 2 to 5 percent slopes, eroded. This gently sloping, somewhat poorly drained soil is on the side slopes of drainageways in the uplands. Individual areas are irregular in shape and range from 2 to 20 acres.

Typically, the surface layer is yellowish brown, friable silt loam. It is mixed with brown subsoil material. Water erosion has thinned the surface layer to a thickness of about 7 inches. The subsoil extends to a depth of 60 inches or more. The upper part is brown and grayish brown, mottled, friable silt loam and silty clay loam. The lower part is dark gray and light gray, mottled, firm loam and clay loam. In some areas the firm part of the subsoil is higher or lower in the profile. In places the surface layer is thinner.

Included with this soil in mapping are small areas of the somewhat poorly drained Herrick and Keller soils. These soils are upslope from the Fishhook soil. Also included are the well drained Hickory soils on the side slopes of drainageways below the Fishhook soil.

Included soils make up 5 to 15 percent of the unit.

Water and air move through the Fishhook soil at a slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is perched 1 to 3 feet below the surface in spring. Available water capacity is high. Organic matter content is low. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to pasture and hay. It is moderately suited to cultivated crops and to use as woodland. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, further water erosion is a hazard. Contour farming, a system of conservation tillage that leaves crop residue on the surface after planting, and terraces help to control erosion.

Establishing pasture plants or hay helps to prevent excessive water erosion. Orchardgrass, tall fescue, and alfalfa are suited to this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

If this soil is used as a site for dwellings, the seasonal high water table and shrink-swell potential are limitations. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile drains at the base of the foundation helps to lower the seasonal high water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and slow permeability are limitations. Underground drains help to lower the water table. Enlarging the absorption area improves the absorption of liquid waste.

The land capability classification is IIIe.

6C2—Fishhook silty clay loam, 5 to 10 percent slopes, eroded. This moderately sloping, somewhat poorly drained soil is on the side slopes of drainageways in the uplands. Individual areas are irregular in shape and range from 2 to 30 acres.

Typically, the surface layer is dark yellowish brown, friable silty clay loam. It is mixed with grayish brown subsoil material. Water erosion has thinned the surface layer to a thickness of about 5 inches. The subsoil extends to a depth of more than 60 inches. The upper part is grayish brown, mottled, friable silty clay loam. The lower part is gray, mottled, firm clay loam. In some areas the surface layer is thicker and is silt loam. In other areas the firm part of the subsoil is higher or lower in the profile.

Included with this soil in mapping are small areas of the dark colored Herrick soils. These soils are on broad uplands above the Fishhook soil. Also included are small areas of the well drained Hickory soils on the side slopes of drainageways below the Fishhook soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the Fishhook soil at a slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is perched 1 to 3 feet below the surface in spring. Available water capacity is high. Organic matter content is low. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to pasture and hay. It is moderately suited to cultivated crops and to use as woodland. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

In areas used for corn, soybeans, or small grain, further water erosion is a hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces help to control water erosion and maintain soil productivity.

If this soil is used as woodland, the windthrow hazard and plant competition are management concerns because of a high content of clay. To reduce the windthrow hazard, harvesting methods that do not leave isolated or widely spaced trees are needed. Removing only high-value trees from a 50-foot-wide strip along the west and south edges of the woodland also reduces this hazard. The competition from undesirable vegetation in openings created by timber harvesting operations can be controlled by chemical or mechanical means. Restricted grazing helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots. Measures that protect the woodland from fire are needed.

Establishing pasture plants or hay helps to prevent excessive water erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition and control erosion.

If this soil is used as a site for dwellings, the seasonal high water table and shrink-swell potential are

limitations. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile drains at the base of the foundation helps to lower the seasonal high water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and slow permeability are limitations. Underground drains help to lower the seasonal high water table. Enlarging the absorption area improves the absorption of liquid waste.

The land capability classification is IIIe.

7C2—Atlas silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, somewhat poorly drained soil is on the side slopes of drainageways in the uplands. Individual areas are irregular in shape and range from 2 to 40 acres.

Typically, the surface layer is brown, friable silt loam. Water erosion has thinned the surface layer to a thickness of about 7 inches. The subsoil extends to a depth of more than 60 inches. The upper part is light yellowish brown, mottled, firm silty clay loam. The next part is olive brown, mottled, firm clay loam. The lower part is olive gray, mottled, firm clay loam. In some areas the surface layer is thinner and is silty clay loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Keomah and Marine soils and the well drained Hickory soils. Keomah and Marine soils formed in loess and are on broad ridges above the Atlas soil. Hickory soils are on the side slopes of drainageways below the Atlas soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the Atlas soil at a very slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is perched 1 to 2 feet below the surface in spring. Available water capacity is moderate. Organic matter content is moderately low. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to pasture and hay. It is moderately suited to cultivated crops and to use as woodland. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, further water erosion is a hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces help to control water erosion and maintain soil productivity.

Establishing pasture plants or hay helps to prevent excessive water erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition and control erosion.

If this soil is used as woodland, seedling mortality and the windthrow hazard are management concerns because of a high content of clay. The seedling mortality rate can be reduced by planting species that can tolerate excess moisture. To reduce the windthrow hazard, harvesting methods that do not leave isolated or widely spaced trees are needed. Removing only high-value trees from a 50-foot-wide strip along the west and south edges of the woodland also reduces this hazard. Restricted grazing helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots. Measures that protect the woodland from fire are needed.

If this soil is used as a site for dwellings, the seasonal high water table and shrink-swell potential are limitations. Installing tile lines around the base of foundations helps to lower the seasonal high water table. Reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

The seasonal high water table and very slow permeability are limitations if this soil is used as a site for septic tank absorption fields. Septic tank systems can function satisfactorily if a sealed sand filter and a disinfection tank or an evapotranspiration bed are installed. Sewage lagoons work well if the site has been leveled.

The land capability classification is IIIe.

7C3—Atlas silty clay loam, 5 to 10 percent slopes, severely eroded. This moderately sloping, somewhat poorly drained soil is on the side slopes of drainageways in the uplands. In most areas water erosion has removed nearly all of the original surface layer, and tillage has mixed the rest with the upper part of the subsoil. Individual areas are irregular in shape and range from 2 to 20 acres.

Typically, the surface layer is yellowish brown, friable silty clay loam about 3 inches thick. The subsoil to a depth of 60 inches or more is mottled, firm clay loam. The upper part is yellowish brown and gray. The lower part is strong brown and light gray. In some areas the surface layer is thicker and darker. In other areas the upper part of the subsoil contains less sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Keomah and Marine soils

and the well drained Hickory soils. Keomah and Marine soils formed in loess and are on broad ridges above the Atlas soil. Hickory soils are on the side slopes of drainageways below the Atlas soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the Atlas soil at a very slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is perched at a depth of 1 to 2 feet in spring. Available water capacity is moderate. Organic matter content is low. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is moderately suited to pasture and hay. It is poorly suited to cultivated crops and to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn or soybeans, further water erosion is a severe hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces help to control water erosion and maintain soil productivity. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake.

Establishing pasture plants or hay helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Deferred grazing helps to prevent surface compaction, excessive runoff, and excessive erosion. When a seedbed is prepared in pastured areas, contour farming also helps to prevent excessive runoff and erosion.

If this soil is used as woodland, seedling mortality and the windthrow hazard are management concerns. The seedling mortality rate can be reduced by selecting planting stock that is older and larger than is typical and by mulching. Replanting may be needed in some areas. Harvesting methods that do not isolate the remaining trees or leave them widely spaced reduce the windthrow hazard. Removing only high-value trees from a strip 50 feet wide along the west and south edges of the woodland also reduces this hazard. Excluding livestock from the woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots. Measures that prevent fire are needed.

If this soil is used as a site for dwellings, the seasonal high water table and shrink-swell potential are limitations. Installing subsurface tile drains near foundations helps to lower the seasonal high water table. Extending footings below the subsoil or reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling.

The seasonal high water table and very slow permeability are limitations if this soil is used as a site for septic tank absorption fields. Septic tank systems can function satisfactorily if a sealed sand filter and a disinfection tank or an evapotranspiration bed are installed. Sewage lagoons work well if the site has been leveled.

The land capability classification is IVe.

7D2—Atlas silt loam, 10 to 15 percent slopes, eroded. This strongly sloping, somewhat poorly drained soil is on the side slopes of drainageways in the uplands. Individual areas are irregular in shape and range from 2 to 30 acres.

Typically, the surface layer is dark brown, friable silt loam. Water erosion has thinned the surface layer to a thickness of about 7 inches. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown, mottled, firm silty clay loam, and the lower part is light brownish gray, mottled, firm clay loam. In some areas the surface layer is thinner. In other areas the upper part of the subsoil has less sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Keomah and Marine soils and the well drained Hickory soils. Keomah and Marine soils are in nearly level areas above the Atlas soil. Hickory soils are on the side slopes of drainageways below the Atlas soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the Atlas soil at a very slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is perched at a depth of 1 to 2 feet in spring. Available water capacity is moderate. Organic matter content is moderately low. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is moderately suited to pasture and hay and to use as woodland. It is poorly suited to cultivated crops and to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn or soybeans, further water erosion is a hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces help to control water erosion and maintain soil productivity. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water infiltration.

Establishing pasture or hay helps to control erosion. Orchardgrass, bromegrass, tall fescue, and alfalfa are suited to this soil. Deferred grazing helps to prevent surface compaction, excessive runoff, and excessive erosion. When a seedbed is prepared in pastured areas, contour farming also helps to prevent excessive runoff and erosion.

If this soil is used as woodland, seedling mortality and the windthrow hazard are management concerns. The seedling mortality rate can be reduced by selecting planting stock that is older and larger than is typical and by mulching. Replanting may be needed in some areas. Harvesting methods that do not isolate the remaining trees or leave them widely spaced reduce the windthrow hazard. Removing only high-value trees from a strip 50 feet wide along the west and south edges of the woodland also reduces this hazard. Excluding livestock from the woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots. Measures that prevent fire are needed.

If this soil is used as a site for dwellings, the seasonal high water table, shrink-swell potential, and slope are limitations. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling. Cutting, filling, and land shaping help to reduce the slope.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table, very slow permeability, and slope are limitations. Septic tank systems can work well if a sealed sand filter and a disinfection tank or an evapotranspiration bed are installed and the site has been leveled.

The land capability classification is IVe.

7E2—Atlas silt loam, 15 to 20 percent slopes, eroded. This moderately steep, somewhat poorly drained soil is on the side slopes of drainageways in the uplands. Individual areas are irregular in shape and range from 2 to 20 acres.

Typically, the surface layer is brown, friable silt loam. Water erosion has thinned the surface layer to a thickness of about 5 inches. The subsoil is about 50 inches thick. The upper part is dark yellowish brown, mottled, firm silty clay loam. The next part is strong brown, mottled, firm clay loam. The lower part is light grayish brown, mottled, firm clay loam. The underlying material to a depth of 60 inches or more is strong brown and light grayish brown, mottled, firm clay loam. In some areas the surface layer is thinner or thicker.

Included with this soil in mapping are small areas of the moderately well drained Rozetta and Elco soils and the well drained Fayette and Hickory soils. Elco, Fayette, and Rozetta soils are on the side slopes of drainageways and on ridges above the Atlas soil. Hickory soils are on the side slopes of drainageways below the Atlas soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the Atlas soil at a very slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is perched at a depth of 1 to 2 feet in spring. Available water capacity is moderate. Organic matter content is moderately low. The shrink-swell potential and the potential for frost action are high.

Most areas are used for cultivated crops. Some areas are used for pasture. This soil is well suited to use as habitat for woodland wildlife. It is moderately well suited to use as woodland. It generally is unsuited to cultivated crops because water erosion is a hazard. Cultivated areas should be seeded to pasture or hay or planted to trees. The soil is poorly suited to pasture and hay. It generally is unsuited to use as a site for dwellings and septic tank absorption fields because of the slope.

In pastured areas measures that control water erosion are needed when grasses and legumes are becoming established. Interseeding legumes by a no-till seeding method and seeding on the contour improve forage quality and help to control erosion. A permanent cover of pasture plants helps to control water erosion and maintains tilth. Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Proper stocking rates, rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition.

If this soil is used as woodland, the hazard of water erosion and the equipment limitation are management concerns because of the slope. Laying out logging roads and skid trails on the contour helps to control erosion. On the steeper slopes, skidding logs or trees uphill with a cable and winch also helps to control erosion. Grass firebreaks, instead of bare soil, are needed because of the erosion hazard. Bare logging areas should be seeded to grass or a grass-legume mixture. Machinery should be used only during periods when the soil is firm enough to support its weight. Excluding livestock from woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots.

In the areas used as habitat for woodland wildlife, excluding livestock helps to prevent the depletion of

shrubs and sprouts. The shrubs and sprouts provide food and cover for such woodland wildlife as deer, squirrels, and songbirds. Hedges and rows of shrubs provide cover for doves and many songbirds.

The land capability classification is VIe.

8D2—Hickory loam, 10 to 15 percent slopes, eroded. This strongly sloping, well drained soil is on short, uneven side slopes in the uplands. Individual areas are irregular in shape and range from 5 to 60 acres.

Typically, the surface layer is brown, friable loam. Water erosion has thinned the surface layer to a thickness of about 8 inches. The subsoil is yellowish brown, firm clay loam about 34 inches thick. It is mottled in the lower part. The underlying material to a depth of 60 inches or more is grayish brown, mottled, firm loam. In some areas the surface layer is thicker and is silt loam. In places the subsoil has a higher content of clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Lawson and Coffeen soils and the moderately well drained Terril and Rozetta soils. Lawson and Coffeen soils are on flood plains below the Hickory soil. Terril soils are on foot slopes below the Hickory soil. Rozetta soils are in less sloping areas above the Hickory soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the Hickory soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential and the potential for frost action are moderate.

Most areas are used for pasture. Some areas are used for cultivated crops. This soil is well suited to pasture and hay and to use as woodland. It is moderately suited to cultivated crops and to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, water erosion is a hazard. A conservation tillage system that leaves crop residue on the surface after planting, contour farming, terraces, or a combination of these helps to control erosion.

Establishing pasture plants or hay helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Rotation grazing and deferred grazing help to prevent surface compaction and excessive runoff. When a seedbed is prepared on pasture or hayland, contour farming helps to prevent excessive runoff and erosion.

If this soil is used as woodland, plant competition is a management concern. It suppresses the growth of desirable seedlings. In openings where timber has been harvested, it can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots. Measures that prevent fire are needed.

If this soil is used as a site for dwellings, the shrink-swell potential and slope are limitations. Cutting and filling help to overcome the slope. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, the slope and moderate permeability are limitations. Enlarging the absorption area improves the absorption of liquid waste. Installing the filter lines on the contour helps to overcome the slope.

The land capability classification is IIIe.

8E2—Hickory loam, 15 to 20 percent slopes, eroded. This moderately steep, well drained soil is on the side slopes of drainageways in the uplands. Individual areas are irregular in shape and range from 3 to 100 acres.

Typically, the surface layer is dark brown, friable loam. Water erosion has thinned the surface layer to a thickness of about 6 inches. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown, friable loam. The next part is yellowish brown, mottled, firm clay loam. The lower part is light brownish gray, firm clay loam. In some areas the surface layer is silt loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Wakeland and Coffeen soils on flood plains and the moderately well drained Terril soils on foot slopes. Also included are the somewhat poorly drained Keomah and moderately well drained Rozetta soils in nearly level areas above the Hickory soil. Included soils make up 3 to 15 percent of the unit.

Water and air move through the Hickory soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential and the potential for frost action are moderate.

In most areas this soil is used for pasture. It is well suited to use as woodland and moderately suited to pasture and hay. It is poorly suited to cultivated crops and to use as a site for dwellings and septic tank absorption fields.

In pastured areas measures that control water erosion are needed when grasses and legumes are

becoming established. Seeding legumes on the contour improves forage quality and helps to control water erosion. A permanent cover of pasture plants helps to control erosion and maintains tilth. Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Proper stocking rates, pasture rotation, deferred grazing, and applications of fertilizer help to keep the pasture in good condition.

If this soil is used as woodland, the main management concerns are the hazard of water erosion and the equipment limitation caused by the slope. Also, plant competition suppresses the growth of desirable seedlings. In openings where timber has been harvested, it can be controlled by chemical or mechanical means. Laying out logging roads and skid trails on the contour helps to control erosion. On the steeper slopes, skidding logs or trees uphill with a cable and winch also helps to control erosion. Grass firebreaks, instead of bare soil, are needed because of the erosion hazard. Bare logging areas should be seeded to grass or a grass-legume mixture. Machinery should be used only during periods when the soil is firm enough to support its weight. Excluding livestock from the woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots.

If this soil is used as a site for dwellings, the moderately steep slope is the major limitation. Cutting and filling helps to overcome this limitation.

The moderate permeability and slope are limitations if this soil is used as a site for septic tank absorption fields. Increasing the size of the absorption field improves the absorption of liquid waste. Installing the filter lines on the contour or cutting and land shaping help to overcome the slope.

The land capability classification is IVe.

8F—Hickory silt loam, 20 to 30 percent slopes. This steep, well drained soil is on the side slopes of drainageways in the uplands. Individual areas are long and narrow or irregular in shape and range from 10 to 200 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 4 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 5 inches thick. The subsoil is about 36 inches thick. In sequence downward, it is yellowish brown, friable silt loam; yellowish brown, firm clay loam; yellowish brown, mottled, firm clay loam; and mottled light brownish gray and strong brown, firm clay loam. The underlying material to a depth of 60 inches or more is mottled grayish brown and strong brown, firm gravelly sandy clay loam. In some of the more eroded areas, the surface layer contains more sand and clay. In places, the subsoil is thinner and calcareous underlying material is within a depth of 40 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Coffeen, Lawson, and Wakeland soils. These soils are on flood plains below the Hickory soil. Also included are small areas of the well drained Fayette and moderately well drained Rozetta and Hosmer soils on gently sloping shoulder slopes and narrow ridges above the Hickory soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the Hickory soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential and the potential for frost action are moderate.

In most areas this soil is used as woodland. It is well suited to use as woodland and as habitat for woodland wildlife. It is poorly suited to pasture and hay. It generally is unsuited to cultivated crops and to use as a site for dwellings and septic tank absorption fields because of the slope and the hazard of water erosion.

If this soil is used as woodland, the main management concerns are the hazard of water erosion and the equipment limitation caused by the slope. Also, plant competition suppresses the growth of desirable seedlings. In openings where timber has been harvested, it can be controlled by chemical or mechanical means. Laying out logging roads and skid trails on the contour helps to prevent excessive runoff and erosion. On the steeper slopes, skidding logs or trees uphill with a cable and winch also helps to prevent excessive runoff and erosion. Grass firebreaks, instead of bare soil, are needed because of the erosion hazard. Bare areas should be seeded to grass or a grass-legume mixture. Machinery should be used only during periods when the soil is firm enough to support its weight. Excluding livestock from the woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots.

Areas used as habitat for woodland wildlife should be protected from fire and grazing. Adequate stands of herbaceous cover can be maintained, but the steep slope and low fertility limit the yields of grain and seed crops.

The land capability classification is VIe.

8F2—Hickory loam, 20 to 30 percent slopes, eroded. This steep, well drained soil is on the side slopes of drainageways in the uplands. Individual areas

are long and narrow or irregular in shape and range from 10 to 200 acres.

Typically, the surface layer is dark grayish brown, friable loam. Water erosion has thinned the surface layer to a thickness of about 8 inches. The subsoil is clay loam about 36 inches thick. The upper part is dark grayish brown and yellowish brown and is friable. The next part is brown, mottled, and firm. The lower part is grayish brown and yellowish brown, mottled, and firm. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm clay loam. In places, the subsoil is thinner and calcareous underlying material is within a depth of 40 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Coffeen, Lawson, and Wakeland soils. These soils are on flood plains below the Hickory soil. Also included are small areas of the well drained Fayette and moderately well drained Rozetta and Hosmer soils on gently sloping shoulder slopes and narrow ridges above the Hickory soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the Hickory soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential and the potential for frost action are moderate.

Most areas are used as pasture. The pastured areas either have been cleared of trees or have very little understory vegetation. This soil is well suited to use as woodland and as habitat for woodland wildlife. It is poorly suited to pasture and hay. It generally is unsuited to cultivated crops and to use as a site for dwellings and septic tank absorption fields because of the slope.

If this soil is used as woodland, the main management concerns are the hazard of water erosion and the equipment limitation caused by the slope. Also, plant competition suppresses the growth of desirable seedlings. In openings where timber has been harvested, it can be controlled by chemical or mechanical means. Laying out logging roads and skid trails on the contour helps to prevent excessive runoff and erosion. On the steeper slopes, skidding logs or trees uphill with a cable and winch also helps to prevent excessive runoff and erosion. Grass firebreaks, instead of bare soil, are needed because of the erosion hazard. Bare areas should be seeded to grass or a grass-legume mixture. Machinery should be used only during periods when the soil is firm enough to support its weight. Excluding livestock from the woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots.

Areas used as habitat for woodland wildlife require protection from fire and grazing. Adequate stands of herbaceous cover can be established and maintained, but the steep slope and low fertility limit the yields of grain and seed crops.

The land capability classification is VIe.

8G—Hickory silt loam, 30 to 60 percent slopes. This very steep, well drained soil is on the side slopes of drainageways in the uplands. Individual areas are irregular in shape and range from 5 to 100 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 4 inches thick. The subsurface layer is grayish brown, friable silt loam about 7 inches thick. The subsoil is about 33 inches thick. It is brown and yellowish brown. The upper part is friable loam. The lower part is friable clay loam. The underlying material to a depth of 60 inches or more is dark yellowish brown, firm, calcareous clay loam. In some areas the surface layer is loam. In other areas, the subsoil is thinner and calcareous underlying material is within a depth of 40 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Coffeen, Lawson, and Wakeland soils. These soils are on flood plains below the Hickory soil. Also included are areas of the well drained Fayette and moderately well drained Rozetta and Hosmer soils on gently sloping uplands above the Hickory soil. Included soils make up 3 to 10 percent of the unit.

Water and air move through the Hickory soil at a moderate rate. Surface runoff is rapid. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential and the potential for frost action are moderate.

In most areas this soil is used as woodland. It is well suited to use as woodland and as habitat for woodland wildlife. It generally is unsuited to pasture, hay, and cultivated crops and to use as a site for dwellings and septic tank absorption fields because of the slope and the hazard of water erosion.

If this soil is used as woodland, the main management concerns are the hazard of water erosion and the equipment limitation caused by the slope. Also, plant competition suppresses the growth of desirable seedlings. Laying out logging roads and skid trails on or nearly on the contour helps to prevent excessive runoff and erosion. Skidding logs or trees uphill with a cable and winch also helps to prevent excessive runoff and erosion. Grass firebreaks, instead of bare soil, are needed because of the erosion hazard. Bare areas should be seeded to grass or a grass-legume mixture.

Machinery should be used only during periods when the soil is firm enough to support its weight and dry enough to provide the needed traction. In openings where timber has been harvested, undesirable vegetation can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots. Measures that protect the woodland from fire are needed.

Areas used as habitat for woodland wildlife require protection from fire and grazing. Adequate stands of herbaceous cover can be maintained, but the slope and low fertility limit the yields of grain and seed crops.

The land capability classification is VIIe.

16—Rushville silt loam. This nearly level, poorly drained soil is on broad flats in the uplands. It is ponded for brief periods in spring. Individual areas are irregular in shape and range from 5 to 240 acres.

Typically, the surface layer is grayish brown, friable silt loam about 8 inches thick. The subsurface layer is light brownish gray, friable silt loam about 9 inches thick. The subsoil is about 34 inches thick. It is firm and mottled. The upper part is grayish brown silty clay. The lower part is grayish brown and gray silty clay loam. The underlying material to a depth of 60 inches or more is light brownish gray, mottled, friable silty clay loam. In some areas the subsoil contains less clay. In other areas the surface layer is darker. In places depth to the seasonal high water table is more than 1 foot.

Included with this soil in mapping are small areas of the somewhat poorly drained Darmstadt and poorly drained Huey soils. These soils have a high content of sodium in the subsoil. They are in positions similar to those of the Rushville soil. They make up less than 5 percent of the unit.

Water and air move through the Rushville soil at a very slow rate. Surface runoff is very slow or ponded. A perched seasonal high water table is 1 foot above the surface to 1 foot below in spring. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to pasture and hay. It is moderately suited to cultivated crops. Because the soil is subject to ponding, it generally is unsuited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, the ponding damages crops and delays planting. Surface drains help to reduce the ponding hazard. Minimizing tillage and returning crop residue to the soil help to maintain tilth and fertility.

In areas used for pasture and hay, the ponding is a hazard. It can be controlled, however, by surface inlet tile drains or shallow ditches. Reed canarygrass and ladino clover are suited to this soil. Restricted use during wet periods helps to keep the pasture in good condition.

The land capability classification is IIIw.

17—Keomah silt loam. This nearly level, somewhat poorly drained soil is on broad ridges in the uplands. Individual areas are irregular in shape and range from 3 to 150 acres.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is grayish brown, friable silt loam about 8 inches thick. The subsoil is about 34 inches thick. It is mottled. The upper part is brown, friable silt loam. The next part is brown, dark grayish brown, light yellowish brown, and yellowish brown, firm silty clay loam. The lower part is light brownish gray, firm silty clay loam. The underlying material to a depth of 60 inches or more is light gray, mottled, friable silt loam. In some areas the seasonal high water table is within a depth of 1 foot. In other areas the lower part of the subsoil contains more sand. In places the surface layer is darker.

Included with this soil in mapping are small areas of the well drained Hickory soils and the poorly drained Virden soils. Hickory soils are on side slopes below the Keomah soil. Virden soils have a dark colored surface layer. They are on broad flats below the Keomah soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the Keomah soil at a slow or moderately slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 2 to 4 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is moderately suited to use as woodland. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, the seasonal high water table is a limitation. Tile drains and open ditches help to lower the seasonal high water table. Soil tilth also is a management problem. It can be improved by minimizing tillage and by adding crop residue or other organic material to the soil.

If this soil is used as woodland, plant competition is a

management concern. It suppresses the growth of desirable seedlings. In openings where timber has been harvested, it can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots. Measures that prevent fire are needed.

If this soil is used as a site for dwellings, the seasonal high water table and shrink-swell potential are limitations. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile drains at the base of the foundation lowers the seasonal high water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and slow or moderately slow permeability are limitations. Underground drains help to lower the water table. Enlarging the absorption area improves the absorption of liquid waste.

The land capability classification is IIw.

43A—Ipava silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on broad ridges in the uplands. Individual areas are irregular in shape and range from 2 to more than 500 acres.

Typically, the surface layer is very dark gray, friable silt loam about 7 inches thick. The subsurface layer is very dark gray, friable silty clay loam about 7 inches thick. The subsoil is mottled silty clay loam about 40 inches thick. The upper part is yellowish brown and firm. The next part is strong brown, yellowish brown, and grayish brown and is firm. The lower part is light brownish gray and friable. The underlying material to a depth of 60 inches or more is light brownish gray, mottled, friable silt loam. In some areas the surface layer is lighter in color.

Included with this soil in mapping are small areas of the moderately well drained Assumption soils, the somewhat poorly drained Keller soils, and the poorly drained Virden soils. Assumption and Keller soils are subject to water erosion. They are on the side slopes of drainageways below the Ipava soil. Virden soils are in depressions below the Ipava soil and are subject to ponding. Included soils make up 2 to 10 percent of the unit.

Water and air move through the Ipava soil at a moderately slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 1 to 3 feet below the surface in spring. Available water capacity and organic matter content are high. The shrink-swell potential and the potential for frost action also are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

No major limitations affect the use of this soil for corn, soybeans, or small grain. In some years the seasonal high water table delays planting. Subsurface tile drains function satisfactorily if suitable outlets are available. A conservation tillage system that leaves crop residue on the surface after planting helps to maintain tilth and fertility.

If this soil is used as a site for dwellings, the seasonal high water table and shrink-swell potential are limitations. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile drains at the base of the foundation helps to lower the water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and moderately slow permeability are limitations. Underground drains help to lower the water table. Enlarging the absorption area improves the absorption of liquid waste.

The land capability classification is I.

43B—Ipava silt loam, 2 to 5 percent slopes. This gently sloping, somewhat poorly drained soil is on broad ridges in the uplands. Individual areas are irregular in shape and range from 5 to 125 acres.

Typically, the surface layer is black, friable silt loam about 8 inches thick. The subsurface layer is very dark grayish brown, friable silty clay loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is mottled and friable. The upper part is brown silty clay loam. The next part is yellowish brown silty clay loam. The lower part is yellowish brown silt loam. In some areas the surface layer is thinner. In other areas the seasonal high water table is at a depth of more than 3 feet.

Included with this soil in mapping are small areas of the poorly drained Virden soils. These soils are in depressions below the Ipava soil. They make up 2 to 7 percent of the unit.

Water and air move through the Ipava soil at a moderately slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is 1 to 3 feet below the surface in spring. Available water capacity and organic matter content are high. The shrink-swell potential and the potential for frost action also are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

In areas used for corn, soybeans, or small grain, water erosion is a hazard. It can be controlled, however, by a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, terraces, or a combination of these.

If this soil is used as a site for dwellings, the seasonal high water table and shrink-swell potential are limitations. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile drains at the base of foundations lowers the water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and moderately slow permeability are limitations. Underground drains help to lower the water table. Enlarging the absorption area improves the absorption of liquid waste.

The land capability classification is IIe.

46—Herrick silt loam. This nearly level, somewhat poorly drained soil is on broad ridges in the uplands. Individual areas are irregular in shape and range from 10 to more than 700 acres in size.

Typically, the surface layer is very dark gray, friable silt loam about 8 inches thick. The subsurface layer is very dark gray and dark grayish brown, friable silt loam about 12 inches thick. The subsoil to a depth of 60 inches or more is mottled silty clay loam. The upper part is brown and firm. The next part is grayish brown and firm. The lower part is grayish brown and yellowish brown and is friable. In places the surface layer is thinner. In some areas the seasonal high water table is within a depth of 1 foot.

Included with this soil in mapping are small areas of the moderately well drained Harrison soils, the somewhat poorly drained Keller soils, and the poorly drained Piasa soils. Harrison soils are on slight rises above the Herrick soil. Keller soils are on the side slopes of drainageways below the Herrick soil. Piasa soils have a high content of sodium in the subsoil. They are in depressions below the Herrick soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the Herrick soil at a moderately slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 1 to 3 feet below the surface in spring. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

The drainage system installed in most areas of this soil is sufficient for the production of corn, soybeans, and small grain. Measures that maintain or improve the drainage system are needed. Tile drains and surface drains function satisfactorily if suitable outlets are available. Minimizing tillage and returning crop residue to the soil help to maintain tilth and fertility.

If this soil is used as a site for dwellings, the seasonal high water table and shrink-swell potential are limitations. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile drains at the base of the foundation helps to lower the water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and moderately slow permeability are limitations. Underground drains help to lower the water table. Enlarging the absorption area improves the absorption of liquid waste.

The land capability classification is IIw.

50—Virden silty clay loam. This nearly level, poorly drained soil is on broad flats in the uplands. It is occasionally ponded for brief periods in winter and early in spring. Individual areas are irregular in shape and range from 2 to more than 1,500 acres.

Typically, the surface layer is black, friable silty clay loam about 10 inches thick. The subsurface layer is black, mottled, friable silty clay loam about 8 inches thick. The subsoil to a depth of 60 inches or more is mottled, firm silty clay loam. The upper part is dark gray, and the lower part is gray. In some areas the surface layer is silt loam. In some places depth to the seasonal high water table is more than 2 feet. In other places the surface layer is thinner and lighter in color.

Included with this soil in mapping are small areas of the somewhat poorly drained Ipava and Keller soils and the poorly drained Piasa soils. Ipava soils are on slight rises above the Virden soil. Keller soils are on the side slopes of drainageways below the Virden soil. Piasa soils have a high content of sodium in the subsoil. They are closely intermingled with areas of the Virden soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the Virden soil at a moderately slow rate. Surface runoff is slow to ponded in cultivated areas. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below in spring. Available water capacity and organic matter content are

high. The shrink-swell potential and the potential for frost action also are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

The drainage system installed in most areas of this soil is sufficient for the production of corn, soybeans, and small grain. Measures that maintain or improve the drainage system are needed. Tile drains and surface drains function satisfactorily if suitable outlets are available. Land grading helps to control ponding. Minimizing tillage and returning crop residue to the soil help to maintain tilth and fertility.

If this soil is used as a site for dwellings, the ponding is a hazard and the shrink-swell potential is a limitation. Ponding can be controlled by lowering the water table with underground drains and by installing surface drains. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, the ponding is a hazard. Surface and subsurface drains are needed to lower the water table. Providing as much as 2 feet of loamy fill material increases the depth to the seasonal high water table and improves the absorption of liquid waste.

The land capability classification is IIw.

73—Ross silt loam. This nearly level, well drained soil is on flood plains. It is frequently flooded for very brief periods from March to May. Individual areas are irregular in shape and range from 2 to 500 acres.

Typically, the surface layer is very dark gray, friable silt loam about 8 inches thick. The subsurface layer is about 22 inches of very dark grayish brown, friable silt loam and loam. The subsoil is about 20 inches thick. The upper part is very dark grayish brown and dark brown, friable loam. The lower part is dark brown, very friable fine sandy loam. The underlying material to a depth of 60 inches or more is yellowish brown and dark yellowish brown, very friable loamy fine sand. In places the seasonal high water table is within a depth of 4 feet. In some areas the subsoil contains less sand.

Included with this soil in mapping are small areas of the well drained Hickory soils and the somewhat poorly drained Wakeland soils. Hickory soils are on upland side slopes above the Ross soil. Wakeland soils are in positions similar to those of the Ross soil. Included soils make up 1 to 10 percent of the unit.

Water and air move through the Ross soil at a moderate rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 4 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content also is high. The shrink-swell potential is low, and the potential for frost action is moderate.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. Because of the flooding, it is generally unsuited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, dikes or diversions help to reduce the extent of the crop damage caused by floodwater. Minimizing tillage and returning crop residue to the soil or regularly adding other organic material help to maintain fertility and tilth.

In areas used for pasture, overgrazing causes surface compaction and poor tilth. Proper stocking rates, rotation grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition. Tall fescue and alsike clover are suited to this soil. In areas used for hay, the flooding delays harvesting in some years.

The land capability classification is IIw.

76—Otter silt loam. This nearly level, poorly drained soil is on flood plains. It is frequently flooded for brief periods from March to May. Also, it is subject to ponding. Individual areas are irregular in shape and range from 10 to 100 acres.

Typically, the surface layer is very dark gray, friable silt loam about 10 inches thick. The subsurface layer is very dark gray, mottled, friable silt loam about 19 inches thick. The underlying material extends to a buried soil at a depth of about 45 inches. It is stratified dark grayish brown and light brownish gray, mottled, friable silt loam. The buried soil to a depth of 60 inches or more is very dark gray, mottled friable silt loam. In some places the seasonal high water table is at a depth of more than 2 feet. In other places the soil contains more clay throughout. In some areas the surface soil is thinner.

Included with this soil in mapping are small areas of the well drained Hickory soils and the somewhat poorly drained Wakeland soils. Hickory soils are on side slopes above the Otter soil. Wakeland soils are in positions similar to those of the Otter soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the Otter soil at a moderate rate. Surface runoff is slow to ponded in cultivated areas. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below in spring. Available water capacity is very high. Organic matter content is high. The shrink-swell potential is low, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It

is well suited to cultivated crops, pasture, and hay. It has good potential for use as habitat for wetland wildlife. Because of the flooding and the ponding, it is generally unsuited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, the flooding is a hazard and the seasonal high water table is a limitation. The flooding occurs less often than once every 2 years during the growing season. In most areas a drainage system has been installed. Measures that maintain or improve the drainage system are needed. Subsurface tile drains function satisfactorily if suitable outlets are available. Dikes or diversions can reduce the extent of the crop damage caused by floodwater. A conservation tillage system that leaves crop residue on the surface after planting improves tilth, helps to prevent surface compaction and crusting, and increases the rate of water infiltration.

In areas used for pasture, overgrazing causes surface compaction and poor tilth. Proper stocking rates, rotation grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition. Reed canarygrass and ladino clover are suited to this soil. In areas used for hay, the flooding delays harvesting in some years.

The land capability classification is IIw.

112—Cowden silt loam. This nearly level, poorly drained soil is on broad flats in the uplands. It is subject to ponding. Individual areas are irregular in shape and range from 20 to 300 acres.

Typically, the surface layer is very dark gray, friable silt loam about 6 inches thick. The subsurface layer is dark grayish brown and light brownish gray, mottled, friable silt loam about 10 inches thick. The subsoil is about 35 inches thick. It is mottled and firm. The upper part is dark gray silty clay and silty clay loam. The lower part is grayish brown silty clay loam. The underlying material to a depth of 60 inches or more is grayish brown, mottled, friable silt loam. In some areas the seasonal high water table is at a depth of more than 2 feet. In other areas the surface layer is thicker.

Included with this soil in mapping are small areas of the poorly drained Piasa soils. These soils have a high content of sodium in the subsoil. They are closely intermingled with areas of the Cowden soil. They make up 3 to 12 percent of the unit.

Water and air move through the Cowden soil at a slow rate. Surface runoff is slow to ponded in cultivated areas. The seasonal high water table ranges from 0.5 foot above the surface to 2.0 feet below in spring. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

The drainage system installed in most areas of this soil is sufficient for the production of corn, soybeans, and small grain. Measures that maintain the drainage system are needed. Surface drains can remove excess surface water satisfactorily if suitable outlets are available. Land grading helps to control ponding. Minimizing tillage and returning crop residue to the soil help to maintain tilth and fertility.

If this soil is used as a site for dwellings, the ponding is a hazard and the shrink-swell potential is a limitation. Ponding can be controlled by lowering the water table with underground drains and by installing surface drains. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, the ponding is a hazard and the slow permeability is a limitation. Installing surface and subsurface drains helps to lower the water table. Adding several feet of loamy fill material reduces the hazard of ponding and improves the absorption of liquid waste.

The land capability classification is IIw.

113A—Oconee silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on low, broad ridges in the uplands. Individual areas are irregular in shape and range from 2 to 240 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is dark grayish brown and grayish brown, mottled, friable silt loam about 8 inches thick. The subsoil is mottled, friable silty clay loam about 34 inches thick. The upper part is grayish brown, the next part is brown, and the lower part is pale brown. The underlying material to a depth of 60 inches or more is pale brown, mottled, friable silt loam. In some places the seasonal high water table is within a depth of 1 foot. In other places the surface layer is thicker.

Included with this soil in mapping are small areas of the moderately well drained Harrison soils and the poorly drained Piasa soils. Harrison soils are on slight rises above the Oconee soil. Piasa soils have a high content of sodium in the subsoil. They are slightly lower on the landscape than the Oconee soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the Oconee soil at a

slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 1 to 3 feet below the surface in spring. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

The drainage system installed in most areas of this soil is sufficient for the production of corn, soybeans, and small grain. Measures that maintain or improve the drainage system are needed. Tile drains and surface drains function satisfactorily if suitable outlets are available. Minimizing tillage and returning crop residue to the soil help to maintain tilth and fertility.

If this soil is used as a site for dwellings, the seasonal high water table and shrink-swell potential are limitations. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile drains at the base of foundations lowers the water table.

The seasonal high water table and slow permeability are limitations if this soil is used as a site for septic tank absorption fields. The septic tank system works well if a sealed sand filter and a disinfection tank or an evapotranspiration bed are installed. Sewage lagoons work well on this soil.

The land capability classification is IIw.

113B—Oconee silt loam, 2 to 5 percent slopes. This gently sloping, somewhat poorly drained soil is on broad ridges in the uplands. Individual areas are irregular in shape and range from 5 to 40 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is grayish brown and very dark grayish brown, mottled, friable silt loam about 10 inches thick. The subsoil is mottled silty clay loam about 35 inches thick. The upper part is brown, yellowish brown, and grayish brown and is firm. The lower part is multicolored and is friable. The underlying material to a depth of 60 inches or more is multicolored, friable silt loam. In some areas the surface layer is thicker.

Included with this soil in mapping are small areas of the poorly drained Cowden soils. These soils are in slight depressions below the Oconee soil. They make up 5 to 10 percent of the unit.

Water and air move through the Oconee soil at a slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is 1 to 3 feet below the surface in spring. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

In areas used for corn, soybeans, or small grain, water erosion is a hazard. Also, the seasonal high water table delays planting in some years. Water erosion can be controlled by a system of conservation tillage that leaves crop residue on the surface after planting, by contour farming, or by terraces. Surface ditches help to lower the seasonal high water table. Returning crop residue to the soil and regularly adding other organic material help to maintain tilth and fertility.

If this soil is used as a site for dwellings, the seasonal high water table and shrink-swell potential are limitations. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile drains at the base of the foundation lowers the water table.

The seasonal high water table and slow permeability are limitations if this soil is used as a site for septic tank absorption fields. Septic tank systems work well if a sealed sand filter and a disinfection tank or an evapotranspiration bed are installed. Sewage lagoons work well if the site has been leveled.

The land capability classification is IIe.

119B2—Elco silt loam, 2 to 5 percent slopes, eroded. This gently sloping, moderately well drained soil is on the side slopes of drainageways in the uplands. Individual areas are irregular in shape and range from 2 to 20 acres.

Typically, the surface layer is dark yellowish brown, friable silt loam. Erosion has thinned the surface layer to a thickness of about 7 inches. The subsoil extends to a depth of more than 60 inches. It is friable and mottled. In sequence downward, it is brown silty clay loam, yellowish brown silt loam, light gray and gray silt loam, and dark gray silty clay loam. In some areas the seasonal high water table is within a depth of 2.5 feet. In places the lower part of the subsoil has less clay.

Included with this soil in mapping are small areas of the well drained Hickory soils and the somewhat poorly drained Keomah soils. Hickory soils are on side slopes below the Elco soil. Keomah soils are on broad flats above the Elco soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the Elco soil at a moderately slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is

perched at a depth of 2.5 to 4.5 feet in spring. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay and to use as woodland. It is moderately suited to use as a site for dwellings. It is poorly suited to use as a site for septic tank absorption fields.

Measures that prevent further water erosion are needed in areas used for soybeans, corn, or small grain. Examples are a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces. Tilling when the soil is wet causes surface cloddiness, surface compaction, excessive runoff, and excessive erosion. Returning crop residue to the soil and regularly adding other organic material help to maintain tilth and fertility.

Establishing pasture plants or hay helps to keep water erosion within tolerable limits. Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition and control erosion.

If this soil is used as a site for dwellings with basements, the seasonal high water table and shrink-swell potential are limitations. The shrink-swell potential also is a limitation on sites for dwellings without basements. Installing subsurface tile drains near foundations helps to lower the seasonal high water table. Extending footings below the subsoil or reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and moderately slow permeability are limitations. Installing subsurface tile drains higher on the side slopes than the absorption field helps to intercept seepage. Increasing the size of the absorption field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is IIe.

119C2—Elco silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, moderately well drained soil is on the side slopes of drainageways in the uplands. Individual areas are irregular in shape and range from 3 to 50 acres.

Typically, the surface layer is mixed grayish brown and yellowish brown, friable silt loam. Water erosion has thinned the surface layer to a thickness of about 8 inches. The subsoil extends to a depth of 60 inches or more. It is mottled. The upper part is yellowish brown, friable silty clay loam. The next part is grayish brown, friable silty clay loam. The lower part is dark olive gray, firm loam. In places the surface layer is thinner and is silty clay loam. In some areas the lower part of the subsoil has less sand. In other areas the seasonal high water table is within a depth of 2.5 feet.

Included with this soil in mapping are small areas of the well drained Hickory soils. These soils are on side slopes below the Elco soil. They make up 5 to 10 percent of the unit.

Water and air move through the Elco soil at a moderately slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is perched at a depth of 2.5 to 4.5 feet in spring. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to pasture and hay. It is moderately suited to cultivated crops and to use as a site for dwellings. It is poorly suited to use as a site for septic tank absorption fields.

In the areas used for corn, soybeans, or small grain, further water erosion is a hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces help to control water erosion and maintain soil productivity.

Establishing pasture plants or hay helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition and control erosion.

If this soil is used as a site for dwellings with basements, the seasonal high water table and shrink-swell potential are limitations. The shrink-swell potential also is a limitation on sites for dwellings without basements. Installing subsurface tile drains near foundations helps to lower the water table. Extending footings below the subsoil or reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and moderately slow permeability are limitations. Installing subsurface

tile drains higher on the side slopes than the absorption field helps to intercept seepage. Increasing the size of the absorption field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is IIIe.

119D2—Elco silt loam, 10 to 15 percent slopes, eroded. This strongly sloping, moderately well drained soil is on the side slopes of drainageways in the uplands. Individual areas are irregular in shape and range from 2 to 30 acres.

Typically, the surface layer is mixed brown and yellowish brown, friable silt loam. Water erosion has thinned the surface layer to a thickness of about 8 inches. The subsoil extends to a depth of 60 inches or more. It is mottled. The upper part is yellowish brown, friable silty clay loam. The next part is light brownish gray, firm clay loam. The lower part is grayish brown, firm clay loam. In places the surface layer is thinner and is silty clay loam. In some areas the seasonal high water table is within a depth of 2.5 feet.

Included with this soil in mapping are small areas of the well drained Hickory soils. These soils are on side slopes below the Elco soil. They make up 5 to 10 percent of the unit.

Water and air move through the Elco soil at a moderately slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is perched at a depth of 2.5 to 4.5 feet in spring. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to pasture and hay and to use as woodland. It is moderately suited to cultivated crops and to use as a site for dwellings. It is poorly suited to use as a site for septic tank absorption fields.

In areas used for corn, soybeans, or small grain, further water erosion is a hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces help to control water erosion and maintain soil productivity.

Adapted forage and hay crops grow well on this soil. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Timely deferment of grazing helps to prevent overgrazing and thus helps to prevent surface compaction, excessive runoff, and an increase in the hazard of erosion. Tilling on the contour when a seedbed is prepared or when the pasture is renovated helps to control erosion. A no-till system of seeding also helps to control erosion. Applications of fertilizer are needed. The plants should not be grazed or clipped until they are sufficiently established.

If this soil is used as woodland, plant competition is a management concern. It suppresses the growth of desirable seedlings. In openings where timber has been harvested, it can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots. Measures that prevent fire are needed.

If this soil is used as a site for dwellings with basements, the seasonal high water table, slope, and shrink-swell potential are limitations. The shrink-swell potential and slope also are limitations on sites for dwellings without basements. Installing subsurface tile drains near the foundations helps to lower the seasonal high water table. Cutting, filling, and land shaping help to overcome the slope. Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

The seasonal high water table, moderately slow permeability, and slope are limitations if this soil is used as a site for septic tank absorption fields. Installing underground drains higher on the side slopes than the absorption field helps to lower the water table. Enlarging the absorption area improves the absorption of liquid waste. Installing the filter lines on the contour helps to overcome the slope.

The land capability classification is IIIe.

120—Huey silt loam. This nearly level, poorly drained soil is on broad flats in the uplands. It is subject to ponding. It has a high content of sodium in the subsoil. Individual areas are irregular in shape and range from 2 to 120 acres.

Typically, the surface layer is dark grayish brown and brown, friable silt loam about 8 inches thick. The subsoil is grayish brown, mottled, friable silty clay loam about 33 inches thick. The underlying material to a depth of 60 inches or more is gray and brown, mottled friable silt loam and loam. In some areas the surface layer is darker.

Included with this soil in mapping are small areas of the poorly drained Cowden and Rushville soils and the somewhat poorly drained Darmstadt soils. Cowden and Rushville soils do not have a high content of sodium in the subsoil. They are in positions similar to those of the

Huey soil. Darmstadt soils are slightly higher on the landscape than the Huey soil. Included soils make up 3 to 10 percent of the unit.

Water and air move through the Huey soil at a very slow rate. Surface runoff is slow to ponded in cultivated areas. A perched seasonal high water table is 0.5 foot above the surface to 2.0 feet below in spring. Available water capacity is moderate. Organic matter content is moderately low. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is poorly suited to cultivated crops, hay, and pasture. It generally is unsuited to use as a site for dwellings and septic tank absorption fields because of the ponding.

A drainage system is needed in areas of this soil used for soybeans, corn, or small grain. Measures that improve fertility and control soil blowing also are needed. Where suitable outlets are available, a combination of subsurface drains and surface inlets or surface ditches can help to lower the water table. The high content of sodium in the subsoil results in moisture stress during dry periods and excess moisture during wet periods. Also, the sodium restricts the availability and uptake of some plant nutrients. Tilling when the soil is wet causes surface compaction and surface cloddiness and decreases the rate of water infiltration. Minimizing tillage, returning crop residue to the soil, and adding other organic material increase the infiltration rate and improve tilth and fertility. Leaving crop residue on the surface and establishing field windbreaks help to control soil blowing.

The land capability classification is IVw.

127B—Harrison silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on broad ridges in the uplands. Individual areas are irregular in shape and range from 2 to 30 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 10 inches thick. The subsoil extends to a depth of more than 60 inches. The upper part is dark brown and yellowish brown, firm and friable silty clay loam. The next part is yellowish brown, mottled, firm and friable silty clay loam. The lower part is brown and yellowish brown, mottled, friable silt loam. In some areas the surface layer is thinner.

Included with this soil in mapping are small areas of the somewhat poorly drained Herrick soils and the poorly drained Virden soils. Herrick soils are on the lower parts of rises. Virden soils are on flats below the Harrison soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the Harrison soil at a moderate rate. Surface runoff is medium in cultivated areas. The seasonal high water table is perched at a depth of 3 to 6 feet in spring. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential also is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is moderately suited to use as a site for dwellings and poorly suited to use as a site for septic tank absorption fields.

Measures that control water erosion are needed in areas used for soybeans, corn, or small grain. These include a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces. Tilling when the soil is wet causes surface cloddiness, surface compaction, excessive runoff, and excessive erosion. Returning crop residue to the soil and regularly adding other organic material help to maintain tilth and fertility.

If this soil is used as a site for dwellings, the shrink-swell potential is a limitation. Also, the seasonal high water table is a limitation on sites for dwellings with basements. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile lines around the base of foundations lowers the water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and moderate permeability are limitations. Subsurface tile drains lower the water table. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome the moderate permeability.

The land capability classification is IIe.

134C2—Camden silt loam, 5 to 12 percent slopes, eroded. This moderately sloping, moderately well drained soil is on knolls and short, uneven side slopes on stream terraces. Individual areas are irregular in shape and range from 2 to 50 acres.

Typically, the surface layer is dark brown, friable silt loam. Water erosion has thinned the surface layer to a thickness of about 6 inches. The subsoil is about 48 inches thick. The upper part is yellowish brown, firm silty clay loam. The next part is strong brown, friable silty clay loam. The lower part is strong brown, friable clay loam. The underlying material to a depth of 60 inches or more is strong brown, friable loam. In some areas the lower part of the subsoil has less sand. In other areas the upper part of the subsoil has more sand.

Included with this soil in mapping are small areas of

the well drained Hickory soils and the somewhat poorly drained Coffeen and Wakeland soils. Hickory soils are in the more sloping areas above the Camden soil. Coffeen and Wakeland soils are on flood plains below the Camden soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the Camden soil at a moderate rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is 4 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to pasture and hay and to use as woodland. It is moderately suited to cultivated crops and to use as a site for dwellings and septic tank absorption fields.

In areas used for corn, soybeans, or small grain, further water erosion is a hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, and contour farming help to control water erosion and maintain soil productivity.

Establishing pasture plants or hay helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

If this soil is used as woodland, plant competition is a management concern. It suppresses the growth of desirable seedlings. In openings where timber has been harvested, it can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots. Measures that prevent fire are needed.

If this soil is used as a site for dwellings with basements, the seasonal high water table, slope, and shrink-swell potential are limitations. The shrink-swell potential and slope also are limitations on sites for dwellings without basements. Installing subsurface tile drains near foundations helps to lower the water table. Cutting, filling, and land shaping help to overcome the slope. Extending footings below the subsoil or reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table, moderate permeability, and slope are limitations. Underground drains help to lower the water table. Enlarging the absorption area improves the absorption of liquid waste. Installing the filter lines on the contour helps to overcome the slope.

The land capability classification is IIIe.

214B—Hosmer silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on ridgetops and side slopes in the uplands. Individual areas are irregular in shape and range from 5 to 100 acres.

Typically, the surface layer is dark grayish brown, friable silt loam about 6 inches thick. The subsurface layer is dark grayish brown and brown, friable silt loam about 9 inches thick. The subsoil is about 35 inches of brown silt loam and silty clay loam. The upper part is friable. The lower part is mottled and is firm and brittle. The underlying material to a depth of 60 inches or more is light brownish gray, mottled, friable silt loam. In some areas the soil formed in a thinner layer of loess. In other areas the surface layer is darker.

Included with this soil in mapping are small areas of the somewhat poorly drained Marine soils and the well drained Hickory soils. Marine soils are on the lower ridges. Hickory soils are on the steeper side slopes. Included soils make up 5 to 15 percent of the unit.

Water and air move through the upper part of the Hosmer soil at a moderate rate and through the lower part at a very slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is perched at a depth of 2.5 to 3.0 feet in spring. Available water capacity is moderate. Organic matter content is moderately low. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay and to use as woodland. It is moderately suited to use as a site for dwellings. It is poorly suited to use as a site for septic tank absorption fields.

Measures that control water erosion are needed in the areas used for soybeans, corn, or small grain. Examples are a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces. Tilling when the soil is wet causes surface cloddiness, surface compaction, excessive runoff, and excessive erosion. Returning crop residue to the soil and regularly adding other organic material help to maintain tilth and fertility.

Establishing pasture plants or hay helps to control erosion. Bromegrass, orchardgrass, tall fescue, and

alfalfa are suited to this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

If this soil is used as woodland, plant competition is a management concern. It suppresses the growth of desirable seedlings. In openings where timber has been harvested, it can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots. Measures that prevent fire are needed.

If this soil is used as a site for dwellings, the shrink-swell potential is a limitation. Also, the seasonal high water table is a limitation on sites for dwellings with basements. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile lines around the base of foundations helps to lower the water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and very slow permeability are limitations. Underground drains help to lower the water table. Enlarging the absorption area improves the absorption of liquid waste.

The land capability classification is IIe.

250D—Velma silt loam, 10 to 15 percent slopes. This strongly sloping, well drained soil is on the side slopes of drainageways in the uplands. Individual areas are irregular in shape and range from 5 to 50 acres.

Typically, the surface layer is very dark grayish brown, very friable silt loam about 7 inches thick. The subsurface layer is very dark grayish brown, friable loam about 9 inches thick. The subsoil is friable clay loam about 38 inches thick. The upper part is yellowish brown. The lower part is yellowish brown and pale brown and is mottled. The underlying material to a depth of 60 inches or more is pale brown, mottled, friable loam. In some areas the seasonal high water table is within a depth of 5 feet. In other areas the surface layer is thinner and lighter in color.

Included with this soil in mapping are small areas of the somewhat poorly drained Lawson and moderately well drained Terril soils. These soils are on flood plains and foot slopes below the Velma soil. They make up 5 to 15 percent of the unit.

Water and air move through the Velma soil at a moderate rate. Surface runoff is rapid in cultivated areas. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential and the potential for frost action also are moderate.

Most areas formerly were used for cultivated crops. About half the areas currently are cultivated, and half are used for pasture and hay. This soil is well suited to pasture and hay. It is moderately suited to cultivated crops and to use as a site for dwellings and septic tank absorption fields.

In areas of this soil used for corn, soybeans, or small grain, water erosion is a hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces help to control water erosion and maintain soil productivity.

Adapted forage and hay crops grow well on this soil. Bromegrass, orchardgrass, tall fescue, and alfalfa are suitable. Timely deferment of grazing helps to prevent overgrazing and thus also helps to prevent surface compaction, excessive runoff, and an increase in the hazard of erosion. Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion. A no-till system of seeding also helps to control erosion. Applications of fertilizer are needed. The plants should not be grazed or clipped until they are sufficiently established.

If this soil is used as a site for dwellings, the shrink-swell potential and slope are limitations. Cutting and filling help to overcome the slope. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, the slope and moderate permeability are limitations. Installing the filter lines on the contour helps to overcome the slope. Enlarging the absorption field improves the absorption of liquid waste.

The land capability classification is IIIe.

259B—Assumption silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on side slopes along drainageways in the uplands. Individual areas are irregular in shape and range from 2 to 30 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 5 inches thick. The subsurface layer is very dark grayish brown, friable silt loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is brown, friable silty clay loam. The next part is brown and grayish brown, mottled, friable silty clay loam. The lower

part is gray, mottled, firm clay loam and silty clay loam. In some areas the surface layer is thinner and lighter in color. In other areas the seasonal high water table is within a depth of 2.5 feet.

Included with this soil in mapping are small areas of the somewhat poorly drained Herrick and Ipava soils. These soils are on ridges above the Assumption soil. They make up 5 to 10 percent of the unit.

Water and air move through the Assumption soil at a moderately slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is perched at a depth of 2.5 to 4.5 feet in spring. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential also is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is moderately suited to use as a site for dwellings. It is poorly suited to use as a site for septic tank absorption fields.

Measures that control water erosion are needed in areas used for soybeans, corn, or small grain. Examples are a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces. Tilling when the soil is wet causes surface cloddiness, surface compaction, excessive runoff, and excessive erosion. Returning crop residue to the soil and regularly adding other organic material help to maintain tilth and fertility.

If this soil is used as a site for dwellings, the shrink-swell potential is a limitation. Also, the seasonal high water table is a limitation on sites for dwellings with basements. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile lines around the base of foundations lowers the water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and moderately slow permeability are limitations. Underground drains help to lower the water table. Enlarging the absorption field improves the absorption of liquid waste.

The land capability classification is IIe.

259B2—Assumption silt loam, 2 to 5 percent slopes, eroded. This gently sloping, moderately well drained soil is on side slopes along drainageways in the uplands. Individual areas are irregular in shape and range from 3 to 30 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam. Water erosion has thinned the surface layer to a thickness of about 6 inches. The subsoil extends to a depth of more than 60 inches. The upper part is dark yellowish brown, mottled, friable silty clay loam. The next part is yellowish brown, mottled, friable silty clay loam. The lower part is grayish brown, mottled, firm clay loam. In some areas the surface layer is thinner and is silty clay loam. In other areas the seasonal high water table is within a depth of 2.5 feet.

Included with this soil in mapping are small areas of the somewhat poorly drained Herrick and Ipava soils. These soils are on ridges above the Assumption soil. They make up 5 to 10 percent of the unit.

Water and air move through the Assumption soil at a moderately slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is perched at a depth of 2.5 to 4.5 feet in spring. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential also is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is moderately suited to use as a site for dwellings. It is poorly suited to use as a site for septic tank absorption fields.

Measures that prevent further water erosion are needed in areas used for soybeans, corn, or small grain. These include a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces. Tilling when the soil is wet causes surface cloddiness, surface compaction, excessive runoff, and excessive erosion. Returning crop residue to the soil and regularly adding other organic material help to maintain tilth and fertility.

Establishing pasture plants or hay helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Rotation grazing and deferred grazing help to prevent surface compaction, excessive runoff, and excessive erosion. Tilling the pasture on the contour when a seedbed is prepared helps to control erosion.

If this soil is used as a site for dwellings, the shrink-swell potential is a limitation. Also, the seasonal high water table is a limitation on sites for dwellings with basements. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile lines around the base of foundations helps to lower the water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and moderately slow permeability are limitations. Underground drains help to lower the water table. Enlarging the absorption field improves the absorption of liquid waste.

The land capability classification is IIe.

259C2—Assumption silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, moderately well drained soil is on the side slopes of drainageways in the uplands. Individual areas are irregular in shape and range from 3 to 30 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam. Water erosion has thinned the surface layer to a thickness of about 8 inches. The subsoil extends to a depth of more than 60 inches. The upper part is yellowish brown, mottled, friable silty clay loam. The lower part is light brownish gray, mottled, firm clay loam. In some areas the surface layer is thinner and is silty clay loam. In other areas the seasonal high water table is within a depth of 2.5 feet.

Included with this soil in mapping are small areas of the somewhat poorly drained Herrick and Ipava soils. These soils are on ridges above the Assumption soil. They make up 5 to 10 percent of the unit.

Water and air move through the Assumption soil at a moderately slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is perched at a depth of 2.5 to 4.5 feet in spring. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential also is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to pasture and hay. It is moderately suited to cultivated crops and to use as a site for dwellings. It is poorly suited to use as a site for septic tank absorption fields.

In areas used for corn, soybeans, or small grain, further water erosion is a hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces help to control water erosion and maintain soil productivity.

Establishing pasture plants or hay helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

If this soil is used as a site for dwellings, the shrink-swell potential is a limitation. Also, the seasonal high water table is a limitation on sites for dwellings with basements. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile lines around the base of foundations lowers the water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and moderately slow permeability are limitations. Underground drains lower the water table. Enlarging the absorption fields improves the absorption of liquid waste.

The land capability classification is IIIe.

279A—Rozetta silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on ridges in the uplands. Individual areas are irregular in shape and range from 5 to 150 acres.

Typically, the surface layer is brown, very friable silt loam about 10 inches thick. The subsurface layer is pale brown, friable silt loam about 5 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is pale brown, friable silty clay loam. The next part is light yellowish brown, mottled, firm silty clay loam. The lower part is light gray and light yellowish brown, mottled, firm silty clay loam and silt loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Keomah soils and the well drained Fayette soils. Keomah soils are in drainageways below the Rozetta soil. Fayette soils are on the more sloping ridges above or below the Rozetta soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the Rozetta soil at a moderate rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 4 to 6 feet below the surface in spring. Available water capacity is very high. Organic matter content is moderately low. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is moderately suited to use as a site for dwellings and septic tank absorption fields.

No major limitations affect the use of this soil for corn, soybeans, or small grain. A conservation tillage system that leaves crop residue on the surface after planting helps to maintain tilth and fertility.

If this soil is used as a site for dwellings, the shrink-swell potential is a limitation. Also, the water table is a limitation on sites for dwellings with basements. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile lines around the base of foundations helps to lower the water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table is a limitation. Underground drains help to lower the water table.

The land capability classification is I.

279B—Rozetta silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on ridges in the uplands. Individual areas are irregular in shape and range from 5 to 100 acres.

Typically, the surface layer is dark grayish brown, friable silt loam about 6 inches thick. The subsurface layer is yellowish brown, friable silt loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown, friable silty clay loam. The next part is yellowish brown and light gray, mottled, firm silty clay loam. The lower part is multicolored, friable silty clay loam and silt loam In some areas the seasonal high water table is below a depth of 60 inches. In other areas the surface layer is darker.

Included with this soil in mapping are small areas of the somewhat poorly drained Keomah soils and the well drained Hickory soils. Keomah soils are on low ridges above the Rozetta soil. Hickory soils are on the steeper slopes below the Rozetta soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the Rozetta soil at a moderate rate. Surface runoff is medium in cultivated areas. The seasonal high water table is 4 to 6 feet below the surface in spring. Available water capacity is very high. Organic matter content is moderately low. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is moderately suited to use as a site for dwellings and septic tank absorption fields.

Measures that control water erosion are needed in areas used for soybeans, corn, or small grain. Examples are a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces. Tilling when the soil is wet causes surface cloddiness, surface compaction, excessive runoff, and excessive erosion. Returning crop residue to the soil and regularly adding other organic material help to maintain tilth and fertility.

If this soil is used as a site for dwellings, the shrink-swell potential is a limitation. Also, the seasonal high water table is a limitation on sites for dwellings with basements. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile lines around the base of foundations lowers the water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table is a limitation. Installing underground drains lowers the water table.

The land capability classification is IIe.

279C2—Rozetta silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, moderately well drained soil is on side slopes in the uplands. Individual areas are irregular in shape and range from 3 to 20 acres.

Typically, the surface layer is brown, friable silt loam. Water erosion has thinned the surface layer to a thickness of about 7 inches. The subsoil to a depth of 60 inches or more is yellowish brown and brown, mottled, friable silty clay loam. In some areas the lower part of the subsoil has a higher content of sand. In other areas the seasonal water table is below a depth of 6 feet.

Water and air move through this soil at a moderate rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is 4 to 6 feet below the surface in spring. Available water capacity is very high. Organic matter content is moderately low. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to pasture and hay and to use as woodland. It is moderately suited to cultivated crops and to use as a site for dwellings and septic tank absorption fields.

In areas used for corn, soybeans, or small grain, further water erosion is a hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, terraces, or a combination of these helps to keep soil loss at an acceptable level and thus maintains soil productivity.

Establishing pasture plants or hay helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition and help to control erosion.

If this soil is used as woodland, the main management concerns are the hazard of water erosion and the equipment limitation caused by the slope. Also, plant competition suppresses the growth of desirable seedlings. In openings where timber has been harvested, it can be controlled by chemical or mechanical means. Laying out logging roads and skid trails on the contour helps to prevent excessive runoff and erosion. On the steeper slopes, skidding logs or trees uphill with a cable and winch also helps to prevent excessive runoff and erosion. Grass firebreaks, instead of bare soil, are needed because of the erosion hazard.

Bare areas should be seeded to grass or a grass-legume mixture. Machinery should be used only during periods when the soil is firm enough to support its weight. Excluding livestock from the woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots.

If this soil is used as a site for dwellings, the shrink-swell potential is a limitation. Also, the seasonal high water table is a limitation on sites for dwellings with basements. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile lines around the base of foundations helps to lower the water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table is a limitation. Installing underground drains lowers the water table.

The land capability classification is IIIe.

280B—Fayette silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on ridges in the uplands. Individual areas are irregular in shape and range from 5 to 50 acres.

Typically, the surface layer is dark grayish brown and yellowish brown silt loam about 8 inches thick. The subsoil to a depth of 60 inches or more is friable silty clay loam. The upper part is dark yellowish brown. The next part is dark yellowish brown and mottled. The lower part is yellowish brown and mottled. In some areas the seasonal high water table is within a depth of 60 inches.

Water and air move through this soil at a moderate rate. Surface runoff is medium in cultivated areas. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is well suited to use as a site for septic tank absorption fields. It is moderately suited to use as a site for dwellings.

Measures that control water erosion are needed in areas used for soybeans, corn, or small grain. These include a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces. Tilling when the soil is wet causes surface cloddiness, surface compaction, excessive runoff, and excessive erosion. Returning crop residue to the soil and regularly adding other organic material help to maintain tilth and fertility.

If this soil is used as a site for dwellings, the shrink-swell potential is a limitation. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling.

The land capability classification is IIe.

280C2—Fayette silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, well drained soil is on ridges and side slopes in the uplands. Individual areas are irregular in shape and range from 3 to 30 acres.

Typically, the surface layer is brown, friable silt loam. Water erosion has thinned the surface layer to a thickness of about 7 inches. The subsoil extends to a depth of 60 inches or more. It is dark yellowish brown, friable silty clay loam. In places the surface is thinner and is silty clay loam. In some areas the subsoil contains more clay. In other areas the lower part of the subsoil contains more sand.

Water and air move through this soil at a moderate rate. Surface runoff is rapid in cultivated areas. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to pasture and hay. It is moderately suited to cultivated crops and to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn or soybeans, further water erosion is a severe hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces help to control erosion. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water infiltration.

Establishing pasture plants or hay helps to control water erosion. Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Rotation grazing and deferred grazing help to prevent surface compaction, excessive runoff, and excessive erosion. Tilling the pasture on the contour when a seedbed is prepared helps to control erosion.

If this soil is used as woodland, plant competition is a management concern. It suppresses the growth of desirable seedlings. In openings where timber has been harvested, it can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots. Measures that prevent fire are needed.

If this soil is used as a site for dwellings, the shrink-swell potential and slope are limitations. Cutting and

filling help to reduce the slope. Reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, the slope is a limitation. It can be overcome by installing the filter lines on the contour.

The land capability classification is IIIe.

333—Wakeland silt loam. This nearly level, somewhat poorly drained soil is on flood plains. It is frequently flooded for brief periods from March through May. Individual areas are irregular in shape and range from 5 to 875 acres.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The underlying material to a depth of 60 inches or more is stratified dark grayish brown, brown, grayish brown, and dark gray, mottled silt loam. In some areas the underlying material contains more sand. In other areas a dark colored buried soil is within a depth of 40 inches. In places the surface layer is darker.

Included with this soil in mapping are small areas of the well drained Hickory soils. These soils are on side slopes above the Wakeland soil. They make up 3 to 8 percent of the unit.

Water and air move through the Wakeland soil at a moderate rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 1 to 3 feet below the surface in spring. Available water capacity is very high. Organic matter content is moderately low. The shrink-swell potential is low, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to pasture, hay, and cultivated crops. Because of the flooding, it generally is unsuited to use as a site for dwellings and septic tank absorption fields.

In the areas used for soybeans or corn, the seasonal high water table or flooding delays planting in most years. Crops are occasionally damaged by floodwater. Installing surface ditches or subsurface drains lowers the water table. Tilling when the soil is wet causes surface cloddiness, excessive runoff, and excessive erosion. Returning crop residue to the soil and minimizing tillage help to maintain good tilth and increase the rate of water infiltration.

The land capability classification is IIw.

402—Colo silt loam. This nearly level, poorly drained soil is on flood plains. It is frequently flooded for brief periods from March through May. Individual areas are irregular in shape and range from 10 to 200 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is very dark gray, mottled silty clay loam about 15 inches thick. The subsoil extends to a depth of 60 inches or more. It is very dark gray, mottled, friable silty clay loam. In some areas the subsoil contains less clay. In other areas it contains more sand.

Included with this soil in mapping are small areas of the well drained Hickory soils. These soils are on side slopes above the Colo soil. They make up 3 to 18 percent of the unit.

Water and air move through the Colo soil at a moderate rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 1 to 3 feet below the surface in spring. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops, pasture, and hay. Because of the flooding, it generally is unsuited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn or soybeans, the flooding is a hazard and the seasonal high water table is a limitation. During the growing season the soil is flooded less often than once every 2 years. In most areas a drainage system has been installed. Measures that maintain or improve the drainage system are needed. Subsurface tile drains work well if suitable outlets are available. Dikes or diversions reduce the extent of the crop damage caused by floodwater. A conservation tillage system that leaves crop residue on the surface after planting improves tilth, helps to prevent surface compaction and surface crusting, and increases the rate of water infiltration.

The land capability classification is IIw.

428A—Coffeen silt loam, 0 to 3 percent slopes. This nearly level, somewhat poorly drained soil is on flood plains. It is frequently flooded for brief periods from March through May. Individual areas are irregular in shape and range from 2 to 200 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam. It is about 10 inches thick. The subsoil is dark grayish brown and grayish brown, mottled, friable silt loam about 18 inches thick. The underlying material to a depth of 60 inches or more is grayish brown, mottled, friable silt loam. In some areas the surface layer is thicker. In other areas the subsoil contains more clay. In places the surface layer is lighter in color.

Included with this soil in mapping are small areas of the well drained Hickory and Ross soils and the moderately well drained Terril soils. Hickory soils are on side slopes above the Coffeen soil. Ross and Terril soils are on foot slopes above the Coffeen soil. Included soils make up 3 to 15 percent of the unit.

Water and air move through the Coffeen soil at a moderate rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 1 to 3 feet below the surface in spring. Available water capacity is very high. Organic matter content is moderate. The shrink-swell potential is low, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. Because of the flooding, it generally is unsuited to use as a site for dwellings and septic tank absorption fields.

In the areas used for soybeans or corn, the seasonal high water table or flooding delays planting in most years. Floodwater occasionally damages crops. Installing surface ditches or subsurface drains lowers the water table. Tilling when the soil is wet causes surface cloddiness, excessive runoff, and excessive erosion. Returning crop residue to the soil and minimizing tillage help to maintain good tilth and increase the rate of water infiltration.

The land capability classification is IIw.

451—Lawson silt loam. This nearly level, somewhat poorly drained soil is on flood plains. It is frequently flooded for brief periods from March through May. Individual areas are irregular in shape and range from 10 to 425 acres.

Typically, the surface layer is very dark gray, friable silt loam about 7 inches thick. The subsurface layer is very dark gray, dark brown, and very dark grayish brown, friable silt loam about 28 inches thick. The underlying material to a depth of 60 inches or more is grayish brown, mottled, friable silt loam. In some areas the dark colored surface soil is thinner. In some places the surface soil is lighter in color. In other places the soil contains more sand.

Included with this soil in mapping are small areas of the well drained Hickory soils. These soils are on side slopes above the Lawson soil. They make up 5 to 8 percent of the unit.

Water and air move through the Lawson soil at a moderate rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 1 to 3 feet below the surface in spring. Available water capacity is very high. Organic matter content is high. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. Because of the flooding, it generally is unsuited to use as a site for dwellings and septic tank absorption fields.

In areas used for soybeans or corn, the seasonal high water table or flooding delays planting in most years. Floodwater occasionally damages crops. Installing surface ditches or subsurface drains lowers the water table. Tilling when the soil is wet causes surface cloddiness, excessive runoff, and excessive erosion. Returning crop residue to the soil and minimizing tillage help to maintain good tilth and increase the rate of water infiltration.

The land capability classification is IIw.

470B—Keller silt loam, 2 to 5 percent slopes. This gently sloping, somewhat poorly drained soil is on the side slopes of drainageways in the uplands. Individual areas are irregular in shape and range from 2 to 30 acres.

Typically, the surface layer is very dark gray, friable silt loam about 10 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is dark grayish brown and grayish brown, mottled, friable silty clay loam. The next part is gray, mottled, friable and firm silty clay loam. The lower part is gray, mottled, firm clay loam. In some areas the surface layer is thinner.

Included with this soil in mapping are small areas of the somewhat poorly drained Herrick and Ipava soils. These soils are on broad ridges above the Keller soil. They make up less than 10 percent of the unit.

Water and air move through the upper part of the Keller soil at a moderate rate and through the lower part at a slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is perched at a depth of 1 to 3 feet in spring. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

Measures that control water erosion are needed in areas used for soybeans, corn, or small grain. These include a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces. Tilling when the soil is wet causes surface cloddiness, surface compaction, excessive runoff, and

excessive erosion. Returning crop residue to the soil and regularly adding other organic material help to maintain tilth and fertility.

The seasonal high water table is a limitation if this soil is used as a site for dwellings. Also, the shrink-swell potential is a limitation on sites for dwellings without basements. Installing foundation drains lowers the water table. Reinforcing footings and foundations helps to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and moderately slow or slow permeability are limitations. Installing underground drains lowers the water table. Enlarging the absorption area improves the absorption of liquid waste.

The land capability classification is IIe.

517—Marine silt loam. This nearly level, somewhat poorly drained soil is on broad ridges in the uplands. Individual areas are irregular in shape and range from 3 to 300 acres.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is light brownish gray, mottled, friable silt loam about 3 inches thick. The subsoil extends to a depth of 60 inches or more. In sequence downward, it is brown, mottled, friable silty clay loam; pale brown and light yellowish brown, mottled, firm silty clay; pale brown, mottled, firm silty clay loam; and light brownish gray, mottled, friable silt loam. In some areas the upper part of the subsoil has less clay. In other areas the surface layer is darker. In some places the seasonal high water table is below a depth of 2 feet. In other places the lower part of the subsoil has more sand.

Water and air move through this soil at a slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is perched at a depth of 1 to 2 feet in spring. Available water capacity is high. Organic matter content is moderately low. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

In areas used for corn, soybeans, or small grain, installing a drainage system helps to lower the seasonal high water table. Tile drains and surface drains work well if suitable outlets are available. Minimizing tillage and returning crop residue to the soil help to maintain tilth and fertility.

If this soil is used as a site for dwellings, the seasonal high water table and shrink-swell potential are limitations. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile drains at the base of foundations lowers the water table.

If this soil is used as a site for septic tank absorption fields, the seasonal high water table and slow permeability are limitations. Installing underground drains lowers the water table. Enlarging the absorption area improves the absorption of liquid waste.

The land capability classification is IIw.

536—Dumps, mine. This map unit consists of nearly level to very steep accumulations of refuse from the washing and separating of coal. Individual areas are irregularly shaped or fan shaped and range from 2 to 260 acres.

The material consists of shale, siltstone, and coal fragments, sandstone cobbles, and loamy spoil material from the overburden. It is dominantly gray and black in unburned areas and red in burned areas. Escarpments are near water areas and adjacent to areas of natural soil.

Surface runoff is ponded or slow to very rapid. The material is compacted and erodes easily. The material and the included water areas are extremely acid. Because of the acidity, runoff from this material is toxic to most plants. The nearly level areas are wet.

Areas of this unit are idle. They generally support no vegetation, but some small areas support cottonwood, wild cherry, and boxelder.

Some areas have potential for low-intensity recreational uses, such as shooting ranges and paths and trails. The major management concerns are wetness in the nearly level areas and water erosion and toxic runoff in the more sloping areas. Reclamation requires grading, land shaping, and additions of soil material that can support vegetation. The feasibility and extent of reclamation should be based on an onsite investigation and an evaluation of the intended use.

This unit is not assigned a land capability classification.

587B—Terril loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on foot slopes and alluvial fans. Individual areas are irregular in shape and range from 2 to 21 acres in size.

Typically, the surface layer is very dark grayish brown, friable loam about 13 inches thick. The subsurface layer is about 20 inches of black, friable loam and clay loam. The subsoil extends to a depth of 60 inches or more. It is very dark grayish brown and

mottled. The upper part is clay loam. The lower part is loam. In some areas the seasonal high water table is within a depth of 6 feet.

Included with this soil in mapping are small areas of the well drained Hickory soils and the somewhat poorly drained Coffeen and Lawson soils. Hickory soils are on side slopes above the Terril soil. Coffeen and Lawson soils are on flood plains below the Terril soil. Included soils make up 3 to 8 percent of the unit.

Water and air move through the Terril soil at a moderate rate. Surface runoff is medium in cultivated areas. Available water capacity is high. Organic matter content also is high. The shrink-swell potential is low, and the potential for frost action is moderate.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay and to use as a site for dwellings and septic tank absorption fields.

Measures that control water erosion are needed in areas used for soybeans, corn, or small grain. These include a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces. Returning crop residue to the soil and regularly adding other organic material help to maintain tilth and fertility.

If this soil is used as a site for dwellings or septic tank absorption fields, mulching is needed to control water erosion until a permanent plant cover is established on the construction site.

The land capability classification is IIe.

620B—Darmstadt silt loam, 2 to 5 percent slopes. This gently sloping, somewhat poorly drained soil is on the side slopes of drainageways and low ridges in the uplands. It has a high sodium content in the lower part of the subsoil. Individual areas are irregular in shape and range from 2 to 45 acres.

Typically, the surface layer is dark brown, friable silt loam about 8 inches thick. The subsoil to a depth of 60 inches or more is friable silty clay loam. The upper part is yellowish brown and brown. The next part is dark yellowish brown. The lower part is yellowish brown and pale brown. In some areas the subsoil has more sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Herrick, Marine, and Oconee soils and the poorly drained Huey soils. Herrick, Oconee, and Marine soils have less sodium and more clay in the subsoil than the Darmstadt soil. All of the included soils are on broad flats below the Darmstadt soil. They make up 5 to 10 percent of the unit.

Water and air move through the Darmstadt soil at a very slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is perched at a depth of 1 to 3 feet in spring. Available water capacity is moderate. Organic matter content is moderately low. The shrink-swell potential is moderate, and the potential for frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to pasture and hay and to use as habitat for woodland wildlife. It is moderately suited to cultivated crops, pasture, and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

In areas used for corn, soybeans, or small grain, water erosion is a hazard. It can be controlled by a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, or terraces. The high content of sodium in the subsoil results in moisture stress during dry periods and excess moisture during wet periods. Also, it restricts the availability and uptake of some plant nutrients.

Establishing pasture plants or hay helps to control erosion. Bromegrass, orchardgrass, tall fescue, and alsike clover are suited to this soil. Rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition.

If this soil is used as a site for dwellings, the seasonal high water table and shrink-swell potential are limitations. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile drains at the base of foundations lowers the water table.

The seasonal high water table and very slow permeability are limitations if this soil is used as a site for septic tank absorption fields. A septic tank system works well if a sealed sand filter and a disinfection tank or an evapotranspiration bed are installed. Sewage lagoons work well if the site has been leveled.

The land capability classification is IIIe.

660C2—Coatsburg silt loam, 4 to 7 percent slopes, eroded. This moderately sloping, poorly drained soil is on the side slopes of drainageways in the uplands. Individual areas are irregular in shape and range from 5 to 125 acres.

Typically, the surface layer is very dark grayish brown, friable silt loam. Water erosion has thinned the surface layer to a thickness of about 7 inches. The subsoil extends to a depth of 60 inches or more. It is mottled. The upper part is dark grayish brown and grayish brown, firm silty clay. The lower part is dominantly gray and grayish brown, firm clay. In some areas the surface layer is thicker. In the more eroded

areas, it is silty clay loam or clay loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Keller and Ipava soils. Keller soils are on side slopes above the Coatsburg soil. Ipava soils are on broad ridges above the Coatsburg soil. Included soils make up less than 10 percent of the unit.

Water and air move through the Coatsburg soil at a very slow rate. Surface runoff is rapid in cultivated areas. The seasonal high water table is perched within a depth of 1 foot in spring. Available water capacity is moderate. Organic matter content also is moderate. The shrink-swell potential and the potential for frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to pasture and hay. It is moderately suited to cultivated crops. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn or soybeans, further water erosion is a severe hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, and terraces help to control water erosion and maintain soil productivity. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water infiltration.

Establishing pasture plants or hay helps to control water erosion. Reed canarygrass, tall fescue, and alsike clover are suited to this soil. Timely deferment of grazing helps to prevent surface compaction, excessive runoff, and excessive erosion. Tilling the pasture on the contour when a seedbed is prepared also helps to prevent excessive runoff and erosion.

If this soil is used as a site for dwellings, the seasonal high water table and shrink-swell potential are limitations. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Installing tile drains at the base of foundations helps to lower the water table.

The seasonal high water table and very slow permeability are limitations if this soil is used as a site for septic tank absorption fields. Installing subsurface interceptor tile drains higher on the side slopes than the absorption field lowers the water table. Specially designed systems that include sand filters improve the absorption of liquid waste.

The land capability classification is IIIe.

784G—Berks loam, 30 to 60 percent slopes. This very steep, well drained soil is on side slopes along drainageways in the uplands. Individual areas are long and narrow and range from 5 to 30 acres.

Typically, the surface layer is dark grayish brown, friable loam about 4 inches thick. The subsoil is light yellowish brown and brownish yellow very channery loam about 16 inches thick. Sandstone or siltstone bedrock is at a depth of about 20 inches.

Included with this soil in mapping are small areas of the well drained Hickory and Fayette soils, the moderately well drained Rozetta soils, and the somewhat poorly drained Atlas and Wakeland soils. Hickory and Atlas soils are on side slopes above the Berks soil. Fayette and Rozetta soils are on ridgetops above the Berks soil. Wakeland soils are on flood plains below the Berks soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the Berks soil at a moderate or moderately rapid rate. Surface runoff is rapid. Available water capacity is very low. Organic matter content is moderately low. The shrink-swell potential and the potential for frost action are low.

In most areas this soil is used as woodland. It is poorly suited to use as woodland. It generally is unsuited to cultivated crops, pasture, and hay and to use as a site for dwellings and septic tank absorption fields. The main limitations are the slope and the hazard of water erosion.

In the areas used as woodland, the hazard of water erosion and the equipment limitation are management concerns because of the slope. Seedling mortality is a concern because of the very low available water capacity, which results from the content of rock fragments in the soil and the depth to bedrock. Laying out logging roads and skid trails on or nearly on the contour helps to prevent excessive runoff and erosion. Skidding logs or trees uphill with a cable and winch also helps to prevent excessive runoff and erosion. Grass firebreaks, instead of bare soil, are needed because of the erosion hazard. Bare areas should be seeded to grass or a grass-legume mixture. Killing or eliminating all vegetation within 2 feet of the existing trees or the seedlings reduces the rate of seedling mortality. Planting the older and larger nursery stock also reduces the rate of seedling mortality. Excluding livestock from the woodland helps to prevent the destruction of leaf mulch and desirable young trees, surface compaction, and damage to tree roots. Measures that prevent fire are needed.

The land capability classification is VIIe.

802E—Orthents, loamy, hilly. These moderately well drained soils are on berms and in spoil areas. The

berms are mainly around slurry pits and freshwater ponds on coal-mining sites. The spoil areas are adjacent to gravel pits. Individual areas are irregular in shape and range from 10 to 250 acres. Slopes range from 7 to 25 percent.

In a typical area, these soils have layers of yellowish brown to gray, friable and firm clay loam, loam, silty clay loam, and silt loam.

Included with these soils in mapping are rock piles, access roads, water areas, buildings, and parking lots. Included areas make up 2 to 10 percent of the unit.

Water and air move through the Orthents at a moderate to slow rate. Surface runoff generally is rapid. Available water capacity is moderate or high. Organic matter content is low to moderate. The potential for frost action and the shrink-swell potential are moderate.

In most areas these soils contain water or slurry near mining and quarrying operations. In some areas they are used as sites for small commercial buildings. They are moderately suited to this use.

During the construction of embankments on these soils, water erosion is a hazard. Establishing grasses and legumes helps to control erosion. Bromegrass, orchardgrass, tall fescue, alfalfa, and alsike clover are suitable. During periods when these plants are becoming established, mulching or seeding a nurse crop of rye or oats helps to control water erosion.

If these soils are used as sites for commercial buildings, the shrink-swell potential is a limitation. Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling.

These soils are not assigned a land capability classification.

941—Virden-Piasa complex. These nearly level, poorly drained soils are on broad flats in the uplands. They are subject to ponding. Individual areas are irregular in shape and range from 20 to 405 acres. They are about 60 percent Virden soil, 30 percent Piasa soil, and 10 percent other soils. The Virden and Piasa soils occur as areas so closely intermingled that they could not be separated at the scale used in mapping.

Typically, the surface layer of the Virden soil is black, friable silty clay loam about 8 inches thick. The subsurface layer is black, mottled, friable silty clay loam about 11 inches thick. The subsoil to a depth of 60 inches or more is mottled, firm silty clay loam. The upper part is very dark gray and dark gray. The lower part is gray and grayish brown. In some areas the seasonal high water table is at a depth of more than 2 feet. In other areas, the surface layer is thinner and the subsurface layer is lighter in color.

Typically, the surface layer of the Piasa soil is very dark grayish brown, friable silt loam about 7 inches thick. As the soil in recently tilled areas dries out, the surface layer becomes lighter in color than that of the Virden soil. The subsurface layer is very dark grayish brown, friable silt loam about 7 inches thick. The subsoil to a depth of 60 inches or more is mottled, firm silty clay loam. It has a high content of sodium. The upper part is dark grayish brown. The next part is olive gray, olive, and grayish brown. The lower part is light brownish gray. In some areas the surface layer is lighter in color. In other areas, the surface layer is thinner and the subsurface layer is lighter in color.

Water and air move through the Virden soil at a moderately slow rate and through the Piasa soil at a very slow rate. Surface runoff is slow to ponded on both soils. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below in spring. Available water capacity is high in the Virden soil and moderate in the Piasa soil. Organic matter content is high in the Virden soil and moderate in the Piasa soil. The shrink-swell potential and the potential for frost action are high in both soils.

In most areas these soils are used for cultivated crops. They are moderately suited to cultivated crops, pasture, and hay. They generally are unsuited to use as sites for dwellings and septic tank absorption fields because of the ponding.

In areas used for corn or soybeans, the main limitations are the seasonal high water table in both soils and the high sodium content in the subsoil of the Piasa soil. The sodium results in moisture stress during dry periods and excess moisture during wet periods. Also, it restricts the availability and uptake of some plant nutrients. In most areas the drainage system is sufficient for the production of corn, soybeans, and small grain. Measures that maintain the drainage system are needed. Surface drains work well if suitable outlets are available. Land grading helps to control ponding. Minimizing tillage and returning crop residue to the soil help to maintain tilth and fertility.

The land capability classification is IIIw.

993—Cowden-Piasa silt loams. These nearly level, poorly drained soils are on broad flats in the uplands. They are subject to ponding. Individual areas are irregular in shape and range from 50 to more than 5,000 acres. They are about 60 percent Cowden soil, 30 percent Piasa soil, and 10 percent other soils. The Cowden and Piasa soils occur as areas so closely intermingled that they could not be separated at the scale used in mapping.

Typically, the surface layer of the Cowden soil is very dark gray, friable silt loam about 8 inches thick. The subsurface layer is dark grayish brown, mottled, friable silt loam about 5 inches thick. The subsoil is dark gray and grayish brown, mottled, firm silty clay loam about 42 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray and grayish brown, mottled, friable silt loam. In some areas the surface layer is lighter in color. In other areas it is thicker. In places the seasonal high water table is at a depth of more than 2 feet.

Typically, the surface layer of the Piasa soil is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam. It is about 6 inches thick. The subsoil to a depth of 60 inches or more is mottled, firm silty clay loam. It has a high content of sodium. The upper part is dark grayish brown and grayish brown. The lower part is gray. In some areas the surface layer is thinner. In other areas it is lighter in color.

Water and air move through the Cowden soil at a slow rate and through the Piasa soil at a very slow rate. Surface runoff is slow to ponded on both soils. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below in spring. Available water capacity is high in the Cowden soil and moderate in the Piasa soil. Organic matter content is moderate in both soils. The shrink-swell potential and the potential for frost action are high.

Most areas are used for cultivated crops. The Cowden soil is well suited to cultivated crops, and the Piasa soil is moderately suited. Both soils are well suited to pasture and hay. They generally are unsuited to use as sites for dwellings and septic tank absorption fields because of the ponding.

In areas used for corn or soybeans, the seasonal high water table in both soils and the high content of sodium in the subsoil of the Piasa soil are limitations. The sodium results in moisture stress during dry periods and excess moisture during wet periods. Also, it restricts the availability and uptake of some plant nutrients. In most areas the drainage system is sufficient for the production of corn, soybeans, and small grain. Measures that maintain the drainage system are needed. Surface drains function satisfactorily where suitable outlets are available. Land grading helps to control ponding. Minimizing tillage and returning crop residue to the soil help to maintain tilth and fertility.

The land capability classification is IIIw.

995—Herrick-Piasa silt loams. These nearly level soils are in the uplands. The somewhat poorly drained Herrick soil is on low, broad ridges. The poorly drained Piasa soil is on broad flats. It is subject to ponding. Individual areas are irregular in shape and range from 20 to 2,000 acres. They are about 60 percent Herrick soil, 30 percent Piasa soil, and 10 percent other soils. The Herrick and Piasa soils occur as areas so closely intermingled that they could not be mapped separately at the scale used in mapping.

Typically, the surface layer of the Herrick soil is very dark gray, friable silt loam about 8 inches thick. The subsurface layer is dark grayish brown, mottled, friable silt loam about 11 inches thick. The subsoil to a depth of 60 inches or more is grayish brown and brown, mottled, friable silty clay loam. In places the subsurface layer is thinner.

Typically, the surface layer of the Piasa soil is very dark grayish brown, friable silt loam about 7 inches thick. The subsurface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. It is mottled and has a high content of sodium. In sequence downward, it is dark grayish brown, firm silty clay loam; grayish brown, firm silty clay loam; dark grayish brown and yellowish brown, firm silty clay loam; and gray, friable silt loam.

Water and air move through the Herrick soil at a moderately slow rate and through the Piasa soil at a very slow rate. Surface runoff is slow on the Herrick soil and slow to ponded on the Piasa soil. The seasonal high water table in the Herrick soil is at a depth of 1 to 3 feet in spring, and that in the Piasa soil is 0.5 foot above the surface to 2.0 feet below in late winter and in spring. Available water capacity is high in the Herrick soil and moderate in the Piasa soil. Organic matter content is moderate in both soils. The potential for frost action and shrink-swell potential are high.

In most areas these soils are used for cultivated crops. They are moderately suited to cultivated crops. They are well suited to pasture and hay. They are poorly suited to use as sites for dwellings and septic tank absorption fields.

In areas used for corn, soybeans, or small grain, the main limitations are the seasonal high water table in both soils and the high content of sodium in the subsoil of the Piasa soil. The sodium results in moisture stress during dry periods and excess moisture during wet periods. Also, it restricts the availability and uptake of some plant nutrients. A combination of subsurface drains and surface inlets or shallow ditches helps to remove excess water. Leaving crop residue on the surface reduces the evaporation rate. Tilling when the

soil is wet causes surface compaction and surface cloddiness and decreases the rate of water infiltration. Minimizing tillage, returning crop residue to the soil, and adding other organic material increase the water infiltration rate and improve tilth.

If these soils are used as sites for dwellings, the seasonal high water table and shrink-swell potential are limitations. Backfilling with sand and gravel and reinforcing footings and foundations help to prevent the structural damage caused by shrinking and swelling. Installing subsurface drains around the footings helps to lower the water table. Establishing or maintaining lawns on the Piasa soil is difficult because of the high content of sodium. Spreading topsoil on the site and frequently watering during dry periods help to establish and maintain the lawn.

The seasonal high water table and moderately slow or very slow permeability are limitations if these soils are used as sites for septic tank absorption fields. Also, excess sodium causes dispersion of the Piasa soil. The dispersion occurs when the soil is saturated. It reduces the absorption rate. Septic tank systems work well only if a sealed sand filter and a disinfection tank or an evapotranspiration bed are installed.

The land capability classification is IIIw.

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 the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban and built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 357,761 acres in Macoupin County, or nearly 64 percent of the total acreage, meets the requirements for prime farmland. Associations 1, 2, 3, 5, and 6, which are described under the heading "General Soil Map Units," have the highest percentage, but prime farmland is throughout the county. About 330,000 acres of the prime farmland is used for crops, mainly corn and soybeans, which account for most of the local agricultural income each year.

A recent trend in land use in some parts of the county 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 Macoupin County that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. 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 for 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 in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures. In Macoupin County most of the naturally wet soils have been adequately drained.

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 avoid 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 behavior 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 in 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 recreation 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 in harmony with the natural soil.

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

John Paden, district conservationist, Soil 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 Soil 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 "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 396,700 acres in Macoupin County is cropland, and 56,000 acres is used for hay or pasture *(4)*. The soils have good potential for increased production of crops, particularly corn and soybeans. This soil survey can be used as a valuable guide to the latest management techniques that increase food and fiber production.

Water erosion is a major management concern *(4)*. In 1983, an estimated 124,000 acres of cropland was eroding at a rate of more than 5 tons of soil per acre, which is the recommended tolerance rate. Soils that have a slope of 2 percent or more are susceptible to excessive water erosion. In areas with less than 2 percent slopes, water erosion may be a problem if runoff is concentrated. Some soils are so eroded that little or no surface soil remains. Atlas silty clay loam, 5 to 10 percent slopes, severely eroded, is an example.

Water erosion is damaging for three reasons. First, soil productivity is reduced as the surface layer is lost and the subsoil becomes incorporated into the plow layer. Valuable nutrients are lost along with the surface layer. Second, erosion causes deterioration of soil tilth and reduces the rate of water infiltration. It is especially damaging on soils that have a clayey or unfavorable subsoil or have a root-restricting layer near the surface. Cowden, Marine, and Rushville soils are examples of soils that have a clayey subsoil. Darmstadt, Huey, and Piasa soils have an unfavorable subsoil that is high in content of exchangeable sodium. Hosmer soils have an

unfavorable subsoil that is so firm and brittle that root penetration is difficult. The clayey soils tend to be cloddy if worked when too wet and crust after a hard rain. On these soils, preparation of a good seedbed is difficult. Third, erosion allows sediment to enter drainage ditches, road ditches, streams, and lakes. Removing this sediment is very expensive. Management that controls erosion also helps to prevent sedimentation and improves water quality for municipal and recreational uses and for fish and wildlife.

Conservation practices that provide a protective plant cover, increase the rate of water infiltration, and reduce the runoff rate help to control water erosion. The following paragraphs describe some of the conservation practices that are suitable on the cropland in Macoupin County. In many areas a combination of these practices is needed to control water erosion. The combination needed depends on the soil characteristics and the topography.

A conservation cropping system provides a plant cover for extended periods. It is a combination of a cropping sequence and the needed cultural and management measures. Grasses and legumes commonly are included in the cropping sequence. The protective cover provided by these plants reduces the runoff rate, helps to control water erosion, provides nitrogen, and improves tilth. The grasses and legumes also provide feed for livestock or can be sold for cash. Bromegrass, orchardgrass, reed canarygrass, tall fescue, alfalfa, alsike clover, and red clover are commonly included in the cropping system.

Terraces are effective in controlling water erosion on the more sloping soils. They intercept runoff and conduct it to a stable outlet at a nonerosive velocity. They are a series of embankments or of ridges and channels that are properly spaced and have a proper grade. Outlets may be grassed waterways or tile outlets. There are several different types of terraces. If various types and designs are used, many of the gently sloping and moderately sloping soils in the county can be terraced. Atlas, Fishhook, and other soils in areas where the topography is irregular and slopes commonly are short and steep, however, are not suitable for terracing. Conversion to other uses, such as pasture, hay, or woodland, is desirable in areas of these soils.

Grassed waterways in drainageways safely dispose of runoff. They help to prevent gully erosion and provide outlets for terraces. Other conservation practices are contour farming and conservation tillage. Contour farming is most effective in areas where the slope is 7 percent or less. It commonly is used in combination with terraces. Conservation tillage is a system of tillage that maintains a protective amount of crop residue on the surface throughout the year. No-till and ridge-till are examples.

Information about the design of conservation practices is available at the office of the Macoupin County Soil and Water Conservation District.

Under the right climatic conditions, most of the soils in nearly level areas are susceptible to soil blowing. Maintaining a plant cover or a surface mulch and using tillage methods that leave the surface rough help to control soil blowing. Windbreaks also help to control soil blowing.

A drainage system is needed on much of the farmland in the county. Unless the poorly drained and somewhat poorly drained soils are artificially drained, the seasonal high water table can damage crops or delay planting or harvesting in most years. About 31 percent of the cropland is in areas of poorly drained soils. These include the Otter and Colo soils on flood plains and the Cowden, Rushville, and Virden soils in the uplands. About 58 percent of the cropland is in areas of somewhat poorly drained soils. The most extensive of these are Keomah, Herrick, Ipava, Marine, and Oconee soils. The Wakeland and Lawson soils on flood plains also are somewhat poorly drained.

The design of drainage systems differs from soil to soil. Surface ditches and tile are needed in some areas. Also, measures that control flooding are needed in areas that are subject to damaging overflow during the growing season. Standard tile lines do not function well in upland soils that are slowly permeable or very slowly permeable. Cowden, Piasa, and Virden soils are examples. Surface ditches or a combination of scattered tile lines and surface inlets are needed in areas of these soils. In some areas land leveling helps to prevent shallow ponding.

Natural fertility is low in soils that have a high content of sodium in the subsoil. The excessive amounts of sodium in Darmstadt, Huey, and Piasa soils interfere with the availability and uptake of some plant nutrients. Returning crop residue to the soil and regularly adding manure and other organic material improve fertility and help to maintain tilth.

Natural fertility is high in Herrick, Lawson, Virden, and other soils that have a thick, dark surface layer. These soils formed under prairie grasses or were greatly influenced by those grasses. They have a deep root zone and a high or very high available water capacity.

Natural fertility is medium in Keomah, Marine,

Rozetta, Rushville, and other soils that formed under forest vegetation and have a light colored surface layer. The supply of available phosphorus and potash is low in some of these soils. Soil tests are needed to determine the amounts of lime and fertilizer needed. Assistance in determining the proper kinds or amounts of fertilizer and lime is available at the local office of the Cooperative Extension Service.

Tilth has an important effect on seed germination and the rate of water infiltration. Soils having a silt loam surface layer that is moderate or high in organic matter content are characterized by granular structure and good tilth. Cowden, Ipava, Lawson, and Oconee soils are examples.

Soils that are low in organic matter content or high in sodium content have weak structure in the surface layer. Examples are Hosmer, Rushville, and Huey soils. During periods of heavy rainfall, a crust forms on the surface. This crust is hard when dry. As a result, the rate of water infiltration decreases and the runoff rate and the hazard of water erosion increase. Returning crop residue to the soil and adding manure or other organic material improve tilth.

Tilth deteriorates as a result of water erosion. As the upper part of the subsoil is incorporated into the surface layer of eroded soils, the plow layer becomes more clayey and tilth becomes poor. As a result, the rate of water infiltration decreases and the runoff rate and the hazard of water erosion increase. The eroded soils are sticky when wet and hard and cloddy when dry. Examples are Atlas, Fishhook, Keller, and Coatsburg soils. On these soils, a conservation cropping system dominated by hay and pasture helps to control water erosion and improves tilth.

The need for an adequate amount of soil moisture during dry years is a concern in soils that have an unfavorable or root-restricting subsoil. These soils have a moderate or low available water capacity. Examples are Atlas, Fishhook, Hosmer, and Berks soils.

Bromegrass, orchardgrass, reed canarygrass, tall fescue, alfalfa, alsike clover, ladino clover, and red clover are common pasture and hay species grown in the county. All of these species grow well in areas of well drained to somewhat poorly drained soils. Poorly drained soils, such as Cowden, Rushville, and Virden soils, are better suited to reed canarygrass, ladino clover, and alsike clover than to other species. Overgrazing or grazing when the soil is wet reduces productivity and causes surface compaction and excessive runoff. Applications of fertilizer, proper stocking rates, and rotation grazing help to keep the stand productive.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents *(3)*. 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 table 6 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 Soil 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 *(8)*. 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 and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey.

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

Class VIII soils and 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 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 each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

About 78,000 acres in the county, or 14 percent of the total acreage, is woodland. Many of the wooded areas are along the major drainageways.

Table 7 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. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 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*, excessive 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*, high content of rock fragments in the soil; and *L*, low strength. 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, and L.

In table 7, *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, fire lanes, and 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 or season of use is 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.

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 feet per acre per year, indicates the amount of fiber produced on 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 is the dominant species on the soil and the one that determines the ordination class.

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

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 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 Soil Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

Only a small acreage in Macoupin County is developed for recreational uses. Scattered recreational areas are throughout the county. The most popular of these is Beaver Dam State Park. Other facilities in the county include playgrounds, swimming pools, athletic

fields, golf courses, fishing ponds, and camping and picnic areas.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for 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 recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, 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 by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

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 gentle 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

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 10, 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 or hazards 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 flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. 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, flood hazard, 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 flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and lambsquarter.

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. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian olive, autumn olive, and 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.

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. The 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, squirrel, gray fox, raccoon, and deer.

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.

In the following paragraphs, the associations described under the heading "General Soil Map Units" are grouped into three wildlife areas. Some of the plants and animals common in the three areas are specified.

Wildlife area 1 consists of the Ipava-Virden, Herrick-Virden, and Herrick-Piasa-Virden associations. The soils in this area generally are nearly level to gently sloping and are poorly drained to moderately well drained. These soils are on uplands.

This area is mainly cropland. A few small areas are pastured or wooded. Wildlife habitat is fair or poor because of a lack of adequate crop residue, herbaceous nesting and roosting cover, woody cover,

and travel lanes or hedgerows. The areas along field borders and the minor streams, the meadows, and the pastured areas provide some habitat for openland wildlife. The wildlife attracted to this area include rabbit, red fox, pheasant, and many types of songbirds.

Measures that keep pastures in good condition, measures that exclude livestock from wooded areas, a system of conservation tillage that leaves crop residue on the surface after planting, and deferment of mowing in grassy areas until August improve the habitat. Seeding roadsides, fence rows, and travel lanes to perennial plants, such as smooth bromegrass, alfalfa, and alsike clover, or allowing the perennial native grasses, such as bluestem, switchgrass, and cordgrass, to dominate helps to control undesirable weeds and provides good wildlife cover.

Wildlife area 2 consists of the Hickory-Marine-Hosmer and Hickory-Rozetta-Keomah associations. The soils in this area generally are nearly level to steep and are poorly drained to well drained. This area borders the major streams and creeks in the county. It is used as cropland, pasture, or woodland, and thus it provides habitat for a variety of wildlife. Wildlife habitat generally is good, especially in the areas of woodland. Wildlife attracted to this area include deer, squirrel, raccoon, pheasant, rabbit, opossum, snakes, turtles, owls, doves, and many other birds.

Native trees, shrubs, and prairie plants provide the best cover if measures that exclude grazing livestock are applied. The habitat can be improved by leaving crop residue on the surface after harvest, establishing food plots of grain crops and strips of grass or grass-legume mixtures, deferring the mowing of grassy areas until August, and establishing hedgerows and windbreaks that include trees and shrubs that bear fruit and nuts.

Wildlife area 3 consists of the Coffeen-Lawson-Wakeland association. The soils in this area generally are nearly level to moderately steep and are poorly drained to well drained. This area includes the bottom land and terraces along the major streams and creeks. It is used as cropland, woodland, or pasture, and thus it provides habitat for a variety of both upland and wetland wildlife. Wildlife habitat generally is good or fair. Wildlife attracted to this area include deer, squirrel, rabbit, raccoon, opossum, muskrat, snakes, turtles, frogs, owls, doves, ducks, and many other types of birds and waterfowl.

Native trees, shrubs, and wetland plants provide the best cover if measures that exclude grazing livestock are applied. The habitat can be improved by leaving crop residue on the surface after harvest and establishing food plots of grain crops. Wetland habitat can be improved by establishing or preserving areas of open water, by increasing the capacity of ditches, pits, dikes, and levees to retain water, and by planting millet, buckwheat, sorghum, corn, and other crops that provide food for waterfowl.

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. The ratings are given in the following tables: 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 need to 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 kind 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 (1) evaluate the

potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) 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 11 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 the 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, shrink-swell potential, 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 12 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.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. 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.

Table 12 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 due to rapid permeability of 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 needs to be considered.

The ratings in table 12 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 type 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 type 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 the 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 soil blowing.

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

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 13 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 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 the depth to the water table is 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. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, 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 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 14 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 and for embankments, dikes, and levees. 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.

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 potential 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, or 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 reduce 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 soil blowing 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 soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or 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. These results are reported in table 18.

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 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.

Engineering Index Properties

Table 15 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 "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. "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 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. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 18.

Rock fragments larger than 3 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 16 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.

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, and 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.

Permeability refers to the ability of a soil to transmit water or air. The estimates 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. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

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.

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 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 change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) 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. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

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 soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.
3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous, loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.
5. Loamy soils that are less than 20 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.
6. Loamy soils that are 20 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.
7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.
8. Stony or gravelly soils and other soils not subject to soil blowing.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, 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.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils 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 permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 17, 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 or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 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; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that is occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months.

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 absence of distinctive horizons that form in soils that are not subject to flooding.

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 depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; 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 table 17.

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.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

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.

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 creates a severe corrosion environment. 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.

Engineering Index Test Data

Table 18 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series described in the section "Soil Series and Their Morphology." The soil samples were tested by the Illinois Department of Transportation.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); and Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(9)*. 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 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten 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 a udic moisture regime, 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; 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 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 known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that 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 class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, mesic Typic Hapludalfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the underlying material can differ within a series.

Soil Series and Their Morphology

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

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 (7)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (9)*. Unless otherwise stated, 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."

Assumption Series

The Assumption series consists of moderately well drained, moderately slowly permeable soils on side

slopes along drainageways in the uplands. These soils formed in a thin mantle of loess and in glacial till. Slopes range from 2 to 10 percent.

Typical pedon of Assumption silt loam, 2 to 5 percent slopes, 285 feet west and 925 feet south of the northeast corner of sec. 31, T. 9 N., R. 9 W.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; very friable; common very fine roots; medium acid; clear smooth boundary.

A—5 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; common fine roots; medium acid; clear smooth boundary.

Bt1—11 to 21 inches; brown (10YR 5/3) silty clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—21 to 26 inches; brown (10YR 5/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and few fine prominent yellowish red (5YR 5/8) mottles; moderate fine and medium subangular blocky structure; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt3—26 to 35 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; weak fine and medium subangular blocky structure; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; neutral; clear smooth boundary.

2Btg1—35 to 54 inches; gray (5Y 5/1) silty clay loam; common fine prominent yellowish brown (10YR 5/6) and few medium prominent strong brown (7.5YR 5/8) mottles; weak fine prismatic structure; firm; neutral; gradual smooth boundary.

2Btg2—54 to 60 inches; gray (5Y 5/1) clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; firm; neutral.

The solum ranges from 55 to more than 60 inches in thickness. The dark colored surface soil ranges from 7 to 18 inches in thickness.

The Ap and A horizons have value of 2 or 3 and chroma 1 to 3. They are silt loam or silty clay loam. The Bt horizon has value of 3 to 5 and chroma of 2 to 4. It is silt loam or silty clay loam. The 2Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2.

Assumption silt loam, 2 to 5 percent slopes, eroded, and Assumption silt loam, 5 to 10 percent slopes, eroded, have a thinner dark colored surface soil than is definitive for the series. This difference, however, does not affect the usefulness or behavior of the soils.

Atlas Series

The Atlas series consists of somewhat poorly drained, very slowly permeable soils on side slopes in the uplands. These soils formed in less than 20 inches of loess or pedisediment and in the underlying glacial till, which has a strongly developed paleosol. Slopes range from 5 to 20 percent.

Typical pedon of Atlas silt loam, 10 to 15 percent slopes, eroded, 360 feet east and 1,760 feet north of the center of sec. 29, T. 8 N., R. 6 W.

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; mixed with yellowish brown (10YR 5/4) subsoil material; weak very fine and fine granular structure; friable; common very fine roots; neutral; abrupt smooth boundary.

Bt—7 to 12 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint yellowish brown (10YR 5/6) and few fine distinct dark yellowish brown (10YR 4/6) mottles; moderate fine and medium subangular blocky structure; friable; common very fine roots; common distinct brown (10YR 5/3) clay films on faces of peds; very strongly acid; clear smooth boundary.

2Btg1—12 to 20 inches; light brownish gray (2.5Y 6/2) clay loam; many medium prominent yellowish brown (10YR 5/6) and few medium prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few very fine roots; few distinct strong brown (7.5YR 4/6) and many distinct brown (10YR 5/3) clay films on faces of peds; very strongly acid; clear smooth boundary.

2Btg2—20 to 29 inches; light brownish gray (2.5Y 6/2) clay loam; many medium prominent strong brown (7.5YR 5/6) mottles; moderate coarse subangular blocky structure; firm; few very fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; 3 percent pebbles; strongly acid; gradual smooth boundary.

2Btg3—29 to 39 inches; light brownish gray (2.5Y 6/2) clay loam; common medium prominent strong brown (7.5YR 5/8 and 5/6) mottles; moderate coarse prismatic structure; firm; few very fine roots;

common distinct grayish brown (10YR 5/2) clay films on faces of peds; common medium accumulations (iron and manganese oxides); 3 percent pebbles; strongly acid; gradual smooth boundary.

2Btg4—39 to 49 inches; light brownish gray (2.5Y 6/2) clay loam; common coarse prominent strong brown (7.5YR 4/6) mottles; moderate coarse prismatic structure; firm; common distinct grayish brown (10YR 5/2) clay films on faces of peds; common medium accumulations (iron and manganese oxides); 3 percent pebbles; medium acid; gradual smooth boundary.

2Btg5—49 to 60 inches; light brownish gray (2.5Y 6/2) clay loam; common medium prominent strong brown (7.5YR 4/6) mottles; weak coarse prismatic structure; firm; common distinct grayish brown (10YR 5/2) clay films on faces of peds; few medium accumulations (iron and manganese oxides); neutral.

The solum is 55 to more than 60 inches thick. It ranges from very strongly acid to mildly alkaline. The overlying silty material is less than 20 inches thick.

The Ap horizon has value of 4 or 5. It is silt loam or silty clay loam. Some pedons have a thin E horizon, which has hue of 10YR, value of 4 or 5, and chroma of 1 to 3. The Bt horizon has value of 4 to 6 and chroma of 3 or 4. The 2Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of less than 3. It is clay loam, silty clay loam, or clay. Some pedons have a 2Cg horizon within a depth of 60 inches. This horizon is loam or clay loam. It is slightly acid to mildly alkaline.

Berks Series

The Berks series consists of well drained, moderately permeable and moderately rapidly permeable soils on side slopes in the uplands. These soils formed in material weathered from sandstone or siltstone. Slopes range from 30 to 60 percent.

Typical pedon of Berks loam, 30 to 60 percent slopes, 1,240 feet north and 100 feet west of the southeast corner of sec. 10, T. 12 N., R. 9 W.

A—0 to 4 inches; dark grayish brown (10YR 4/2) loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

Bw1—4 to 14 inches; light yellowish brown (10YR 6/4) very channery loam; few fine distinct strong brown (7.5YR 5/8) mottles; weak fine and medium subangular blocky structure; friable; many fine and few coarse roots; 40 percent sandstone fragments; medium acid; gradual smooth boundary.

Bw2—14 to 20 inches; brownish yellow (10YR 6/6) very channery loam; few fine distinct strong brown (7.5YR 5/8) mottles; weak fine and medium subangular blocky structure; friable; many medium and few coarse roots; 60 percent sandstone fragments; very strongly acid; abrupt smooth boundary.

R—20 inches; sandstone bedrock.

The solum ranges from 18 to 40 inches in thickness. The depth to bedrock ranges from 20 to 40 inches.

The A horizon has value of 3 to 5 and chroma of 2 to 4. It is silt loam or loam. The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 7. It is silt loam, loam, or silty clay loam and is 20 to 60 percent channers, by volume. Some pedons have a C horizon. This horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 6. It is loam or silt loam. The bedrock is sandstone or siltstone.

Camden Series

The Camden series consists of moderately well drained, moderately permeable soils on side slopes on stream terraces. These soils formed in loess and in glacial outwash. Slopes range from 5 to 12 percent.

Typical pedon of Camden silt loam, 5 to 12 percent slopes, eroded, 1,640 feet east and 2,760 feet south of the northwest corner of sec. 20, T. 9 N., R. 8 W.

Ap—0 to 6 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many very fine roots; medium acid; abrupt smooth boundary.

Bt1—6 to 13 inches; yellowish brown (10YR 5/6) silty clay loam; moderate fine subangular blocky structure; firm; many very fine roots; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; about 15 percent of total is sand, mostly very fine sand; medium acid; clear smooth boundary.

Bt2—13 to 21 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium prismatic structure parting to medium subangular blocky; firm; many very fine roots; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; medium acid; clear smooth boundary.

Bt3—21 to 27 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; common very fine roots; common

distinct dark brown (7.5YR 4/4) clay films on faces of peds; many distinct silt coatings on faces of peds, very pale brown (10YR 7/3) dry; medium acid; clear smooth boundary.

2Bt4—27 to 40 inches; strong brown (7.5YR 5/6) clay loam; moderate medium prismatic structure; friable; common distinct dark brown (7.5YR 4/4) clay films on faces of peds; medium acid; clear smooth boundary.

2Bt5—40 to 54 inches; strong brown (7.5YR 5/6) clay loam; weak medium prismatic structure; friable; very few distinct dark brown (7.5YR 4/4) clay films on faces of peds; slightly acid; gradual smooth boundary.

2C—54 to 60 inches; strong brown (7.5YR 5/6) loam; massive; friable; few faint dark brown (7.5YR 4/4) clay films in root channels; slightly acid.

The solum ranges from 44 to 60 inches in thickness. The Ap horizon has chroma of 2 to 4. The Bt and 2Bt horizons have value of 4 or 5 and chroma of 4 to 6. The 2Bt horizon is clay loam, loam, or silt loam. The 2C horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 1 to 8. It is sandy loam, loam, or silt loam.

Coatsburg Series

The Coatsburg series consists of poorly drained, very slowly permeable soils on side slopes at the upper ends of drainageways in the uplands. These soils formed mainly in glacial till that has a strongly developed paleosol. Slopes range from 4 to 7 percent.

The Coatsburg soils in this county have a thinner dark colored surface soil than is definitive for the series. This difference, however, does not significantly affect the usefulness or behavior of the soils.

Typical pedon of Coatsburg silt loam, 4 to 7 percent slopes, eroded, 1,240 feet south and 1,080 feet east of the northwest corner of sec. 20, T. 12 N., R. 6 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; common fine prominent dark brown (7.5YR 4/4) mottles; moderate fine granular structure; friable; few very fine roots; slightly acid; abrupt smooth boundary.

2Bt1—7 to 19 inches; dark grayish brown (10YR 4/2) silty clay; common fine distinct dark yellowish brown (10YR 4/6) mottles; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm; many distinct dark gray (10YR 4/1) clay films on faces of peds; about 3 percent pebbles and 10 percent sand; few very fine roots; strongly acid; clear smooth boundary.

2Bt2—19 to 25 inches; grayish brown (10YR 5/2) silty clay; common fine prominent strong brown (7.5YR 4/6) mottles; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; firm; many distinct dark gray (10YR 4/1) clay films on faces of peds; about 3 percent pebbles and 10 percent sand; few very fine roots; medium acid; clear smooth boundary.

2Bt3—25 to 31 inches; grayish brown (10YR 5/2) silty clay; common medium prominent strong brown (7.5YR 4/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; many distinct dark gray (10YR 4/1) clay films on faces of peds; about 3 percent pebbles and 15 percent sand; few very fine roots; medium acid; clear smooth boundary.

2Bt4—31 to 40 inches; gray (10YR 5/1) clay; many medium prominent strong brown (7.5YR 4/4 and 4/6) mottles; weak coarse prismatic structure; firm; many distinct dark gray (10YR 4/1) clay films on faces of peds; about 3 percent pebbles and 25 percent sand; medium acid; clear smooth boundary.

2Bt5—40 to 60 inches; mottled grayish brown (10YR 5/2), yellowish brown (10YR 5/8), strong brown (7.5YR 4/6), and grayish brown (2.5Y 5/2) clay; weak coarse prismatic structure; firm; common distinct dark gray (10YR 4/1) clay films on faces of peds; about 3 percent pebbles and 25 percent sand; slightly acid.

The solum ranges from 50 to more than 60 inches in thickness. The Ap horizon has value of 2 or 3. The 2Bt horizon has hue of 10YR, 2.5Y, or 5Y and value of 4 to 6. It is clay, silty clay, clay loam, or silty clay loam.

Coffeen Series

The Coffeen series consists of somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in recent alluvial sediments. Slopes range from 0 to 3 percent.

Typical pedon of Coffeen silt loam, 0 to 3 percent slopes, 1,060 feet south and 2,600 feet west of the northeast corner of sec. 21, T. 9 N., R. 9 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common fine roots; few distinct pale brown (10YR 6/3) silt coatings on faces of peds; neutral; abrupt smooth boundary.

A—8 to 18 inches; very dark grayish brown (10YR 3/2)

silt loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure parting to moderate fine granular; friable; common fine roots; few iron stains; neutral; clear smooth boundary.

Bw—18 to 24 inches; dark grayish brown (10YR 4/2) silt loam; common medium prominent strong brown (7.5YR 5/6) and few medium distinct dark brown (7.5YR 4/2) mottles; moderate medium subangular blocky structure; friable; common fine roots; few iron and manganese stains; few distinct light brownish gray (10YR 6/2) silt coatings on faces of peds; very dark gray (10YR 3/1) organic stains on faces of peds; neutral; clear smooth boundary.

Bg—24 to 36 inches; grayish brown (10YR 5/2) silt loam; common fine prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common iron and manganese stains; few distinct light brownish gray (10YR 6/2) silt coatings on faces of peds; very dark gray (10YR 3/1) organic stains on faces of peds; neutral; clear smooth boundary.

Cg—36 to 60 inches; grayish brown (10YR 5/2) silt loam; common fine prominent strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; friable; common iron and manganese stains; few distinct light gray (10YR 7/2) silt coatings on faces of peds; neutral.

The solum ranges from 31 to 40 inches in thickness. The mollic epipedon ranges from 14 to 18 inches in thickness.

The Bw horizon has value of 4 or 5. The Cg horizon has value of 4 or 5 and chroma of 1 or 2. It is dominantly silt loam but in some pedons has strata of loam or silty clay loam below a depth of 40 inches.

Colo Series

The Colo series consists of poorly drained, moderately permeable soils on flood plains. These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

Typical pedon of Colo silt loam, 620 feet north and 520 feet east of the southwest corner of sec. 16, T. 9 N., R. 9 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

A—9 to 24 inches; very dark gray (N 3/0) silty clay loam, gray (10YR 5/1) dry; few fine prominent dark brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure parting to moderate fine and medium granular; friable; common fine roots; few fine rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Bg1—24 to 52 inches; very dark gray (N 3/0) silty clay loam, gray (10YR 5/1) dry; few fine prominent dark brown (7.5YR 4/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common medium roots; few distinct light gray (10YR 7/2) silt coatings on faces of peds; few fine rounded accumulations (iron and manganese oxides); neutral; gradual smooth boundary.

Bg2—52 to 60 inches; very dark gray (N 3/0) silty clay loam, gray (10YR 5/1) dry; few fine prominent dark brown (7.5YR 4/4) mottles; moderate medium prismatic structure; friable; few medium roots; few fine rounded accumulations (iron and manganese oxides); neutral.

The solum ranges from 36 to more than 60 inches in thickness. The mollic epipedon is more than 36 inches thick.

The Ap and A horizons have hue of 10YR or 2.5Y, or they are neutral in hue. They have value of 2 or 3. The clay content ranges from 30 to 35 percent in the control section.

Cowden Series

The Cowden series consists of poorly drained, slowly permeable soils on broad flats in the uplands. These soils formed in loess. Slopes range from 0 to 2 percent.

Typical pedon of Cowden silt loam, in an area of Cowden-Piasa silt loams; 620 feet east and 1,100 feet north of the southwest corner of sec. 23, T. 7 N., R. 7 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine and medium granular structure; friable; common very fine roots; slightly acid; abrupt smooth boundary.

E—8 to 13 inches; dark grayish brown (10YR 4/2) silt loam; few fine distinct dark yellowish brown (10YR 4/4) mottles; weak thin platy structure; friable; common very fine roots; common distinct light brownish gray (10YR 6/2) silt coatings on faces of peds; medium acid; abrupt smooth boundary.

Btg1—13 to 22 inches; dark gray (10YR 4/1) silty clay

loam; common fine prominent yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; common very fine roots; many distinct dark gray (10YR 4/1) clay films on faces of peds; strongly acid; clear smooth boundary.

Btg2—22 to 34 inches; grayish brown (10YR 5/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common distinct dark gray (10YR 4/1) clay films on faces of peds; very dark gray (10YR 3/1) krotovinas; strongly acid; clear smooth boundary.

Btg3—34 to 44 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; firm; few very fine roots; common distinct dark gray (10YR 4/1) clay films on faces of peds; slightly acid; gradual smooth boundary.

Btg4—44 to 55 inches; grayish brown (2.5Y 5/2) silty clay loam; common coarse prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; friable; few very fine roots; common distinct dark gray (10YR 4/1) clay films on faces of peds; few fine distinct very dark gray (10YR 3/1) organic coatings in root channels; slightly acid; gradual smooth boundary.

Cg—55 to 60 inches; grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) silt loam; common fine prominent yellowish brown (10YR 5/6) and few fine prominent dark yellowish brown (10YR 3/6) mottles; weak coarse prismatic structure; friable; few distinct light gray (10YR 7/2) silt coatings on vertical faces of peds; slightly acid.

The solum ranges from 55 to 60 inches in thickness. The E horizon has value of 4 to 6 and chroma of 1 or 2. The Btg horizon has value of 4 to 6. It is silty clay loam or silty clay. The Cg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or less.

Darmstadt Series

The Darmstadt series consists of somewhat poorly drained, very slowly permeable soils on low, broad ridges and side slopes in the uplands. These soils formed in loess. They have a high content of sodium in the subsoil. Slopes range from 2 to 5 percent.

The Darmstadt soils in this county have a high content of sodium at a greater depth than is definitive for the series. This difference, however, does not significantly alter the usefulness or behavior of the soils.

Typical pedon of Darmstadt silt loam, 2 to 5 percent slopes, 1,420 feet south and 560 feet east of the northwest corner of sec. 1, T. 7 N., R. 6 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak fine subangular blocky structure parting to moderate fine granular; friable; common fine roots; neutral; abrupt smooth boundary.

BE—8 to 11 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct dark brown (7.5YR 4/4), common fine distinct strong brown (7.5YR 5/6), and common fine faint yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable; common very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; many distinct light gray (10YR 7/2) silt coatings on faces of peds; few fine rounded accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

Bt1—11 to 15 inches; brown (10YR 5/3) silty clay loam; common medium prominent dark brown (7.5YR 4/4), common fine prominent strong brown (7.5YR 5/6), and common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable; common very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct light gray (10YR 7/2) silt coatings on faces of peds; few fine rounded concretions (iron and manganese oxides); medium acid; clear smooth boundary.

Bt2—15 to 24 inches; brown (10YR 5/3) silty clay loam; common fine prominent dark brown (7.5YR 4/4), common fine prominent strong brown (7.5YR 5/6), and common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; common very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct light gray (10YR 7/2) silt coatings on faces of peds; few fine rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Bt3—24 to 33 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct strong brown (7.5YR 5/6) and common medium faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; common very fine roots; common distinct dark brown (7.5YR 4/4)

clay films on faces of peds; few distinct light gray (10YR 7/2) silt coatings on faces of peds; few fine rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Bt4—33 to 42 inches; dark yellowish brown (10YR 4/6) silty clay loam; common fine and medium faint yellowish brown (10YR 5/6) and common medium distinct pale brown (10YR 6/3) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common very fine roots; common distinct dark brown (7.5YR 4/4) clay films on faces of peds; very dark gray (10YR 3/1) root channel fillings; few fine rounded accumulations (iron and manganese oxides); mildly alkaline; clear smooth boundary.

Bt5—42 to 47 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct dark brown (7.5YR 4/4), common fine distinct pale brown (10YR 6/3), and common fine faint yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common distinct dark brown (7.5YR 4/4) clay films on faces of peds; very dark gray (10YR 3/1) root channel fillings; few fine rounded accumulations (iron and manganese oxides); moderately alkaline; abrupt smooth boundary.

BC—47 to 60 inches; pale brown (10YR 6/3) silty clay loam; common medium distinct dark yellowish brown (10YR 4/4) and few fine distinct yellowish brown (10YR 5/6) mottles; weak moderately thick platy structure parting to weak fine subangular blocky; friable; very dark gray (10YR 3/1) root channel fillings; moderately alkaline.

The solum ranges from 45 to more than 60 inches in thickness. The content of exchangeable sodium is more than 15 percent in the lower part of the Bt horizon.

The Ap horizon has value of 3 to 5. Some pedons have an E horizon. The Bt horizon has value of 4 to 6.

Elco Series

The Elco series consists of moderately well drained, moderately slowly permeable soils on side slopes in the uplands. These soils formed in loess and in the underlying glacial till. Slopes range from 2 to 15 percent.

Typical pedon of Elco silt loam, 5 to 10 percent slopes, eroded, 300 feet west and 2,100 feet south of the northeast corner of sec. 8, T. 8 N., R. 8 W.

Ap—0 to 8 inches; mixed grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) silt loam, light gray (10YR 7/2) dry; moderate fine and medium granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

Bt1—8 to 17 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable; common fine roots; many distinct brown (10YR 5/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—17 to 23 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to weak medium subangular blocky; friable; few fine roots; common distinct brown (10YR 5/3) clay films on faces of peds; few distinct light gray (10YR 7/2) silt coatings on faces of peds; few fine rounded accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Bt3—23 to 31 inches; grayish brown (10YR 5/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; friable; few fine roots; few faint brown (10YR 5/3) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); medium acid; abrupt smooth boundary.

2Bt4—31 to 43 inches; very dark gray (5Y 3/1) loam; many medium prominent yellowish brown (10YR 5/6) and common fine prominent strong brown (7.5YR 4/6) mottles; weak coarse prismatic structure; firm; few distinct brown (10YR 5/3) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt5—43 to 60 inches; very dark gray (5Y 3/1) loam; few fine prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 4/6) mottles; weak coarse prismatic structure; firm; few distinct brown (10YR 5/3) clay films on faces of peds; neutral.

The solum is more than 60 inches thick. The loess ranges from 25 to 37 inches in thickness.

The Ap horizon has chroma of 2 to 6. It is silt loam or silty clay loam. The Bt horizon has value of 4 or 5 and chroma of 2 to 6. It is silty clay loam or silt loam. The 2Bt horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 to 6, and chroma of 1 to 3. It is loam, clay loam, or silty clay loam.

Fayette Series

The Fayette series consists of well drained, moderately permeable soils on ridges and side slopes

in the uplands. These soils formed in loess. Slopes range from 2 to 10 percent.

Typical pedon of Fayette silt loam, 5 to 10 percent slopes, eroded, 2,280 feet north and 400 feet west of the southeast corner of sec. 21, T. 9 N., R. 9 W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine and medium granular structure; friable; few fine roots; medium acid; clear smooth boundary.

Bt1—7 to 17 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—17 to 30 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; medium acid; clear smooth boundary.

Bt3—30 to 42 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

BC—42 to 60 inches; yellowish brown (10YR 5/4) silty clay loam; weak coarse prismatic structure; friable; common distinct dark brown (7.5YR 4/2) clay films on faces of peds; medium acid.

The Ap horizon has value of 4 or 5 and chroma of 2 to 4. The Bt horizon has value of 4 or 5 and chroma of 3 or 4. It is silty clay loam or silt loam.

Fishhook Series

The Fishhook series consists of somewhat poorly drained, slowly permeable soils on side slopes in the uplands. These soils formed in loess and in the underlying glacial till, which has a strongly developed paleosol. Slopes range from 2 to 10 percent.

Typical pedon of Fishhook silt loam, 2 to 5 percent slopes, eroded, 1,900 feet north and 900 feet east of the center of sec. 20, T. 8 N., R. 7 W.

Ap—0 to 7 inches; yellowish brown (10YR 5/4) silt loam, light brownish gray (10YR 6/2) dry; mixed with brown (10YR 5/3) Bt material; moderate fine and medium granular structure; friable; few fine roots; medium acid; abrupt smooth boundary.

Bt1—7 to 13 inches; brown (10YR 5/3) silt loam; common medium distinct yellowish brown (10YR 5/6) and common medium prominent strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct silt coatings on faces of peds, light brownish gray (10YR 6/2) dry; strongly acid; clear smooth boundary.

Bt2—13 to 19 inches; brown (10YR 5/3) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and common fine prominent strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct silt coatings on faces of peds, light gray (10YR 7/2) dry; medium acid; abrupt smooth boundary.

Btg1—19 to 25 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/6) and few fine prominent dark brown (7.5YR 4/4) mottles; moderate fine and medium subangular blocky structure; friable; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct silt coatings on faces of peds, light brownish gray (10YR 6/2) dry; medium acid; abrupt smooth boundary.

2Btg2—25 to 34 inches; dark gray (5Y 4/1) clay loam; common fine prominent dark brown (7.5YR 4/4) mottles; moderate medium prismatic structure; firm; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; medium acid; clear smooth boundary.

2Btg3—34 to 49 inches; dark gray (5Y 4/1) loam; few fine prominent dark brown (7.5YR 4/4) mottles; moderate medium prismatic structure; firm; few distinct dark gray (5Y 4/1) clay films on faces of peds; neutral; clear smooth boundary.

2Btg4—49 to 60 inches; light gray (5Y 7/1) clay loam; few fine prominent olive yellow (2.5Y 6/6) mottles; moderate medium prismatic structure; few distinct dark gray (5Y 4/1) clay films on faces of peds; firm; neutral.

The solum ranges from 50 to 70 inches in thickness. The Ap horizon has value of 4 or 5 and chroma of 2 to 4. The Bt horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 8, and chroma of 2 to 4. The 2Bt horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 8, and chroma

of 1 or 2. It is loam, clay loam, or silty clay loam.

Harrison Series

The Harrison series consists of moderately well drained, moderately permeable soils on slight rises on broad uplands. These soils formed in loess and in coarser textured silty or loamy sediments. Slopes range from 2 to 5 percent.

Typical pedon of Harrison silt loam, 2 to 5 percent slopes, 1,280 feet east and 1,260 feet south of the northwest corner of sec. 27, T. 12 N., R. 6 W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; common very fine roots; slightly acid; abrupt smooth boundary.

Bt1—10 to 15 inches; dark brown (10YR 4/3) silty clay loam; moderate very fine subangular blocky structure; friable; common very fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bt2—15 to 20 inches; yellowish brown (10YR 5/4) silty clay loam; weak very fine prismatic structure parting to moderate very fine subangular blocky; firm; common very fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bt3—20 to 27 inches; yellowish brown (10YR 5/6) silty clay loam; few fine prominent light brownish gray (10YR 6/2) mottles at a depth of 24 inches and few fine distinct strong brown (7.5YR 5/6) mottles; weak very fine prismatic structure parting to moderate fine subangular blocky; firm; common very fine roots; common distinct dark brown (10YR 4/3) clay films on faces of peds; few distinct very dark grayish brown (10YR 3/2) organic coatings in channels; few fine rounded accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt4—27 to 34 inches; yellowish brown (10YR 5/6) silty clay loam; few fine prominent light brownish gray (10YR 6/2) and few fine distinct strong brown (7.5YR 5/6) mottles; weak very fine prismatic structure parting to moderate fine subangular blocky; firm; few very fine roots; common distinct dark brown (10YR 4/3) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt5—34 to 45 inches; yellowish brown (10YR 5/6) silty clay loam; common fine prominent light brownish gray (10YR 6/2) and common fine prominent strong brown (7.5YR 5/6) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; few distinct dark brown (10YR 4/3) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

2Bt6—45 to 56 inches; yellowish brown (10YR 5/6) silt loam; common fine prominent light brownish gray (10YR 6/2) and common fine and medium faint yellowish brown (10YR 5/8) mottles; weak coarse prismatic structure; friable; about 20 percent very fine sand; few very fine roots; few distinct dark brown (10YR 4/3) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

2BC—56 to 63 inches; brown (7.5YR 5/4) silt loam; common fine distinct strong brown (7.5YR 5/6) and pale brown (10YR 6/3) mottles; weak coarse prismatic structure; friable; about 20 percent very fine sand; few fine rounded accumulations (iron and manganese oxides); neutral.

The solum ranges from 48 to more than 60 inches in thickness. The mollic epipedon ranges from 10 to 19 inches in thickness.

The Bt horizon has chroma of 2 to 6. It is silty clay loam or silt loam. The 2Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 6. It is silt loam, clay loam, or silty clay loam.

Herrick Series

The Herrick series consists of somewhat poorly drained, moderately slowly permeable soils on broad ridges in the uplands. These soils formed in loess. Slopes range from 0 to 2 percent.

Typical pedon of Herrick silt loam, 1,000 feet south and 201 feet east of the northwest corner of sec. 13, T. 8 N., R. 7 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak very fine granular structure; friable; many fine and very fine roots; neutral; abrupt smooth boundary.

A—8 to 13 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak thin platy structure parting to moderate fine granular; friable; many very

fine roots; neutral; clear smooth boundary.
E—13 to 20 inches; dark grayish brown (10YR 4/2) silt loam; few fine prominent yellowish brown (10YR 5/6) mottles; weak medium platy structure parting to moderate fine and medium granular; friable; few very fine roots; common distinct grayish brown (10YR 5/2) silt coatings on faces of peds; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; medium acid; clear smooth boundary.
Bt1—20 to 30 inches; brown (10YR 5/3) silty clay loam; common fine faint grayish brown (10YR 5/2) and common medium distinct yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; many distinct dark gray (10YR 4/1) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); medium acid; gradual smooth boundary.
Bt2—30 to 39 inches; grayish brown (10YR 5/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure parting to weak medium subangular blocky; firm; few very fine roots; many distinct dark gray (10YR 4/1) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); medium acid; gradual smooth boundary.
Bt3—39 to 48 inches; grayish brown (10YR 5/2) silty clay loam; many medium prominent yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure parting to weak medium subangular blocky; firm; few very fine roots; common distinct dark gray (10YR 4/1) clay films on faces of peds; common fine rounded accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.
Bt4—48 to 54 inches; mottled grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) silty clay loam; weak medium prismatic structure; friable; common distinct dark gray (10YR 4/1) clay films on faces of peds and in root channels; common fine rounded accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.
Bt5—54 to 60 inches; mottled yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) silty clay loam; weak coarse prismatic structure; friable; common distinct dark gray (10YR 4/1) clay films in root channels; neutral.

The solum ranges from 49 to more than 60 inches in thickness. The mollic epipedon ranges from 10 to 19 inches in thickness.

The Ap horizon has value of 2 or 3. The E horizon has value of 3 or 4. The Bt horizon has value of 4 to 6 and chroma of 2 to 6. It is dominantly silty clay loam or silty clay but in some pedons is silt loam in the lower part.

Hickory Series

The Hickory series consists of well drained, moderately permeable soils on side slopes of drainageways in the uplands. These soils formed in glacial till. Slopes range from 10 to 60 percent.

Typical pedon of Hickory silt loam, 20 to 30 percent slopes, 1,040 feet west and 2,400 feet north of the southeast corner of sec. 31, T. 9 N., R. 7 W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate fine and medium granular structure; friable; strongly acid; abrupt smooth boundary.
E—4 to 9 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak medium platy structure parting to weak medium subangular blocky; friable; few fine roots; common distinct brown (10YR 5/3) silt coatings on faces of peds; very strongly acid; clear smooth boundary.
Bt1—9 to 13 inches; yellowish brown (10YR 5/4) silt loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few distinct brown (10YR 5/3) silt coatings on faces of peds; very strongly acid; clear smooth boundary.
Bt2—13 to 24 inches; yellowish brown (10YR 5/4) clay loam; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; firm; few fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common distinct brown (10YR 5/3) silt coatings on faces of peds; few fine rounded accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.
Bt3—24 to 30 inches; yellowish brown (10YR 5/4) clay loam; common medium prominent light brownish gray (2.5Y 6/2) mottles; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; firm; few fine roots; common distinct brown (10YR 5/3) and yellowish brown (10YR 5/6) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.
Bt4—30 to 39 inches; yellowish brown (10YR 5/4) clay

loam; many medium prominent grayish brown (2.5Y 5/2) and common fine distinct dark brown (7.5YR 4/4) mottles; weak coarse prismatic structure; firm; few fine roots; common distinct brown (10YR 5/3) clay films on faces of peds; few fine and medium rounded accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.

BC—39 to 45 inches; mottled light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/8) clay loam; weak coarse prismatic structure; firm; few fine roots; few fine and medium rounded accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.

C—45 to 60 inches; mottled grayish brown (10YR 5/2) and strong brown (7.5YR 5/8) gravelly sandy clay loam; massive; firm; strongly acid.

The solum ranges from 40 to more than 60 inches in thickness. The A or Ap horizon has value 3 or 4. The Bt horizon has hue of 10YR, 7.5YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 6. It is clay loam, loam, silty clay loam, or silt loam and is high in sand content. The C horizon is gravelly sandy clay loam, loam, or clay loam.

Hosmer Series

The Hosmer series consists of moderately well drained soils on convex ridgetops and side slopes in the uplands. These soils are moderately permeable in the upper part and very slowly permeable in the lower part. They formed in loess. Slopes range from 2 to 5 percent.

The Hosmer soils in this county have a Bx horizon that is at a greater depth and has a finer structure than is definitive for the series. These differences, however, do not alter the usefulness or behavior of the soils.

Typical pedon of Hosmer silt loam, 2 to 5 percent slopes, 66 feet north and 561 feet west of the southeast corner of sec. 20, T. 9 N., R. 6 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; medium fine roots; neutral; abrupt smooth boundary.

E1—6 to 9 inches; dark grayish brown (10YR 4/2) silt loam; moderate thin platy structure; friable; common very fine roots; neutral; abrupt smooth boundary.

E2—9 to 15 inches; brown (10YR 5/3) silt loam; moderate thin platy structure; friable; few very fine roots; very strongly acid; abrupt smooth boundary.

Bt—15 to 19 inches; brown (10YR 5/3) silt loam; moderate fine and medium subangular blocky structure; friable; few very fine roots; few faint yellowish brown (10YR 5/4) clay films on faces of peds; very strongly acid; abrupt smooth boundary.

Bt/E—19 to 24 inches; brown (10YR 5/3) silty clay loam (Bt); strong medium subangular blocky structure; friable; few very fine roots; few faint yellowish brown (10YR 5/4) clay films on faces of peds; many prominent silt coatings on faces of peds (E), pale brown (10YR 6/3) dry; few fine rounded concretions (iron and manganese oxides); very strongly acid; abrupt smooth boundary.

Bt1—24 to 29 inches; brown (10YR 5/3) silty clay loam; few fine distinct yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; few very fine roots; common distinct light brownish gray (10YR 6/2) clay films on faces of peds; few distinct silt coatings on faces of peds, pale brown (10YR 6/3) dry; few fine rounded concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bt2—29 to 37 inches; brown (10YR 5/3) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; common distinct light brownish gray (10YR 6/2) clay films on faces of peds; common distinct silt coatings on faces of peds, light brownish gray (10YR 6/2) dry; few fine rounded concretions (iron and manganese oxides); very strongly acid; abrupt smooth boundary.

Bt3—37 to 42 inches; brown (10YR 5/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few roots; common distinct light brownish gray (10YR 6/2) clay films on faces of peds; few distinct silt coatings on faces of peds, pale brown (10YR 6/3) dry; few fine rounded concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

Btx—42 to 50 inches; brown (10YR 5/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure; firm; slightly brittle; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct silt coatings on faces of peds, pale brown (10YR 6/3) dry; few fine rounded concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

C—50 to 60 inches; light brownish gray (10YR 6/2) silt loam; common fine prominent yellowish brown (10YR 5/6) and common fine and medium prominent strong brown (7.5YR 5/8) mottles;

massive; friable; few fine rounded concretions (iron and manganese oxides); very strongly acid.

The solum ranges from 50 to more than 80 inches in thickness. The brittle layer is at a depth of 36 to 48 inches.

The Ap horizon has value of 4 or 5 and chroma of 2 to 4. It is dominantly silt loam, but in some pedons it is silty clay loam. The E horizon has value of 4 or 5 and chroma of 2 to 4. The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. It is silt loam or silty clay loam. The Btx horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. The C horizon is similar in color to the Bt horizon. It is silt loam or clay loam.

Huey Series

The Huey series consists of poorly drained, very slowly permeable soils on broad flats in the uplands. These soils formed in loess and glacial till. Slopes range from 0 to 2 percent.

Typical pedon of Huey silt loam, 620 feet south and 1,360 feet west of the northeast corner of sec. 33, T. 7 N., R. 6 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) and brown (10YR 5/3) silt loam; weak medium and fine subangular blocky structure parting to weak fine granular; friable; common very fine roots; mildly alkaline; abrupt smooth boundary.

Btg1—8 to 15 inches; grayish brown (10YR 5/2) silty clay loam; common fine prominent strong brown (7.5YR 4/6) mottles; moderate medium and coarse subangular blocky structure; friable; few distinct brown (10YR 5/3) clay films on faces of peds; common distinct silt coatings on faces of peds, gray (10YR 5/1) and light gray (10YR 6/1) dry; few fine rounded accumulations (iron and manganese oxides); few very fine roots; mildly alkaline; clear smooth boundary.

Btg2—15 to 22 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine prominent strong brown (7.5YR 4/6) mottles; weak medium and coarse prismatic structure parting to moderate medium and fine subangular blocky; friable; common distinct brown (10YR 5/3) clay films on faces of peds; common distinct silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine rounded accumulations (iron and manganese oxides); few very fine roots; strongly alkaline; clear smooth boundary.

Btg3—22 to 30 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine prominent strong brown (7.5YR 5/6) mottles; moderate medium and coarse prismatic structure parting to moderate medium and fine subangular blocky; friable; common distinct grayish brown (10YR 5/2) clay films on faces of peds; few distinct silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine rounded accumulations (iron and manganese oxides); few very fine roots; few distinct gray (10YR 5/1) organic stains on faces of peds; strongly alkaline; abrupt smooth boundary.

Btg4—30 to 41 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; friable; common distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds; few distinct silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine rounded accumulations (iron and manganese oxides); few distinct dark gray (N 4/0) organic stains on faces of peds; strongly alkaline; abrupt smooth boundary.

Cg1—41 to 49 inches; gray (5Y 6/1) silt loam; common medium prominent dark yellowish brown (10YR 4/4), brown (7.5YR 5/2), and dark brown (7.5YR 4/4) mottles; weak coarse subangular blocky structure; friable; few distinct silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine rounded accumulations (iron and manganese oxides); mildly alkaline; clear smooth boundary.

2Cg2—49 to 60 inches; brown (7.5YR 5/2) loam; common fine distinct dark brown (7.5YR 4/4) and common medium distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; few fine rounded accumulations (iron and manganese oxides); mildly alkaline.

The solum ranges from 35 to 55 inches in thickness. The clay content ranges from 35 to 45 percent in the control section. The Btg horizon is more than 15 percent, by volume, exchangeable sodium.

The Ap horizon has value of 4 or 5. The Btg horizon has hue of 10YR, 2.5Y, or 5Y and value of 5 or 6. It ranges from medium acid to strongly alkaline. The Cg and 2Cg horizons are loam, silt loam, or silty clay loam. They are neutral or mildly alkaline.

Ipava Series

The Ipava series consists of somewhat poorly drained, moderately slowly permeable soils on low, broad ridges in the uplands. These soils formed in

loess. Slopes range from 0 to 5 percent.

Typical pedon of Ipava silt loam, 0 to 2 percent slopes, 1,880 feet west and 2,440 feet south of the northeast corner of sec. 5, T. 12 N., R. 6 W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common very fine roots; neutral; abrupt smooth boundary.

A—7 to 14 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine and very fine subangular blocky structure; friable; common very fine roots; slightly acid; clear smooth boundary.

Bt1—14 to 21 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint yellowish brown (10YR 5/6 and 5/8) and few fine distinct light brownish gray (10YR 6/2) mottles; moderate fine subangular blocky structure; firm; common very fine roots; many distinct very dark gray (10YR 3/1) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—21 to 26 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct light brownish gray (10YR 6/2) and common fine faint yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; many distinct very dark gray (10YR 3/1) clay films on faces of peds; few fine rounded very dark gray (10YR 3/1) accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Btg1—26 to 32 inches; mottled grayish brown (10YR 5/2), yellowish brown (10YR 5/6 and 5/8), and strong brown (7.5YR 5/8) silty clay loam; moderate fine prismatic structure; firm; few very fine roots; many distinct very dark gray (10YR 3/1) clay films on faces of peds; few fine rounded very dark gray (10YR 3/1) accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Btg2—32 to 44 inches; mottled grayish brown (10YR 5/2) yellowish brown (10YR 5/6 and 5/8), strong brown (7.5YR 5/8), and light brownish gray (2.5Y 6/2) silty clay loam; moderate medium prismatic structure; firm; few very fine roots; many distinct very dark gray (10YR 3/1) clay films on faces of peds; few fine irregular very dark gray (10YR 3/1) accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Btg3—44 to 54 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6) and common medium prominent strong brown (7.5YR 5/8) mottles; weak medium prismatic structure; friable; few very fine roots; common distinct very dark gray (10YR 3/1) clay films on faces of peds; few fine irregular very dark gray (10YR 3/1) accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Cg—54 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; many medium distinct yellowish brown (10YR 5/6) and common medium prominent strong brown (7.5YR 5/8) mottles; massive; friable; very dark gray (10YR 3/1) root channel fillings; few fine irregular very dark gray (10YR 3/1) accumulations (iron and manganese oxides); neutral.

The solum ranges from 46 to 60 inches in thickness. The mollic epipedon ranges from 14 to 23 inches in thickness.

The Ap and A horizons have value of 2 or 3. They are silt loam or silty clay loam. The Bt and Btg horizons have hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 8. They are silty clay loam or silty clay. The Cg horizon has hue of 10YR, 7.5YR, or 2.5Y, value of 5 or 6, and chroma of 2 to 8.

Keller Series

The Keller series consists of somewhat poorly drained soils on side slopes of drainageways in the uplands. These soils formed in loess and glacial till. Permeability is moderate in the upper part of the profile and slow in the lower part. Slopes range from 2 to 5 percent.

Typical pedon of Keller silt loam, 2 to 5 percent slopes, 1,500 feet east and 1,700 feet north of the southwest corner of sec. 12, T. 8 N., R. 8 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

Bt—10 to 20 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate fine and medium subangular blocky; friable; few very fine roots; many distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine iron stains; medium acid; clear smooth boundary.

Btg1—20 to 26 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate fine and medium prismatic structure; friable; few very fine

roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine iron stains; slightly acid; clear smooth boundary.

Btg2—26 to 31 inches; gray (10YR 5/1) silty clay loam; common medium prominent yellowish brown (10YR 5/6) and few medium prominent strong brown (7.5YR 5/6) mottles; weak fine and medium prismatic structure parting to moderate fine and medium subangular blocky; friable; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine iron stains; neutral; abrupt smooth boundary.

2Btg3—31 to 38 inches; gray (10YR 5/1) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; firm; many distinct dark gray (10YR 4/1) clay films on faces of peds; common fine rounded strong brown (7.5YR 5/6) concretions (iron and manganese oxides); medium acid; clear smooth boundary.

2Btg4—38 to 46 inches; gray (10YR 5/1) clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure; firm; many distinct dark gray (10YR 4/1) clay films on faces of peds; common fine rounded concretions (iron and manganese oxides); medium acid; clear smooth boundary.

2Btg5—46 to 60 inches; gray (10YR 5/1) clay loam; few fine prominent yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/4) mottles; weak coarse prismatic structure; firm; few distinct dark gray (10YR 4/1) clay films on faces of peds; few fine rounded concretions (iron and manganese oxides); neutral.

The solum ranges from 50 to more than 60 inches in thickness. The overlying silty material ranges from 20 to 40 inches in thickness.

The Ap horizon has value of 2 or 3. The Bt and Btg horizons have value of 4 or 5 and chroma of 1 to 3. The 2Btg horizon has hue of 10YR or 2.5Y or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 2. It is silty clay loam, clay loam, or clay.

Keomah Series

The Keomah series consists of somewhat poorly drained, slowly permeable and moderately slowly permeable soils on broad ridges in the uplands. These soils formed in loess. Slopes range from 0 to 2 percent.

Typical pedon of Keomah silt loam, 30 feet north and 280 feet east of the southwest corner of sec. 3, T. 8 N., R. 8 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light gray (10YR 7/2) dry; moderate very fine and fine granular structure; friable; common very fine roots; slightly acid; abrupt smooth boundary.

E—8 to 16 inches; grayish brown (10YR 5/2) silt loam; moderate thin platy structure; friable; common very fine roots; many distinct silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine iron stains; neutral; abrupt smooth boundary.

BE—16 to 24 inches; brown (10YR 5/3) silt loam; common fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate fine and medium subangular blocky structure; friable; few very fine roots; many distinct silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine iron stains; strongly acid; clear smooth boundary.

Bt1—24 to 31 inches; brown (10YR 4/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; firm; few very fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

Bt2—31 to 41 inches; mottled dark grayish brown (10YR 4/2), light yellowish brown (10YR 6/4), and yellowish brown (10YR 5/6 and 5/8) silty clay loam; moderate coarse and medium prismatic structure; firm; few very fine roots; many distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

Bt3—41 to 50 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium prominent yellowish brown (10YR 5/8) mottles; weak coarse prismatic structure; friable; few distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; few distinct silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine rounded accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

C—50 to 60 inches; light gray (10YR 7/2) silt loam; common medium prominent yellowish brown (10YR 5/6) mottles; massive; friable; few distinct very dark grayish brown (10YR 3/2) clay films in root channels; slightly acid.

The solum ranges from 45 to 60 inches in thickness. The E horizon has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has chroma of 2 to 8. It is silty clay loam or silty clay. The C horizon is silt loam or silty clay loam.

Lawson Series

The Lawson series consists of somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

Typical pedon of Lawson silt loam, 400 feet north and 2,120 feet east of the southwest corner of sec. 21, T. 7 N., R. 7 W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate fine granular structure; friable; slightly acid; abrupt smooth boundary.

A1—7 to 28 inches; very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium and fine subangular blocky structure parting to moderate fine granular; friable; neutral; gradual smooth boundary.

A2—28 to 35 inches; very dark grayish brown (10YR 3/2) and dark brown (10YR 4/3) silt loam; moderate medium subangular blocky structure; friable; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; 3 percent pebbles; neutral; clear smooth boundary.

Cg1—35 to 54 inches; grayish brown (10YR 5/2) silt loam; few fine faint brown (10YR 5/3), few fine distinct yellowish brown (10YR 5/6), and few fine prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common distinct very dark gray (10YR 3/1) and dark gray (10YR 4/1) organic coatings on faces of peds; 3 percent pebbles; neutral; gradual smooth boundary.

Cg2—54 to 60 inches; grayish brown (10YR 5/2) silt loam; common fine distinct yellowish brown (10YR 5/4 and 5/6) and common fine prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; common distinct very dark gray (10YR 3/1) and dark gray (10YR 4/1) organic coatings on faces of peds; 3 percent pebbles; neutral.

The mollic epipedon ranges from 24 to 45 inches in thickness. The Ap and A horizons have value of 2 or 3. The Cg horizon has value of 3 to 6 and chroma of 1 to 3. The control section is dominantly silt loam or silty clay loam in which the clay content averages less than 30 percent. In some pedons thin strata of loam or sandy loam are in the control section or strata of silty clay loam, sandy clay loam, sandy loam, or loam are below the control section.

Marine Series

The Marine series consists of somewhat poorly drained, slowly permeable soils on broad ridges in the uplands. These soils formed in loess. Slopes range from 0 to 2 percent.

Typical pedon of Marine silt loam, 520 feet north and 2,080 feet east of the southwest corner of sec. 9, T. 7 N., R. 6 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light gray (10YR 7/2) dry; strong fine and very fine granular structure; friable; neutral; abrupt smooth boundary.

E—8 to 11 inches; light brownish gray (10YR 6/2) silt loam; few fine prominent yellowish brown (10YR 5/6) mottles; moderate thick and medium platy structure; friable; many distinct silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine iron stains; neutral; abrupt smooth boundary.

Bt/E—11 to 14 inches; brown (10YR 5/3) silty clay loam (Bt); common fine distinct brownish yellow (10YR 6/6) mottles; strong fine and medium subangular blocky structure; friable; many distinct silt coatings on faces of peds (E), light gray (10YR 7/2) dry; few fine iron stains; strongly acid; abrupt smooth boundary.

Bt1—14 to 20 inches; pale brown (10YR 6/3) silty clay; common medium distinct yellowish brown (10YR 5/6) and common fine faint light yellowish brown (10YR 6/4) mottles; moderate medium prismatic structure parting to moderate fine angular and subangular blocky; friable; common distinct grayish brown (10YR 5/2) clay films on faces of peds; few fine iron stains; very strongly acid; clear smooth boundary.

Bt2—20 to 28 inches; light yellowish brown (10YR 6/4) silty clay; few fine distinct yellowish brown (10YR 5/8) and light brownish gray (10YR 6/2) mottles; moderate medium and coarse prismatic structure parting to moderate medium subangular blocky; firm; common distinct grayish brown (10YR 5/2) clay films on faces of peds; common distinct silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine

rounded accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bt3—28 to 39 inches; pale brown (10YR 6/3) silty clay loam; common medium distinct yellowish brown (10YR 5/8) and common fine prominent dark brown (7.5YR 4/2) mottles; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; friable; common distinct grayish brown (10YR 5/2) clay films on faces of peds; few distinct silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine iron stains; very strongly acid; gradual smooth boundary.

Bt4—39 to 48 inches; pale brown (10YR 6/3) silty clay loam; common medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; friable; many distinct grayish brown (10YR 5/2) clay films on faces of peds; few fine iron stains; strongly acid; clear smooth boundary.

BC—48 to 60 inches; light brownish gray (10YR 6/2) silt loam; many medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse prismatic structure; friable; few faint grayish brown (10YR 5/2) clay films on vertical faces of peds; few fine iron stains; strongly acid.

The solum ranges from 45 to more than 60 inches in thickness. The Ap horizon has value of 4 or 5. The E horizon has value of 4 to 6 and chroma of 2 to 4. The Bt horizon has value of 4 to 6 and chroma of 2 to 6.

Oconee Series

The Oconee series consists of somewhat poorly drained, slowly permeable soils on low, broad ridges and side slopes in the uplands. These soils formed in loess. Slopes range from 0 to 5 percent.

Typical pedon of Oconee silt loam, 2 to 5 percent slopes, 2,080 feet west and 100 feet south of the northeast corner of sec. 33, T. 8 N., R. 8 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak very fine and fine granular structure; friable; common very fine roots; neutral; abrupt smooth boundary.

E—8 to 18 inches; grayish brown (10YR 5/2) and very dark grayish brown (10YR 3/2) silt loam; few fine prominent yellowish brown (10YR 5/6) mottles; moderate medium and thick platy structure parting to weak moderate subangular blocky; friable; common very fine roots; few fine rounded accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Bt1—18 to 25 inches; mottled brown (10YR 5/3), yellowish brown (10YR 5/6), and grayish brown (10YR 5/2) silty clay loam; moderate fine and medium subangular blocky structure; firm; common very fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

Bt2—25 to 38 inches; yellowish brown (10YR 5/4) silty clay loam; many medium faint yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; many distinct grayish brown (10YR 5/2) clay films on faces of peds; common fine rounded accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Btg—38 to 46 inches; grayish brown (10YR 5/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6) and common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure; firm; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct very dark gray (10YR 3/1) root channel fillings; common fine rounded accumulations (iron and manganese oxides); medium acid; gradual smooth boundary.

BCg—46 to 53 inches; mottled grayish brown (10YR 5/2), gray (10YR 5/1), and yellowish brown (10YR 5/6) silty clay loam; weak coarse prismatic structure; friable; few distinct dark gray (10YR 4/1) clay films on faces of peds; few distinct very dark gray (10YR 3/1) root channel fillings; common fine rounded accumulations (iron and manganese oxides); slightly acid; gradual smooth boundary.

Cg—53 to 60 inches; mottled grayish brown (10YR 5/2), gray (10YR 5/1), and yellowish brown (10YR 5/6) silt loam; massive; friable; common fine rounded accumulations (iron and manganese oxides); slightly acid.

The solum ranges from 50 to 60 inches in thickness. The E horizon has value of 4 or 5. The Bt and Btg horizons have value of 5 or 6 and chroma of 2 to 4. They are silty clay loam or silty clay. The Cg horizon has value of 4 to 6 and chroma of 1 to 3.

Otter Series

The Otter series consists of poorly drained, moderately permeable soils on flood plains. These soils

formed in silty alluvium. Slopes range from 0 to 2 percent.

Typical pedon of Otter silt loam, 2,140 feet west and 620 feet south of the northeast corner of sec. 18, T. 9 N., R. 7 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; few fine prominent strong brown (7.5YR 5/6) mottles; moderate fine and medium granular structure; friable; few fine roots; neutral; clear smooth boundary.

A1—10 to 23 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; common fine distinct dark yellowish brown (10YR 4/4) and few fine prominent strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few fine roots; few fine rounded concretions (iron and manganese oxides); neutral; clear smooth boundary.

A2—23 to 29 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium prismatic structure; friable; few fine roots; common distinct silt coatings on faces of peds, light brownish gray (10YR 6/2) dry; few fine rounded concretions (iron and manganese oxides); neutral; abrupt smooth boundary.

Cg—29 to 45 inches; stratified dark grayish brown (10YR 4/2) and light brownish gray (10YR 6/2) silt loam; few fine distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; few fine roots; mildly alkaline; clear smooth boundary.

Agb—45 to 60 inches; very dark gray (10YR 3/1) silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; few fine roots; common distinct silt coatings on faces of peds, light brownish gray (10YR 6/2) dry; few fine rounded concretions (iron and manganese oxides); mildly alkaline.

The solum and the mollic epipedon both range from 24 to 50 inches in thickness. The Ap and A horizons have value of 2 or 3. The Cg horizon has value of 3 to 5 and chroma of 1 or 2. Some pedons have no Agb horizon within a depth of 60 inches.

Piasa Series

The Piasa series consists of poorly drained, very slowly permeable soils on broad flats in the uplands. These soils formed in loess. They have a high content of sodium in the subsoil. Slopes range from 0 to 2 percent.

Typical pedon of Piasa silt loam, in an area of Herrick-Piasa silt loams, 1,580 feet west and 1,760 feet north of the center of sec. 9, T. 8 N., R. 6 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; slightly acid; abrupt smooth boundary.

Eg—7 to 15 inches; dark grayish brown (10YR 4/2) silt loam; few very dark grayish brown (10YR 3/2) fragments of Ap material; moderate medium platy structure parting to moderate fine and medium subangular blocky; friable; common distinct silt coatings on faces of peds, light brownish gray (10YR 6/2) dry; mildly alkaline; clear smooth boundary.

Btg1—15 to 26 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; friable; common distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; moderately alkaline; clear smooth boundary.

Btg2—26 to 32 inches; grayish brown (10YR 5/2) silty clay loam; many medium prominent yellowish brown (10YR 5/8) and few medium prominent strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; firm; common distinct dark gray (10YR 4/1) clay films on faces of peds; moderately alkaline; clear smooth boundary.

Btg3—32 to 50 inches; mottled dark grayish brown (10YR 4/2) and yellowish brown (10YR 5/6) silty clay loam; moderate coarse prismatic structure; firm; common distinct dark gray (10YR 4/1) clay films on faces of peds; moderately alkaline; clear smooth boundary.

BCg—50 to 60 inches; gray (10YR 6/1) silt loam; common medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; friable; few faint dark gray (10YR 4/1) clay films on faces of peds; moderately alkaline.

The solum ranges from 47 to more than 60 inches in thickness. The top of the natric horizon typically is at the upper boundary of the argillic horizon.

The Ap horizon has value of 2 or 3. The Eg horizon

has value of 4 or 5. The Btg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is silty clay loam or silty clay. It ranges from slightly acid to strongly alkaline.

Ross Series

The Ross series consists of well drained, moderately permeable soils on flood plains. These soils formed in alluvial sediments. Slopes range from 0 to 2 percent.

The Ross soils in this county have less clay in the control section than is definitive for the series. This difference, however, does not significantly affect the usefulness or behavior of the soils.

Typical pedon of Ross silt loam, 280 feet south and 540 feet east of the center of sec. 5, T. 7 N., R. 6 W.

A1—0 to 8 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to moderate fine granular; friable; common very fine roots; few distinct silt coatings on faces of peds, brown (10YR 5/3) dry; neutral; clear smooth boundary.

A2—8 to 20 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium subangular blocky structure parting to moderate fine granular; friable; common very fine roots; neutral; clear smooth boundary.

A3—20 to 30 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate fine and medium subangular blocky structure parting to moderate fine granular; friable; few very fine roots; neutral; clear smooth boundary.

Bw1—30 to 35 inches; very dark grayish brown (10YR 3/2) and dark brown (10YR 4/3) loam; moderate coarse subangular blocky structure; friable; few very fine roots; neutral; clear smooth boundary.

Bw2—35 to 43 inches; dark brown (10YR 4/3) loam; moderate coarse subangular blocky structure; friable; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; clear smooth boundary.

Bw3—43 to 50 inches; dark brown (10YR 4/3) fine sandy loam; moderate fine and medium subangular blocky structure; very friable; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; clear smooth boundary.

C—50 to 60 inches; yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) loamy fine sand; weak fine and medium subangular blocky structure; very friable; neutral.

The solum ranges from 30 to 50 inches in thickness. The mollic epipedon ranges from 24 to 40 inches in thickness.

The Ap and A horizons have value of 2 or 3. They are silt loam or loam. The Bw horizon has value of 2 to 5 and chroma of 1 to 4. It is silt loam, loam, or fine sandy loam. The C horizon has value of 4 to 6 and chroma of 2 to 4. It is fine sandy loam, silt loam, loamy fine sand, or loam.

Rozetta Series

The Rozetta series consists of moderately well drained, moderately permeable soils on ridges and side slopes in the uplands. These soils formed in loess. Slopes range from 0 to 10 percent.

Typical pedon of Rozetta silt loam, 2 to 5 percent slopes, 1,600 feet east and 540 feet south of the northwest corner of sec. 31, T. 11 N., R. 9 W.

A—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; many fine and very fine roots; neutral; abrupt smooth boundary.

E—6 to 15 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct brown (7.5YR 4/4) mottles; weak thin platy structure; friable; common very fine roots; common distinct silt coatings on faces of peds, very pale brown (10YR 7/3) dry; few fine rounded very dark gray (10YR 3/1) accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bt1—15 to 20 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine and medium subangular blocky structure; friable; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; many distinct silt coatings on faces of peds, very pale brown (10YR 7/3) dry; few fine rounded very dark gray (10YR 3/1) accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bt2—20 to 26 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine and medium subangular blocky structure; friable; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; common distinct silt coatings on faces of peds, very pale brown (10YR 7/3) dry; few fine rounded very dark gray (10YR 3/1) accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bt3—26 to 34 inches; yellowish brown (10YR 5/4) silty

clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; common distinct silt coatings on faces of peds, light gray (10YR 7/2) dry; few fine rounded very dark gray (10YR 3/1) accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.

Bt4—34 to 44 inches; mottled light gray (10YR 7/2), yellowish brown (10YR 5/4 and 5/8), and strong brown (7.5YR 5/6) silty clay loam; weak coarse subangular blocky structure; firm; few very fine roots; few distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common medium rounded very dark gray (10YR 3/1) accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

Bt5—44 to 50 inches; mottled light gray (10YR 7/2), yellowish brown (10YR 5/6 and 5/8), and dark brown (7.5YR 4/4) silty clay loam; weak coarse prismatic structure; friable; few fine roots; few distinct brown (10YR 5/3) clay films on faces of peds; common fine rounded very dark gray (10YR 3/1) accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

BC—50 to 60 inches; mottled light gray (10YR 7/1), yellowish brown (10YR 5/6 and 5/8), and dark brown (7.5YR 4/4) silt loam; massive; friable; few very fine roots; few distinct brown (10YR 5/3) clay films in root channels; few fine rounded very dark gray (10YR 3/1) accumulations (iron and manganese oxides); medium acid.

The solum ranges from 45 to more than 60 inches in thickness. The A or Ap horizon has value of 3 to 5 and chroma of 2 or 3. The E horizon has value of 4 to 6 and chroma of 2 to 4. Some eroded pedons do not have an E horizon. The Bt horizon has value of 4 to 8 and chroma of 2 to 8.

Rushville Series

The Rushville series consists of poorly drained, very slowly permeable soils on broad flats in the uplands. These soils are formed in loess. Slopes range from 0 to 2 percent.

Typical pedon of Rushville silt loam, 2,320 feet west and 2,280 feet north of the southeast corner of sec. 11, T. 8 N., R. 8 W.

Ap—0 to 8 inches; grayish brown (10YR 5/2) silt loam, light brownish gray (10YR 6/2) dry; moderate very fine and fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

Eg—8 to 17 inches; light brownish gray (10YR 6/2) silt loam; moderate thin and medium platy structure; friable; few fine roots; few fine rounded concretions (iron and manganese oxides); neutral; abrupt smooth boundary.

Btg1—17 to 26 inches; grayish brown (10YR 5/2) silty clay; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; firm; few fine roots; many distinct gray (10YR 5/1) clay films on faces of peds; few fine rounded concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

Btg2—26 to 34 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; strong medium prismatic structure; firm; few fine roots; many distinct gray (10YR 5/1) clay films on faces of peds; few fine rounded concretions (iron and manganese oxides); medium acid; clear smooth boundary.

Btg3—34 to 51 inches; gray (10YR 6/1) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure; firm; many distinct gray (10YR 5/1) clay films on faces of peds; few fine rounded concretions (iron and manganese oxides); medium acid; clear smooth boundary.

Cg—51 to 60 inches; light brownish gray (10YR 6/2) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; massive; friable; few fine rounded concretions (iron and manganese oxides); slightly acid.

The solum ranges from 51 to 60 inches in thickness. The Ap horizon has value of 4 or 5. The Eg horizon has value of 6 or 7 and chroma of 1 or 2. The Btg horizon has hue of 10YR or 2.5Y.

Terril Series

The Terril series consists of moderately well drained, moderately permeable soils on foot slopes in the uplands and on alluvial fans on flood plains. These soils formed in loamy local alluvium. Slopes range from 2 to 5 percent.

Typical pedon of Terril loam, 2 to 5 percent slopes, 1,500 feet west and 100 feet north of the southeast corner of sec. 32, T. 11 N., R. 8 W.

Ap—0 to 13 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 5/3) dry; moderate fine granular

structure; friable; many very fine roots; slightly acid; abrupt smooth boundary.

A1—13 to 21 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; many very fine roots; neutral; clear smooth boundary.

A2—21 to 33 inches; black (10YR 2/1) clay loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to moderate fine granular; friable; common very fine roots; neutral; clear smooth boundary.

Bw1—33 to 40 inches; very dark grayish brown (10YR 3/2) clay loam, grayish brown (10YR 5/2) dry; common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; friable; common distinct black (10YR 2/1) organic coatings on faces of peds; few fine iron stains; common very fine roots; neutral; clear smooth boundary.

Bw2—40 to 53 inches; very dark grayish brown (10YR 3/2) clay loam, light brownish gray (10YR 6/2) dry; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium prismatic structure; friable; few distinct black (10YR 2/1) organic coatings on faces of peds; common very fine roots; neutral; clear smooth boundary.

Bw3—53 to 60 inches; very dark grayish brown (10YR 3/2) loam light brownish gray (10YR 6/2) dry; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium prismatic structure; friable; few distinct black (10YR 2/1) organic coatings on faces of peds; few fine rounded accumulations (iron and manganese oxides); few very fine roots; neutral.

The solum ranges from 50 to more than 60 inches in thickness. The Bw horizon has value of 3 or 4 and chroma of 2 to 4. It is loam, sandy loam, or clay loam.

Velma Series

The Velma series consists of well drained, moderately permeable soils on side slopes in the uplands. These soils formed dominantly in glacial till. Slopes range from 10 to 15 percent.

Typical pedon of Velma silt loam, 10 to 15 percent slopes, 1,200 feet west and 1,000 feet south of the center of sec. 6, T. 9 N., R. 8 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate very fine and fine granular structure; very friable; many very fine and fine roots; neutral; abrupt smooth boundary.

A—7 to 16 inches; very dark grayish brown (10YR 3/2) loam; mixed with yellowish brown (10YR 5/4) subsoil material; moderate fine and medium granular structure; friable; common very fine and fine roots; 3 percent pebbles; medium acid; clear smooth boundary.

Bt1—16 to 26 inches; yellowish brown (10YR 5/4) clay loam; many distinct dark brown (10YR 4/3) clay films on faces of peds; moderate fine and medium subangular blocky structure; friable; common fine roots; 3 percent pebbles; strongly acid; clear smooth boundary.

Bt2—26 to 34 inches; yellowish brown (10YR 5/4) clay loam; few fine faint yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable; few fine roots; many distinct brown (10YR 5/3) clay films on faces of peds; 3 percent pebbles; strongly acid; clear smooth boundary.

Bt3—34 to 47 inches; mottled yellowish brown (10YR 5/4 and 5/8) and pale brown (10YR 6/3) clay loam; moderate fine and medium subangular blocky structure; friable; few distinct dark brown (10YR 4/3) clay films on faces of peds; 3 percent pebbles; medium acid; clear smooth boundary.

Bt4—47 to 54 inches; yellowish brown (10YR 5/4) clay loam; common medium faint yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few distinct dark brown (10YR 4/3) clay films on faces of peds; 3 percent pebbles; slightly acid; clear smooth boundary.

C—54 to 60 inches; pale brown (10YR 6/3) loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak very coarse subangular blocky structure; friable; common distinct brown (10YR 4/3) clay films on vertical faces of peds; about 3 percent pebbles; strong effervescence; moderately alkaline.

The solum ranges from 40 to more than 60 inches in thickness. The mollic epipedon ranges from 10 to 20 inches in thickness. In some pedons the loess mantle is as much as 15 inches thick.

The Ap and A horizons have value of 2 or 3 and chroma of 1 to 3. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 8. It is clay loam or loam.

Virden Series

The Virden series consists of poorly drained,

moderately slowly permeable soils on broad flats in the uplands. These soils formed in loess. Slopes range from 0 to 2 percent.

Typical pedon of Virden silty clay loam, 1,060 feet east and 1,100 feet north of the southwest corner of sec. 25, T. 10 N., R. 8 W.

Ap—0 to 10 inches; black (10YR 2/1) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many very fine roots; neutral; clear smooth boundary.

A—10 to 18 inches; black (10YR 2/1) silty clay loam, grayish brown (10YR 5/2) dry; few fine prominent olive brown (2.5Y 4/4) mottles; moderate very fine subangular blocky structure; friable; common very fine roots; neutral; clear smooth boundary.

Btg1—18 to 28 inches; dark gray (10YR 4/1) silty clay loam; common fine prominent olive brown (2.5Y 4/4) and few fine prominent yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure parting to moderate fine angular blocky; firm; many very fine roots; many distinct very dark gray (10YR 3/1) clay films on faces of peds; neutral; clear smooth boundary.

Btg2—28 to 37 inches; dark gray (10YR 4/1) silty clay loam; many fine and medium prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common very fine roots; many distinct very dark gray (10YR 3/1) clay films on faces of peds; few fine rounded accumulations and concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

Btg3—37 to 47 inches; gray (10YR 5/1) silty clay loam; many distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; many distinct dark gray (10YR 4/1) clay films on faces of peds; few fine and medium rounded concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

Btg4—47 to 60 inches; gray (10YR 5/1) silty clay loam; many medium prominent strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; firm; many distinct dark gray (10YR 4/1) clay films on faces of peds; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine and medium rounded concretions (iron and manganese oxides); slightly acid.

The solum ranges from 41 to more than 60 inches in thickness. The mollic epipedon ranges from 14 to 24 inches in thickness.

The Ap and A horizons have value of 2 or 3. They are silt loam or silty clay loam. The Btg horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 or 2. Some pedons have a Cg horizon within a depth of 60 inches. This horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is silty clay loam or silt loam.

Wakeland Series

The Wakeland series consists of somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

Typical pedon of Wakeland silt loam, 800 feet south and 640 feet west of the center of sec. 22, T. 9 N., R. 9 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine and medium granular structure; friable; common fine roots; few distinct dark gray (10YR 4/1) organic stains on faces of peds; neutral; clear smooth boundary.

C1—8 to 25 inches; stratified dark grayish brown (10YR 4/2) and brown (10YR 5/3) silt loam; weak medium platy structure; friable; few fine roots; neutral; clear smooth boundary.

C2—25 to 48 inches; stratified dark grayish brown (10YR 4/2) and brown (10YR 5/3) silt loam; few fine prominent reddish brown (5YR 4/4) and few fine medium prominent yellowish red (5YR 5/6) mottles; weak medium platy structure parting to weak fine and medium subangular blocky; friable; few fine roots; few distinct light gray (10YR 7/2) silt coatings on faces of peds; slightly acid; clear smooth boundary.

C3—48 to 60 inches; stratified dark gray (10YR 4/1) and grayish brown (10YR 5/2) silt loam; common medium faint grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; friable; few fine red (2.5YR 4/8) root channel fillings; neutral.

The Ap horizon has value of 3 or 4. The C horizon has value of 4 to 6 and chroma of 1 to 6. It is dominantly silt loam, but in some pedons it has strata of loam or sandy loam in the lower part.

Formation of the Soils

Five factors have determined the characteristics of the soils in Macoupin County. They are parent material, climate, vegetation and animal life, relief, and time.

Parent Material

Parent material is the unconsolidated geologic material in which a soil forms. It affects the mineralogical and chemical nature of the soil and, to a large extent, determines the rate of soil formation. The soils in Macoupin County formed in loess, alluvium, or glacial material.

The loess consists of Peorian loess and Roxana silts. It ranges in thickness from about 7 feet on the nearly level uplands in the northern part of the county to 4 feet on the nearly level uplands in the southern part. The mantle of loess generally is thinner in the more sloping areas. The nearly level to gently sloping Ipava and Virden soils formed entirely in loess. The moderately sloping and strongly sloping Elco and Keller soils formed in loess and in glacial material.

Soils on flood plains formed in recent alluvium that eroded from the upland soils. Most of these areas on bottom land still receive sediments. Coffeen, Lawson, and Ross are examples of soils that formed in alluvium on bottom lands.

Illinoian glacial till underlies the loess in most of Macoupin County. On many side slopes along the major streams, erosion has removed the loess and glacial till is at the surface. Hickory soils formed in glacial till.

Bedrock of the Pennsylvanian Period underlies the loess and glacial material in Macoupin County. This bedrock consists mainly of shale, sandstone, siltstone, and limestone. In a few areas along the major streams, sandstone bedrock is near the surface. Berks soils formed in material weathered from bedrock.

Climate

Macoupin County has a temperate, humid, continental climate. Because it is essentially uniform throughout the county, the climate has not caused any obvious differences among the soils within the county. It has differentiated those soils, however, from the soils in other regions.

Climate is a very important factor of soil formation because it affects weathering, vegetation, and erosion. Temperature and precipitation affect the physical and chemical nature of the soil. The weathering of minerals in the soil increases as temperature increases. As it moves through the soil, water dissolves and transports soluble salts downward. It also transports clay-sized particles from the surface soil to the subsoil. This translocation of clay characterizes the Alfisols in Macoupin County. The temperature and precipitation in the county favor both prairie and forest vegetation. Precipitation also can affect soil formation through the effect it has on erosion. As the rate of erosion approaches the rate of soil formation, the soil generally exhibits less profile development.

Vegetation and Animal Life

Soils are affected by the vegetation under which they formed. The native vegetation in Macoupin County was mainly deciduous hardwood trees and prairie grasses. Hickory, Rushville, and other soils that formed under forest vegetation have a thin, relatively light colored surface layer. As the leaf litter decomposed, organic matter was added to the surface layer. Herrick, Virden, and other soils that formed under prairie grasses have a thick, dark colored surface soil. The many fine and fibrous grass roots in the upper part of these soils added large amounts of organic matter to the soils.

Other living organisms also have contributed to soil formation. These include the microorganisms, bacteria, fungi, earthworms, insects, and burrowing animals that live on or in the soil. These organisms affect the decomposition of organic material and mix and churn the soil.

Human activities also affect soil formation. Farming reduces the content of organic matter in the surface soil and increases the rate of runoff and the hazard of erosion. Building dikes and levees reduces the

frequency of flooding. In some soils installing subsurface drains helps to lower the water table.

Relief

Relief tends to modify the effects of the other soil-forming factors. It affects the amount of water that enters the soil through its effect on runoff and infiltration rates.

Differences in natural drainage generally are closely associated with slope or relief. Soils that formed in the more sloping uplands are well drained and have a brown and yellowish brown subsoil. Soils that formed in low areas, such as depressions, and on broad, nearly level plains are poorly drained and have a grayish subsoil. Cowden and Rushville soils are examples. Some soils formed in intermediate landscape positions, such as low ridges and gently sloping side slopes. These soils are somewhat poorly drained and have a grayish and brownish, mottled subsoil. Oconee and Marine soils are examples.

Time

Time affects the degree of profile development in the soil. The influence of time, however, can be modified by the deposition of new material and by topography. Coffeen, Wakeland, and other soils on bottom land that are subject to flooding receive new deposits each time they are flooded. As a result, they are genetically younger than other soils in the county. Nearly level soils commonly are genetically and morphologically older than the more sloping soils because the slope affects the amount of water that penetrates the surface. The degree of profile development tends to decrease as the slope increases.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

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.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

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.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

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

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

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.

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.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

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 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.

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.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

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

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

Complex, soil. A map unit of two or more kinds of soil 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 are somewhat similar in all areas.

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

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. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

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.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

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 to rock (in tables). Bedrock is too near the surface for the specified use.

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

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

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

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

Well drained.—Water is removed from the soil

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

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

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

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

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.

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 the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

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*.

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

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

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

Forb. Any herbaceous plant not a grass or a sedge.

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.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

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 (geology). Water filling all the unblocked pores of underlying 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.

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. The major horizons 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, any plowed or disturbed surface layer.

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 O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon 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) granular, 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 horizon. 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.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but 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.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

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

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.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

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, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and 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. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

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.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

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.

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 affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 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. For example, slope, stoniness, and thickness.

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.

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.

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.

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.

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—

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

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 is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

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-size particles.

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.

Seepage (in tables). The movement of water through

the soil. Seepage adversely affects the specified use.

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 or of the underlying material. 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.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

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 use in the survey area.

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 feet.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

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.

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.

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 underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to soil blowing 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 soil blowing 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.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 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. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

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.

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 basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

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, are in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

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.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-80 at White Hall, Illinois)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	36.2	17.4	26.8	63	-13	2.3	1.45	0.62	1.95	3	3.5
February----	41.8	22.0	31.9	68	-6	5.0	1.59	.63	2.61	3	3.3
March-------	52.4	30.9	41.7	81	5	47.8	2.97	1.74	4.05	6	2.8
April-------	66.6	43.3	54.9	86	23	200.5	3.54	2.13	4.21	7	.2
May---------	76.1	52.8	64.5	90	34	436.4	3.94	2.09	5.77	7	.0
June--------	84.5	61.6	73.0	96	47	667.4	3.66	2.21	4.67	6	.0
July--------	88.1	65.6	76.9	100	50	831.6	3.58	1.76	5.28	6	.0
August------	86.2	63.6	74.9	99	50	745.5	3.14	1.84	3.95	5	.0
September---	80.2	56.1	68.2	96	37	542.6	3.14	1.68	5.01	6	.0
October-----	69.4	44.9	57.1	88	25	256.8	2.66	1.22	4.23	5	.0
November----	54.1	33.7	43.9	78	10	57.5	2.08	1.04	2.87	5	.9
December----	41.6	23.8	32.7	69	-5	7.5	1.96	1.02	2.74	4	2.2
Yearly:											
Average---	64.7	43.0	53.9	---	---	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,800.9	33.71	---	---	63	12.9

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

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-80 at White Hall, Illinois)

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--	Apr. 11	Apr. 24	May 4
2 years in 10 later than--	Apr. 3	Apr. 17	Apr. 25
5 years in 10 later than--	Mar. 27	Apr. 9	Apr. 16
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 20	Oct. 13	Oct. 8
2 years in 10 earlier than--	Oct. 30	Oct. 22	Oct. 11
5 years in 10 earlier than--	Nov. 7	Oct. 29	Oct. 20

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-80 at White Hall, Illinois)

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	194	179	160
8 years in 10	210	188	170
5 years in 10	222	200	190
2 years in 10	237	218	197
1 year in 10	251	223	202

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
6B2	Fishhook silt loam, 2 to 5 percent slopes, eroded	6,138	1.1
6C2	Fishhook silty clay loam, 5 to 10 percent slopes, eroded	6,142	1.1
7C2	Atlas silt loam, 5 to 10 percent slopes, eroded	11,147	2.0
7C3	Atlas silty clay loam, 5 to 10 percent slopes, severely eroded	1,065	0.2
7D2	Atlas silt loam, 10 to 15 percent slopes, eroded	5,966	1.1
7E2	Atlas silt loam, 15 to 20 percent slopes, eroded	700	0.1
8D2	Hickory loam, 10 to 15 percent slopes, eroded	4,588	0.8
8E2	Hickory loam, 15 to 20 percent slopes, eroded	13,867	2.5
8F	Hickory silt loam, 20 to 30 percent slopes	37,127	6.6
8F2	Hickory loam, 20 to 30 percent slopes, eroded	20,914	3.7
8G	Hickory silt loam, 30 to 60 percent slopes	12,755	2.3
16	Rushville silt loam	4,932	0.9
17	Keomah silt loam	25,994	4.7
43A	Ipava silt loam, 0 to 2 percent slopes	30,840	5.5
43B	Ipava silt loam, 2 to 5 percent slopes	3,669	0.7
46	Herrick silt loam	67,109	12.1
50	Virden silty clay loam	71,254	12.9
73	Ross silt loam	1,659	0.3
76	Otter silt loam	1,940	0.3
112	Cowden silt loam	2,862	0.5
113A	Oconee silt loam, 0 to 2 percent slopes	14,227	2.5
113B	Oconee silt loam, 2 to 5 percent slopes	4,531	0.8
119B2	Elco silt loam, 2 to 5 percent slopes, eroded	1,321	0.2
119C2	Elco silt loam, 5 to 10 percent slopes, eroded	6,820	1.2
119D2	Elco silt loam, 10 to 15 percent slopes, eroded	1,806	0.3
120	Huey silt loam	828	0.1
127B	Harrison silt loam, 2 to 5 percent slopes	4,300	0.8
134C2	Camden silt loam, 5 to 12 percent slopes, eroded	583	0.1
214B	Hosmer silt loam, 2 to 5 percent slopes	14,742	2.6
250D	Velma silt loam, 10 to 15 percent slopes	671	0.1
259B	Assumption silt loam, 2 to 5 percent slopes	2,215	0.4
259B2	Assumption silt loam, 2 to 5 percent slopes, eroded	1,956	0.4
259C2	Assumption silt loam, 5 to 10 percent slopes, eroded	2,759	0.5
279A	Rozetta silt loam, 0 to 2 percent slopes	9,722	1.7
279B	Rozetta silt loam, 2 to 5 percent slopes	17,004	3.0
279C2	Rozetta silt loam, 5 to 10 percent slopes, eroded	967	0.2
280B	Fayette silt loam, 2 to 5 percent slopes	1,864	0.3
280C2	Fayette silt loam, 5 to 10 percent slopes, eroded	796	0.1
333	Wakeland silt loam	10,816	1.9
402	Colo silt loam	1,964	0.4
428A	Coffeen silt loam, 0 to 3 percent slopes	11,229	2.0
451	Lawson silt loam	11,541	2.1
470B	Keller silt loam, 2 to 5 percent slopes	7,032	1.3
517	Marine silt loam	31,044	5.6
536	Dumps, mine	1,207	0.2
587B	Terril loam, 2 to 5 percent slopes	788	0.1
620B	Darmstadt silt loam, 2 to 5 percent slopes	1,025	0.2
660C2	Coatsburg silt loam, 4 to 7 percent slopes, eroded	1,138	0.2
784G	Berks loam, 30 to 60 percent slopes	768	0.1
802E	Orthents, loamy, hilly	1,068	0.2
941	Virden-Piasa complex	4,491	0.8
993	Cowden-Piasa silt loams	18,930	3.4
995	Herrick-Piasa silt loams	33,617	6.0
	Water	4,282	0.8
	Total	558,720	100.0

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
6B2	Fishhook silt loam, 2 to 5 percent slopes, eroded
17	Keomah silt loam (where drained)
43A	Ipava silt loam, 0 to 2 percent slopes
43B	Ipava silt loam, 2 to 5 percent slopes
46	Herrick silt loam
50	Virden silty clay loam (where drained)
73	Ross silt loam (where protected from flooding or not frequently flooded during the growing season)
76	Otter silt loam (where drained and either protected from flooding or not frequently flooded during the growing season)
112	Cowden silt loam (where drained)
113A	Oconee silt loam, 0 to 2 percent slopes (where drained)
113B	Oconee silt loam, 2 to 5 percent slopes
119B2	Elco silt loam, 2 to 5 percent slopes, eroded
127B	Harrison silt loam, 2 to 5 percent slopes
214B	Hosmer silt loam, 2 to 5 percent slopes
259B	Assumption silt loam, 2 to 5 percent slopes
259B2	Assumption silt loam, 2 to 5 percent slopes, eroded
279A	Rozetta silt loam, 0 to 2 percent slopes
279B	Rozetta silt loam, 2 to 5 percent slopes
280B	Fayette silt loam, 2 to 5 percent slopes
333	Wakeland silt loam (where drained and either protected from flooding or not frequently flooded during the growing season)
402	Colo silt loam (where drained and either protected from flooding or not frequently flooded during the growing season)
428A	Coffeen silt loam, 0 to 3 percent slopes (where protected from flooding or not frequently flooded during the growing season)
451	Lawson silt loam (where protected from flooding or not frequently flooded during the growing season)
470B	Keller silt loam, 2 to 5 percent slopes
517	Marine silt loam (where drained)
587B	Terril loam, 2 to 5 percent slopes

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*
6B2---------- Fishhook	IIIe	71	21	23	2.4	4.1
6C2---------- Fishhook	IIIe	69	20	22	2.4	3.9
7C2---------- Atlas	IIIe	52	16	19	2.2	3.6
7C3---------- Atlas	IVe	43	14	16	1.8	3.0
7D2---------- Atlas	IVe	49	15	18	2.1	3.4
7E2---------- Atlas	VIe	---	---	---	2.0	3.2
8D2---------- Hickory	IIIe	72	23	26	2.7	4.5
8E2---------- Hickory	IVe	67	---	---	2.5	4.2
8F---------- Hickory	VIe	---	---	---	2.4	4.0
8F2---------- Hickory	VIe	---	---	---	2.1	3.6
8G---------- Hickory	VIIe	---	---	---	---	---
16---------- Rushville	IIIw	114	36	47	---	---
17---------- Keomah	IIw	131	39	52	5.2	8.7
43A---------- Ipava	I	163	52	66	6.1	10.2
43B---------- Ipava	IIe	161	51	65	6.0	10.0
46---------- Herrick	IIw	141	45	61	5.5	9.2
50---------- Virden	IIw	138	46	57	---	---
73---------- Ross	IIw	130	44	50	5.0	9.2
76---------- Otter	IIw	143	46	---	---	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*
112---------- Cowden	IIw	120	37	53	---	---
113A---------- Oconee	IIw	120	36	54	5.0	8.3
113B---------- Oconee	IIe	119	36	53	4.9	8.2
119B2---------- Elco	IIe	107	36	45	4.2	7.0
119C2---------- Elco	IIIe	105	35	44	4.1	6.9
119D2---------- Elco	IIIe	101	33	42	4.0	6.6
120---------- Huey	IVw	64	23	33	---	---
127B---------- Harrison	IIe	135	42	58	5.2	8.4
134C2---------- Camden	IIIe	118	37	52	4.7	7.8
214B---------- Hosmer	IIe	102	33	47	4.3	7.1
250D---------- Velma	IIIe	110	36	47	4.3	7.1
259B---------- Assumption	IIe	127	39	55	4.9	8.2
259B2---------- Assumption	IIe	123	37	54	4.7	8.0
259C2---------- Assumption	IIIe	120	37	52	4.6	7.8
279A---------- Rozetta	I	131	40	54	5.2	8.7
279B---------- Rozetta	IIe	130	40	53	5.1	8.6
279C2---------- Rozetta	IIIe	123	38	51	4.9	8.2
280B---------- Fayette	IIe	128	39	52	5.1	8.6
280C2---------- Fayette	IIIe	121	37	49	4.9	8.1
333---------- Wakeland	IIw	115	37	---	4.4	6.9

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*
402---------- Colo	IIw	142	39	---	---	---
428A---------- Coffeen	IIw	106	33	---	4.1	6.8
451---------- Lawson	IIw	130	33	---	4.6	7.6
470B---------- Keller	IIe	93	33	44	4.0	6.4
517---------- Marine	IIw	102	38	50	4.8	8.0
536**. Dumps						
587B---------- Terril	IIe	139	43	58	5.4	8.9
620B---------- Darmstadt	IIIe	68	26	36	3.0	5.0
660C2---------- Coatsburg	IIIe	73	23	25	2.9	4.8
784G---------- Berks	VIIe	---	---	---	---	---
802E. Orthents						
941---------- Virden-Piasa	IIIw	120	40	50	---	---
993---------- Cowden-Piasa	IIIw	105	34	48	---	---
995---------- Herrick-Piasa	IIIw	121	39	53	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--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)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
6C2---------- Fishhook	4C	Slight	Slight	Slight	Moderate	White oak----------	70	52	Shortleaf pine, loblolly pine, eastern white pine, eastern redcedar.
						Northern red oak----	70	52	
						Green ash----------	---	---	
						Bur oak----------	---	---	
7C2, 7C3, 7D2--- Atlas	4C	Slight	Slight	Moderate	Moderate	White oak----------	70	52	Green ash, pin oak, red maple, Austrian pine.
						Northern red oak----	70	52	
						Bur oak----------	70	52	
						Green ash----------	---	---	
7E2---------- Atlas	4R	Moderate	Moderate	Moderate	Moderate	White oak----------	70	52	Green ash, pin oak, red maple, Austrian pine.
						Northern red oak----	70	52	
						Bur oak----------	70	52	
						Green ash----------	---	---	
8D2---------- Hickory	5A	Slight	Slight	Slight	Slight	White oak----------	85	67	Eastern white pine, red pine, yellow poplar, sugar maple, white oak, black walnut.
						Northern red oak----	85	67	
						Black oak----------	---	---	
						Green ash----------	---	---	
						Bitternut hickory---	---	---	
						Yellow poplar-------	95	98	
8E2, 8F, 8F2---- Hickory	5R	Moderate	Moderate	Slight	Slight	White oak----------	85	67	Eastern white pine, red pine, yellow poplar, sugar maple, white oak, black walnut.
						Northern red oak----	85	67	
						Black oak----------	---	---	
						Green ash----------	---	---	
						Bitternut hickory---	---	---	
						Yellow poplar-------	95	98	
8G---------- Hickory	5R	Severe	Severe	Slight	Slight	White oak----------	85	67	Eastern white pine, red pine, yellow poplar, sugar maple, white oak, black walnut.
						Northern red oak----	85	67	
						Black oak----------	---	---	
						Green ash----------	---	---	
						Bitternut hickory---	---	---	
						Yellow poplar-------	95	98	
17---------- Keomah	3A	Slight	Slight	Slight	Slight	White oak----------	65	48	Eastern white pine, white oak, red pine, northern red oak, black walnut, sugar maple.
						Northern red oak----	70	52	
119D2---------- Elco	4A	Slight	Slight	Slight	Slight	White oak----------	80	62	White oak, northern red oak, black walnut, green ash, eastern white pine, white ash.
						Northern red oak----	---	---	
						Black walnut--------	---	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
134C2---------- Camden	7A	Slight	Slight	Slight	Slight	Yellow poplar------- Green ash---------- White oak---------- Northern red oak---- Sweetgum----------	95 76 85 85 80	98 75 67 67 79	White ash, white oak, black walnut, green ash, eastern white pine, red pine, yellow poplar, black locust.
214B---------- Hosmer	4A	Slight	Slight	Slight	Slight	White oak---------- Yellow poplar------- Virginia pine------- Sugar maple---------	75 90 75 75	57 90 115 47	Eastern white pine, shortleaf pine, red pine, yellow poplar, white ash.
279C2---------- Rozetta	4A	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Yellow poplar------- Black walnut--------	80 80 90 ---	62 62 90 ---	Eastern white pine, northern red oak, green ash, Scotch pine, yellow poplar.
280C2---------- Fayette	4A	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Yellow poplar------- Black walnut--------	80 80 90 ---	62 62 90 ---	Eastern white pine, northern red oak, green ash, yellow poplar.
784G---------- Berks	3R	Moderate	Severe	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine-------	60 60 60	43 43 91	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

TABLE 8.--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)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
6B2, 6C2---------- Fishhook	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osageorange, green ash, Austrian pine.	Pin oak, eastern white pine.	---
7C2, 7C3, 7D2, 7E2---------- Atlas	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osageorange, green ash, Austrian pine.	Pin oak, eastern white pine.	---
8D2, 8E2, 8F, 8F2, 8G---------- Hickory	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
16---------- Rushville	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
17---------- Keomah	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
43A, 43B---------- Ipava	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
46---------- Herrick	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
50---------- Virden	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
73---------- Ross	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir, Austrian pine.	Norway spruce-----	Pin oak, eastern white pine.
76---------- Otter	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
112---------- Cowden	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, northern whitecedar, blue spruce, Norway spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
113A, 113B-------- Oconee	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
119B2, 119C2, 119D2---------- Elco	Silky dogwood, Amur privet, American cranberrybush.	Northern whitecedar, Washington hawthorn, blue spruce, white fir.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
120---------- Huey	Eastern redcedar, Russian olive.	Siberian elm, green ash.	---	---
127B---------- Harrison	American cranberrybush, Amur honeysuckle, autumn olive, silky dogwood.	Blue spruce, northern whitecedar, Washington hawthorn, white fir.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
134C2---------- Camden	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Northern whitecedar, white fir, Washington hawthorn, blue spruce.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.
214B---------- Hosmer	Eastern redcedar, arrowwood, Washington hawthorn, Amur privet, American cranberrybush, Amur honeysuckle.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
250D---------- Velma	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
259B, 259B2, 259C2---------- Assumption	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
279A, 279B, 279C2- Rozetta	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
280B, 280C2------- Fayette	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
333---------- Wakeland	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	Northern whitecedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
402---------- Colo	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, blue spruce, white fir, northern whitecedar, Washington hawthorn.	Eastern white pine	Pin oak.
428A---------- Coffeen	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
451---------- Lawson	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
470B---------- Keller	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osageorange, green ash, Austrian pine.	Pin oak, eastern white pine.	---
517---------- Marine	Eastern redcedar, American cranberrybush, Amur privet, Washington hawthorn, Amur honeysuckle, autumn olive.	Austrian pine, green ash, eastern white pine, osageorange.	Pin oak----------	---
536*. Dumps				
587B---------- Terril	Gray dogwood, Siberian peashrub, redosier dogwood, lilac.	Honeylocust, Russian olive, Amur maple, blue spruce, northern whitecedar, eastern redcedar.	Eastern white pine, green ash.	---
620B---------- Darmstadt	Eastern redcedar, Russian olive.	Siberian elm, green ash.	---	---
660C2---------- Coatsburg	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
784G---------- Berks	Amur honeysuckle, lilac, autumn olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
802E. Orthents				

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
941*:				
Virden	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
Piasa	Eastern redcedar, Russian olive.	Siberian elm, green ash.	---	---
993*:				
Cowden	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, northern whitecedar, blue spruce, Norway spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Piasa	Eastern redcedar, Russian olive.	Siberian elm, green ash.	---	---
995*:				
Herrick	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Piasa	Eastern redcedar, Russian olive.	Siberian elm, green ash.	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
6B2 Fishhook	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
6C2 Fishhook	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness.	Moderate: wetness.
7C2, 7C3 Atlas	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
7D2 Atlas	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.
7E2 Atlas	Severe: slope, wetness, percs slowly.	Severe: slope, percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Severe: slope.
8D2 Hickory	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
8E2 Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
8F, 8F2, 8G Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
16 Rushville	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
17 Keomah	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.
43A, 43B Ipava	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
46 Herrick	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
50 Virden	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
73 Ross	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
76 Otter	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
112--Cowden	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
113A, 113B--Oconee	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
119B2--Elco	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
119C2--Elco	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
119D2--Elco	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
120--Huey	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding.	Severe: excess sodium, ponding.
127B--Harrison	Slight	Slight	Moderate: slope.	Slight	Slight.
134C2--Camden	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
214B--Hosmer	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Slight.
250D--Velma	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
259B, 259B2--Assumption	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
259C2--Assumption	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight	Slight.
279A--Rozetta	Slight	Slight	Slight	Slight	Slight.
279B--Rozetta	Slight	Slight	Moderate: slope.	Slight	Slight.
279C2--Rozetta	Slight	Slight	Severe: slope.	Slight	Slight.
280B--Fayette	Slight	Slight	Moderate: slope.	Slight	Slight.
280C2--Fayette	Slight	Slight	Severe: slope.	Slight	Slight.
333--Wakeland	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
402--Colo	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
428A--Coffeen	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
451--Lawson	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
470B--Keller	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Severe: erodes easily.	Moderate: wetness.
517--Marine	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
536*. Dumps					
587B--Terril	Slight	Slight	Moderate: slope.	Slight	Slight.
620B--Darmstadt	Severe: wetness, percs slowly, excess sodium.	Severe: excess sodium, percs slowly.	Severe: wetness, percs slowly.	Severe: erodes easily.	Severe: excess sodium.
660C2--Coatsburg	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
784G--Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
802E. Orthents					
941*: Virden	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Piasa	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding.	Severe: excess sodium, ponding.
993*: Cowden	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Piasa	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding.	Severe: excess sodium, ponding.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
995*:					
Herrick	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Piasa	Severe: ponding, percs slowly, excess sodium.	Severe: ponding, excess sodium, percs slowly.	Severe: ponding, percs slowly, excess sodium.	Severe: ponding.	Severe: excess sodium, ponding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
6B2---------- Fishhook	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
6C2---------- Fishhook	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
7C2, 7C3, 7D2------ Atlas	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
7E2---------- Atlas	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
8D2---------- Hickory	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
8E2---------- Hickory	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
8F, 8F2, 8G-------- Hickory	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
16---------- Rushville	Poor	Fair	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.
17---------- Keomah	Good	Good	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair.
43A---------- Ipava	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
43B---------- Ipava	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
46---------- Herrick	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
50---------- Virden	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
73---------- Ross	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
76---------- Otter	Good	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
112---------- Cowden	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
113A---------- Oconee	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
113B---------- Oconee	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
119B2---------- Elco	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
119C2, 119D2---- Elco	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
120---- Huey	Poor	Poor	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.
127B---- Harrison	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
134C2---- Camden	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
214B---- Hosmer	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
250D---- Velma	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
259B, 259B2---- Assumption	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
259C2---- Assumption	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
279A, 279B---- Rozetta	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
279C2---- Rozetta	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
280B---- Fayette	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
280C2---- Fayette	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
333---- Wakeland	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
402---- Colo	Good	Fair	Good	Fair	Poor	Good	Good	Fair	Fair	Good.
428A---- Coffeen	Fair	Fair	Fair	Good	Poor	Fair	Poor	Fair	Good	Poor.
451---- Lawson	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
470B---- Keller	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
517---- Marine	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
536*. Dumps										
587B---- Terril	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
620B---------- Darmstadt	Fair	Good	Poor	Good	Good	Fair	Poor	Fair	Good	Poor.
660C2---------- Coatsburg	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
784G---------- Berks	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
802E. Orthents										
941*:										
Virden----------	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Piasa----------	Poor	Fair	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
993*:										
Cowden----------	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Piasa----------	Poor	Fair	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.
995*:										
Herrick----------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Piasa----------	Poor	Fair	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
6B2, 6C2---------- Fishhook	Severe: wetness.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
7C2, 7C3---------- Atlas	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
7D2---------- Atlas	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
7E2---------- Atlas	Severe: wetness, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
8D2---------- Hickory	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
8E2, 8F, 8F2, 8G-- Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
16---------- Rushville	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
17---------- Keomah	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, frost action, low strength.	Slight.
43A, 43B---------- Ipava	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
46---------- Herrick	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
50---------- Virden	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: ponding.
73---------- Ross	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
76---------- Otter	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
112---------- Cowden	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
113A, 113B-------- Oconee	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
119B2---------- Elco	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
119C2---------- Elco	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
119D2---------- Elco	Moderate: too clayey, wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
120---------- Huey	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: excess sodium, ponding.
127B---------- Harrison	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
134C2---------- Camden	Moderate: wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
214B---------- Hosmer	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness.	Moderate: shrink-swell.	Severe: frost action.	Slight.
250D---------- Velma	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
259B, 259B2------- Assumption	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
259C2---------- Assumption	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Severe: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
279A, 279B-------- Rozetta	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
279C2--- Rozetta	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
280B--- Fayette	Slight---	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
280C2--- Fayette	Slight---	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: frost action, low strength.	Slight.
333--- Wakeland	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
402--- Colo	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Severe: flooding.
428A--- Coffeen	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
451--- Lawson	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
470B--- Keller	Severe: wetness.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
517--- Marine	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
536*. Dumps						
587B--- Terril	Slight---	Slight---	Slight---	Slight---	Severe: low strength.	Slight.
620B--- Darmstadt	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Severe: excess sodium.
660C2--- Coatsburg	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
784G--- Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
802E. Orthents						

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
941*:						
Virden	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: ponding.
Piasa	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, frost action.	Severe: excess sodium, ponding.
993*:						
Cowden	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
Piasa	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, frost action.	Severe: excess sodium, ponding.
995*:						
Herrick	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
Piasa	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, frost action.	Severe: excess sodium, ponding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
6B2 Fishhook	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
6C2 Fishhook	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
7C2, 7C3, 7D2 Atlas	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
7E2 Atlas	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: wetness, slope, too clayey.	Severe: wetness, slope.	Poor: too clayey, hard to pack, slope.
8D2 Hickory	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
8E2, 8F, 8F2, 8G Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
16 Rushville	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
17 Keomah	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
43A, 43B Ipava	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
46 Herrick	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
50 Virden	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
73 Ross	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.
76 Otter	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
112---------- Cowden	Severe: ponding, percs slowly.	Slight----------	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
113A---------- Oconee	Severe: wetness, percs slowly.	Slight----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
113B---------- Oconee	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
119B2---------- Elco	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
119C2---------- Elco	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
119D2---------- Elco	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
120---------- Huey	Severe: ponding, percs slowly.	Slight----------	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, ponding, excess sodium.
127B---------- Harrison	Severe: wetness.	Severe: wetness.	Moderate: wetness, too clayey.	Slight----------	Fair: too clayey, wetness.
134C2---------- Camden	Moderate: wetness, slope.	Severe: seepage, slope.	Severe: seepage, wetness.	Moderate: wetness, slope.	Fair: too clayey, slope.
214B---------- Hosmer	Severe: wetness, percs slowly.	Moderate: slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
250D---------- Velma	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
259B, 259B2--------- Assumption	Severe: wetness, percs slowly.	Severe: wetness.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
259C2---------- Assumption	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
279A---------- Rozetta	Moderate: wetness.	Moderate: seepage, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
279B---------- Rozetta	Moderate: wetness.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
279C2---------- Rozetta	Moderate: wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
280B---------- Fayette	Slight----------	Moderate: slope, seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey.
280C2---------- Fayette	Slight----------	Severe: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
333---------- Wakeland	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
402---------- Colo	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
428A---------- Coffeen	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
451---------- Lawson	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
470B---------- Keller	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
517---------- Marine	Severe: wetness, percs slowly.	Slight----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
536*. Dumps					
587B---------- Terril	Slight----------	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
620B---------- Darmstadt	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, excess sodium.	Severe: wetness.	Poor: wetness, excess sodium.
660C2---------- Coatsburg	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
784G---------- Berks	Severe: slope, thin layer, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope.	Poor: slope, small stones, area reclaim.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
802E. Orthents					
941*: Virden	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Piasa	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
993*: Cowden	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Piasa	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
995*: Herrick	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Piasa	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey, excess sodium.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
6B2 Fishhook	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
6C2 Fishhook	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
7C2, 7C3, 7D2 Atlas	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
7E2 Atlas	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
8D2 Hickory	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
8E2 Hickory	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
8F, 8F2, 8G Hickory	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
16 Rushville	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
17 Keomah	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
43A, 43B Ipava	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
46 Herrick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
50 Virden	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
73 Ross	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
76 Otter	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
112 Cowden	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
113A, 113B Oconee	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
119B2, 119C2---------- Elco	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
119D2---------- Elco	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
120---------- Huey	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.
127B---------- Harrison	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
134C2---------- Camden	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
214B---------- Hosmer	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
250D---------- Velma	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
259B, 259B2, 259C2---- Assumption	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
279A, 279B, 279C2----- Rozetta	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
280B, 280C2---------- Fayette	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
333---------- Wakeland	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
402---------- Colo	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
428A---------- Coffeen	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
451---------- Lawson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
470B---------- Keller	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
517---------- Marine	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
536*. Dumps				
587B---------- Terril	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
620B---------- Darmstadt	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
660C2---------- Coatsburg	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
784G---------- Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
802E. Orthents				
941*:				
Virden----------	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Piasa----------	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.
993*:				
Cowden----------	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Piasa----------	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.
995*:				
Herrick----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Piasa----------	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
6B2, 6C2---------- Fishhook	Moderate: seepage, slope.	Moderate: hard to pack, wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, rooting depth.	Erodes easily, wetness.	Wetness, erodes easily.
7C2, 7C3---------- Atlas	Moderate: slope.	Severe: hard to pack.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily.
7D2, 7E2---------- Atlas	Severe: slope.	Severe: hard to pack.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
8D2, 8E2, 8F, 8F2, 8G---------- Hickory	Severe: slope.	Moderate: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
16---------- Rushville	Slight---------	Severe: ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
17---------- Keomah	Slight---------	Severe: hard to pack.	Frost action, percs slowly.	Wetness, percs slowly.	Wetness, erodes easily, percs slowly.	Erodes easily, percs slowly.
43A---------- Ipava	Slight---------	Severe: wetness.	Frost action---	Wetness--------	Erodes easily, wetness.	Wetness, erodes easily.
43B---------- Ipava	Moderate: slope.	Severe: wetness.	Frost action, slope.	Wetness, slope.	Erodes easily, wetness.	Wetness, erodes easily.
46---------- Herrick	Slight---------	Severe: wetness.	Frost action---	Wetness--------	Erodes easily, wetness.	Wetness, erodes easily.
50---------- Virden	Slight---------	Severe: hard to pack, ponding.	Ponding, frost action.	Ponding--------	Ponding--------	Wetness.
73---------- Ross	Severe: seepage.	Severe: piping.	Deep to water	Flooding-------	Favorable------	Favorable.
76---------- Otter	Moderate: seepage.	Severe: piping, ponding.	Ponding, flooding, frost action.	Ponding, flooding.	Erodes easily, ponding.	Wetness, erodes easily.
112---------- Cowden	Slight---------	Severe: ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
113A---------- Oconee	Slight---------	Severe: hard to pack, wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
113B---------- Oconee	Moderate: slope.	Severe: hard to pack, wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
119B2, 119C2---- Elco	Moderate: seepage, slope.	Moderate: piping, wetness.	Frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily.
119D2---- Elco	Severe: slope.	Moderate: piping, wetness.	Frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily.
120---- Huey	Slight----	Severe: ponding, excess sodium.	Ponding, percs slowly, frost action.	Ponding, droughty, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.
127B---- Harrison	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope----	Erodes easily	Erodes easily.
134C2---- Camden	Severe: slope.	Severe: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
214B---- Hosmer	Moderate: seepage, slope.	Severe: piping.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, rooting depth.
250D---- Velma	Severe: slope.	Moderate: thin layer.	Deep to water	Slope----	Slope----	Slope.
259B, 259B2, 259C2---- Assumption	Moderate: seepage, slope.	Moderate: wetness.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
279A---- Rozetta	Moderate: seepage.	Slight----	Deep to water	Erodes easily	Erodes easily	Erodes easily.
279B, 279C2---- Rozetta	Moderate: seepage, slope.	Slight----	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
280B, 280C2---- Fayette	Moderate: slope, seepage.	Slight----	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
333---- Wakeland	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
402---- Colo	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Wetness----	Wetness.
428A---- Coffeen	Severe: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, flooding.	Wetness----	Wetness.
451---- Lawson	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
470B---- Keller	Moderate: seepage, slope.	Moderate: hard to pack, wetness.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily.
517---- Marine	Slight----	Moderate: hard to pack, wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
536*. Dumps						
587B---------- Terril	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Favorable------	Favorable.
620B---------- Darmstadt	Moderate: slope.	Severe: excess sodium.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Wetness, excess sodium.
660C2---------- Coatsburg	Moderate: slope.	Severe: hard to pack, wetness.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness.	Wetness, erodes easily.
784G---------- Berks	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, thin layer.	Slope, depth to rock.	Slope, droughty, depth to rock.
802E. Orthents						
941*: Virden----------	Slight---------	Severe: hard to pack, ponding.	Ponding, frost action.	Ponding--------	Ponding--------	Wetness.
Piasa----------	Slight---------	Severe: hard to pack, ponding, excess sodium.	Percs slowly, frost action, excess salt.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.
993*: Cowden----------	Slight---------	Severe: ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
Piasa----------	Slight---------	Severe: hard to pack, ponding, excess sodium.	Percs slowly, frost action, excess salt.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.
995*: Herrick----------	Slight---------	Severe: wetness.	Frost action---	Wetness--------	Erodes easily, wetness.	Wetness, erodes easily.
Piasa----------	Slight---------	Severe: hard to pack, ponding, excess sodium.	Percs slowly, frost action, excess salt.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, excess sodium, erodes easily.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
6B2---------- Fishhook	0-13	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	95-100	85-100	25-40	5-15
	13-25	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	90-100	35-50	10-25
	25-60	Clay loam, loam, silty clay loam.	CH, CL	A-7	0-5	95-100	90-100	80-90	75-85	40-60	20-35
6C2---------- Fishhook	0-5	Silty clay loam	ML	A-6, A-7	0	100	100	95-100	90-100	35-50	10-20
	5-29	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	90-100	35-50	10-25
	29-60	Clay loam, loam, silty clay loam.	CH, CL	A-7	0-5	95-100	90-100	80-90	75-85	40-60	20-35
7C2---------- Atlas	0-7	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	95-100	75-95	25-35	5-15
	7-51	Silty clay loam, clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
	51-60	Silty clay loam, clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
7C3---------- Atlas	0-3	Silty clay loam	CH, CL	A-7	0	100	100	95-100	75-100	40-60	25-40
	3-60	Silty clay loam, clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
7D2, 7E2--------- Atlas	0-7	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	95-100	75-95	25-35	5-15
	7-12	Silty clay loam, clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
	12-60	Silty clay loam, clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
8D2, 8E2--------- Hickory	0-8	Loam-------------	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	8-15
	8-42	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	42-60	Sandy loam, loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-95	70-95	60-80	20-40	5-20
8F---------- Hickory	0-13	Silt loam--------	CL, ML	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	8-15
	13-45	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	45-60	Sandy loam, loam, gravelly sandy clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-95	70-95	60-80	20-40	5-20
8F2---------- Hickory	0-8	Loam-------------	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	8-15
	8-44	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	44-60	Sandy loam, loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-95	70-95	60-80	20-40	5-20

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
8G---------- Hickory	0-11	Silt loam--------	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	8-15
	11-44	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	44-60	Sandy loam, loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-95	70-95	60-80	20-40	5-20
16---------- Rushville	0-8	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	8-17	Silt loam, silt	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	20-40	NP-15
	17-51	Silty clay loam, silty clay.	CH, CL	A-7, A-7-6	0	100	100	95-100	95-100	45-60	20-35
	51-60	Silty clay loam	CH, CL, ML, MH	A-7	0	100	100	95-100	95-100	45-60	15-30
17---------- Keomah	0-24	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	24-41	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	100	95-100	45-60	30-45
	41-60	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	100	95-100	35-50	15-30
43A, 43B--------- Ipava	0-7	Silt loam--------	ML, CL	A-6	0	100	100	95-100	90-100	25-40	10-20
	7-54	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	95-100	90-100	45-70	25-40
	54-60	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	95-100	90-100	25-40	5-20
46---------- Herrick	0-20	Silt loam--------	CL, ML	A-4, A-6	0	100	100	95-100	90-100	30-40	5-15
	20-39	Silty clay loam, silty clay.	CH, CL	A-7, A-7-6	0	100	100	95-100	90-100	45-60	25-40
	39-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	35-50	15-35
50---------- Virden	0-18	Silty clay loam	CL	A-7, A-6	0	100	100	98-100	95-100	30-45	10-25
	18-60	Silty clay, silty clay loam.	CH, CL, MH, ML	A-7, A-7-6	0	100	100	98-100	95-100	40-55	15-30
73---------- Ross	0-20	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	90-100	90-100	80-100	65-95	20-35	NP-12
	20-43	Loam, silt loam, silty clay loam.	ML, CL, CL-ML	A-6, A-4, A-7	0	90-100	85-100	70-100	55-95	22-45	3-20
	43-60	Fine sandy loam, loamy fine sand.	CL, ML, SM, GM	A-6, A-4, A-2	0-5	65-100	45-100	30-100	25-80	<30	NP-12
76---------- Otter	0-29	Silt loam--------	CL	A-6, A-7, A-4	0	100	95-100	90-100	80-100	25-45	7-20
	29-60	Silt loam, sandy loam, silty clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6, A-7	0	90-100	80-100	55-95	45-85	25-45	5-20
112---------- Cowden	0-8	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	8-13	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	13-55	Silty clay loam, silty clay.	CH, CL	A-7, A-7-6	0	100	100	95-100	90-100	45-60	20-32
	55-60	Silt loam--------	CL	A-6, A-7-6	0	100	100	95-100	95-100	30-40	10-25

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
113A, 113B-------	0-8	Silt loam--------	CL, ML	A-6, A-4	0	100	100	95-100	90-100	25-40	4-19
Oconee	8-18	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	20-35	8-20
	18-46	Silty clay loam, silty clay.	CL, CH	A-7-6	0	100	100	95-100	90-100	40-65	20-45
	46-53	Silt loam, silty clay loam.	CL, ML	A-6, A-7	0	100	100	95-100	90-100	30-50	10-25
	53-60	Silt loam--------	CL	A-4, A-6 A-7-6	0	100	100	90-100	85-100	20-50	8-25
119B2, 119C2, 119D2----------	0-8	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
Elco	8-31	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	85-100	25-45	10-30
	31-60	Silty clay loam, clay loam, loam.	CL	A-7, A-6	0	100	90-100	85-95	75-95	25-45	10-30
120----------	0-8	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	85-95	20-35	3-15
Huey	8-15	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	95-100	90-100	25-45	10-25
	15-49	Silt loam, silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	15-30
	49-60	Loam, silt loam, silty clay loam.	CL	A-6	0	95-100	90-100	80-95	65-90	20-35	10-20
127B----------	0-10	Silt loam--------	CL	A-4, A-6	0	100	100	100	95-100	30-40	8-15
Harrison	10-56	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	30-45	10-20
	56-63	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0-5	95-100	85-100	80-85	70-80	30-50	10-25
134C2----------	0-6	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	95-100	90-100	20-35	3-15
Camden	6-27	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	90-100	25-40	15-25
	27-54	Loam, clay loam, silt loam.	ML, SM, CL, SC	A-2, A-4, A-6	0-5	90-100	85-100	60-90	30-70	20-40	3-15
	54-60	Loam, sandy loam, silt loam.	SM, SC, ML, CL	A-2, A-4	0-5	90-100	80-100	50-80	20-60	<25	3-10
214B----------	0-15	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	90-100	70-90	<25	3-10
Hosmer	15-42	Silt loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-95	25-35	5-15
	42-60	Silt loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-95	20-30	5-15
250D----------	0-7	Silt loam--------	CL	A-4, A-6	0	100	100	90-100	70-90	20-40	8-25
Velma	7-54	Clay loam, loam, silty clay loam.	CL	A-7, A-6	0-5	100	85-100	80-95	55-75	30-50	15-30
	54-60	Loam, clay loam, sandy loam.	CL, ML, SM, SC	A-4, A-6, A-2	0-5	90-100	75-100	60-90	30-80	20-40	3-20
259B----------	0-11	Silt loam--------	CL, ML	A-6, A-4	0	100	100	95-100	90-100	25-40	8-20
Assumption	11-35	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	10-30
	35-54	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	90-100	85-95	75-90	30-50	10-30
	54-60	Clay loam, silty clay loam, clay.	CL	A-6, A-7	0-5	100	95-100	90-100	70-90	35-50	20-35

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
259B2, 259C2----- Assumption	0-7	Silt loam--------	CL, ML	A-6, A-4	0	100	100	95-100	90-100	25-40	8-20
	7-30	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	10-30
	30-60	Clay loam, silty clay loam, clay.	CL	A-6, A-7	0-5	100	95-100	90-100	70-90	35-50	20-35
279A, 279B------- Rozetta	0-6	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	95-100	24-35	8-15
	6-15	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	20-30	5-15
	15-50	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	95-100	35-50	15-30
	50-60	Silt loam--------	CL	A-6, A-4	0	100	100	95-100	85-100	25-40	7-20
279C2------------ Rozetta	0-7	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	95-100	24-35	8-15
	7-46	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	95-100	35-50	15-30
	46-60	Silt loam--------	CL	A-6, A-4	0	100	100	95-100	85-100	25-40	7-20
280B, 280C2------ Fayette	0-7	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	7-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
333-------------- Wakeland	0-8	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	8-60	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
402-------------- Colo	0-9	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	95-100	25-40	5-15
	9-60	Silty clay loam	CL, CH	A-7	0	100	100	90-100	90-100	40-55	20-30
428A------------- Coffeen	0-18	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	85-100	25-40	5-20
	18-60	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	90-100	80-95	20-35	3-10
451-------------- Lawson	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	85-100	20-40	5-20
	7-35	Silt loam, silty clay loam.	CL, CL-ML	A-4	0	100	100	90-100	85-100	20-30	5-10
	35-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	90-100	60-100	20-45	10-25
470B------------- Keller	0-10	Silt loam--------	CL, ML	A-6, A-4	0	100	100	95-100	90-100	30-40	5-15
	10-31	Silty clay loam	CL, ML	A-7, A-6	0	100	100	95-100	90-100	35-50	10-25
	31-60	Silty clay loam, clay loam, clay.	CH, CL	A-7, A-6	0-5	95-100	90-100	80-95	75-90	35-55	15-30
517-------------- Marine	0-11	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	20-35	5-15
	11-48	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	95-100	40-60	20-35
	48-60	Silty clay loam, silt loam.	CL	A-4, A-6, A-7	0	100	100	95-100	80-100	30-45	8-20
536*. Dumps											
587B------------- Terril	0-13	Loam-------------	CL	A-6	0-5	95-100	95-100	70-90	60-80	30-40	10-20
	13-60	Clay loam, loam, silt loam.	CL, SC, SM-SC, CL-ML	A-6, A-4	0-5	95-100	90-100	65-95	35-85	20-40	5-20
620B------------- Darmstadt	0-8	Silt loam--------	CL, ML, CL-ML	A-6, A-7, A-4	0	95-100	95-100	95-100	75-100	25-45	5-20
	8-42	Silty clay loam, silty clay.	CL, CH	A-7	0	100	95-100	95-100	90-100	40-65	20-40
	42-60	Silty clay loam, silty clay.	CL, CH	A-7	0	100	95-100	95-100	90-100	40-65	20-40

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
660C2----------	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
Coatsburg	7-60	Silty clay, clay, clay loam.	CH	A-7	0	100	95-100	75-90	65-85	50-70	35-55
784G----------	0-4	Loam----------	CL, ML, CL-ML	A-4	0-10	80-100	75-100	65-85	50-75	25-36	5-10
Berks	4-20	Channery loam, very channery loam, channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	20	Weathered bedrock	---	---	---	---	---	---	---	---	---
802E.											
Orthents											
941*:											
Virden----------	0-19	Silty clay loam	CL	A-7, A-6	0	100	100	98-100	95-100	30-45	10-20
	19-60	Silty clay, silty clay loam.	CH, CL, MH, ML	A-7	0	100	100	98-100	95-100	40-55	15-25
Piasa----------	0-7	Silt loam--------	CL, ML	A-6, A-7	0	100	100	95-100	90-100	30-45	10-20
	7-14	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	25-40	8-20
	14-60	Silty clay, silty clay loam.	CL, ML, MH, CH	A-7	0	100	100	95-100	95-100	40-55	15-25
993*:											
Cowden----------	0-8	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	8-13	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	13-55	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	95-100	95-100	45-60	20-32
	55-60	Silt loam--------	CL	A-6	0	100	100	95-100	95-100	30-40	10-20
Piasa----------	0-9	Silt loam--------	CL, ML	A-6, A-7	0	100	100	95-100	90-100	30-45	10-20
	9-15	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	25-40	8-20
	15-52	Silty clay, silty clay loam.	CL, ML, MH, CH	A-7	0	100	100	95-100	95-100	40-55	15-25
	52-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	30-45	10-25
995*:											
Herrick----------	0-19	Silt loam--------	CL, ML	A-4, A-6	0	100	100	95-100	90-100	30-40	5-15
	19-46	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	95-100	90-100	45-60	25-40
	46-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	35-50	20-35
Piasa----------	0-7	Silt loam--------	CL, ML	A-6, A-7	0	100	100	95-100	90-100	30-45	10-20
	7-15	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	25-40	8-20
	15-50	Silty clay, silty clay loam.	CL, ML, MH, CH	A-7	0	100	100	95-100	95-100	40-55	15-25
	50-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	30-45	10-25

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
6B2	0-13	20-27	1.30-1.50	0.6-2.0	0.22-0.24	5.1-7.3	Low	0.37	3	6	1-3
Fishhook	13-25	27-35	1.40-1.60	0.6-2.0	0.18-0.20	4.5-7.3	Moderate	0.37			
	25-60	35-45	1.55-1.75	0.06-0.2	0.09-0.16	4.5-7.8	High	0.37			
6C2	0-5	27-35	1.35-1.55	0.6-2.0	0.20-0.22	5.1-7.3	Moderate	0.37	2	7	.5-1
Fishhook	5-29	27-35	1.40-1.60	0.6-2.0	0.18-0.20	4.5-7.3	Moderate	0.37			
	29-60	30-45	1.55-1.75	0.06-0.2	0.09-0.16	4.5-7.8	High	0.37			
7C2	0-7	20-27	1.30-1.50	0.2-0.6	0.20-0.24	4.5-7.3	Moderate	0.43	3	6	1-3
Atlas	7-51	35-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.3	High	0.32			
	51-60	30-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.8	High	0.32			
7C3	0-3	30-40	1.40-1.60	0.06-0.2	4.5-7.3	4.5-7.3	High	0.43	2	7	.5-1
Atlas	3-60	35-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.3	High	0.32			
7D2, 7E2	0-7	20-27	1.30-1.50	0.2-0.6	0.20-0.24	4.5-7.3	Moderate	0.43	3	6	1-3
Atlas	7-12	35-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.3	High	0.32			
	12-60	30-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.8	High	0.32			
8D2, 8E2	0-8	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low	0.37	5	6	1-2
Hickory	8-42	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate	0.37			
	42-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low	0.37			
8F	0-13	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low	0.37	5	6	1-2
Hickory	13-45	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate	0.37			
	45-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low	0.37			
8F2	0-8	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low	0.37	5	6	1-2
Hickory	8-44	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate	0.37			
	44-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low	0.37			
8G	0-11	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low	0.37	5	6	1-2
Hickory	11-44	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate	0.37			
	44-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low	0.37			
16	0-8	15-27	1.25-1.45	0.2-0.6	0.22-0.24	4.5-7.3	Low	0.43	3	6	1-3
Rushville	8-17	10-22	1.30-1.50	0.06-0.2	0.15-0.20	4.5-7.3	Low	0.43			
	17-51	35-45	1.30-1.50	<0.06	0.09-0.20	4.5-6.5	High	0.43			
	51-60	30-42	1.40-1.60	<0.2	0.11-0.20	4.5-7.8	High	0.43			
17	0-24	16-22	1.30-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.37	5	6	1-2
Keomah	24-41	27-42	1.30-1.45	0.06-0.6	0.18-0.20	4.5-5.5	High	0.37			
	41-60	24-38	1.40-1.55	0.2-0.6	0.18-0.20	5.1-6.5	Moderate	0.37			
43A, 43B	0-7	20-27	1.15-1.35	0.6-2.0	0.22-0.24	5.6-7.3	Moderate	0.28	5	6	4-5
Ipava	7-54	35-43	1.25-1.50	0.2-0.6	0.11-0.20	5.6-7.8	High	0.43			
	54-60	20-27	1.30-1.55	0.2-0.6	0.20-0.22	6.1-8.4	Moderate	0.43			
46	0-20	20-27	1.15-1.30	0.6-2.0	0.22-0.24	5.1-7.3	Moderate	0.28	5	6	3-4
Herrick	20-39	35-42	1.20-1.40	0.2-0.6	0.12-0.17	4.5-6.0	High	0.43			
	39-60	25-40	1.20-1.40	0.2-0.6	0.16-0.20	5.6-7.3	Moderate	0.43			
50	0-18	25-30	1.20-1.40	0.6-2.0	0.21-0.24	5.6-7.8	Moderate	0.28	5	4	4-6
Virden	18-60	35-42	1.20-1.45	0.2-0.6	0.11-0.20	5.6-7.8	High	0.28			

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
73----------	0-20	15-27	1.20-1.45	0.6-2.0	0.19-0.24	6.1-7.8	Low----------	0.32	5	5	3-5
Ross	20-43	11-27	1.20-1.50	0.6-2.0	0.16-0.22	6.1-8.4	Low----------	0.32			
	43-60	5-25	1.35-1.60	0.6-6.0	0.05-0.18	6.1-8.4	Low----------	0.32			
76----------	0-29	18-27	1.10-1.25	0.6-2.0	0.22-0.24	6.1-7.8	Low----------	0.28	5	6	5-10
Otter	29-60	15-28	1.30-1.55	0.6-2.0	0.15-0.20	6.1-8.4	Low----------	0.43			
112----------	0-8	17-27	1.20-1.40	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	3	6	2-3
Cowden	8-13	17-27	1.25-1.45	0.06-0.2	0.18-0.20	4.5-6.0	Low----------	0.37			
	13-55	35-42	1.35-1.60	0.06-0.2	0.12-0.20	4.5-7.3	High---------	0.37			
	55-60	20-27	1.50-1.70	0.2-0.6	0.17-0.22	5.6-7.8	Moderate-----	0.37			
113A, 113B-------	0-8	20-27	1.20-1.30	0.2-0.6	0.22-0.24	5.6-7.8	Moderate-----	0.32	3-2	6	2-3
Oconee	8-18	18-27	1.30-1.45	0.06-0.2	0.20-0.22	4.5-7.3	Moderate-----	0.43			
	18-46	35-42	1.30-1.50	0.06-0.2	0.11-0.17	4.5-6.0	High---------	0.43			
	46-53	20-35	1.40-1.60	0.06-0.2	0.16-0.21	5.1-6.5	Moderate-----	0.43			
	53-60	17-27	1.40-1.60	0.06-0.2	0.20-0.22	5.6-8.4	Moderate-----	0.43			
119B2, 119C2,											
119D2----------	0-8	20-27	1.20-1.35	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	4	6	1-3
Elco	8-31	23-35	1.25-1.45	0.6-2.0	0.18-0.21	5.1-7.8	Moderate-----	0.37			
	31-60	23-35	1.40-1.60	0.2-0.6	0.16-0.20	5.1-7.8	Moderate-----	0.37			
120----------	0-8	15-27	1.35-1.50	0.2-0.6	0.22-0.24	5.1-7.8	Low----------	0.43	2	6	1-3
Huey	8-15	20-35	1.40-1.60	0.06-0.2	0.10-0.18	5.6-8.4	Moderate-----	0.43			
	15-49	25-35	1.45-1.65	<0.06	0.05-0.08	7.4-9.0	Moderate-----	0.43			
	49-60	18-35	1.55-1.75	0.06-0.2	0.10-0.15	6.6-8.4	Moderate-----	0.43			
127B----------	0-10	20-27	1.15-1.30	0.6-2.0	0.22-0.24	6.1-7.3	Low----------	0.32	5	6	2-4
Harrison	10-56	25-35	1.25-1.40	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-----	0.43			
	56-63	20-35	1.30-1.45	0.6-2.0	0.14-0.20	5.6-7.3	Moderate-----	0.43			
134C2----------	0-6	14-27	1.15-1.35	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	6	1-2
Camden	6-27	22-35	1.35-1.55	0.6-2.0	0.16-0.20	5.1-7.3	Moderate-----	0.37			
	27-54	18-30	1.45-1.65	0.6-2.0	0.15-0.25	5.6-7.3	Low----------	0.37			
	54-60	10-22	1.55-1.70	0.6-6.0	0.11-0.22	5.6-7.3	Low----------	0.37			
214B----------	0-15	10-17	1.20-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	4	5	1-2
Hosmer	15-42	24-30	1.30-1.50	0.6-2.0	0.18-0.22	4.5-5.5	Moderate-----	0.43			
	42-60	16-30	1.60-1.70	<0.06	0.06-0.08	4.5-6.0	Low----------	0.43			
250D----------	0-7	20-27	1.30-1.50	0.6-2.0	0.20-0.24	5.1-7.3	Low----------	0.32	5	5	3-4
Velma	7-54	25-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-7.3	Moderate-----	0.32			
	54-60	20-30	1.50-1.70	0.6-2.0	0.06-0.09	7.4-8.4	Low----------	0.32			
259B----------	0-11	20-27	1.10-1.30	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.32	4	6	3-4
Assumption	11-35	25-35	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.3	Moderate-----	0.43			
	35-54	25-35	1.40-1.60	0.2-0.6	0.16-0.20	5.1-7.3	Moderate-----	0.43			
	54-60	30-45	1.45-1.65	0.06-0.6	0.14-0.20	5.1-7.3	High---------	0.43			
259B2, 259C2-----	0-7	20-27	1.10-1.30	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.32	4	6	3-4
Assumption	7-30	25-35	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.3	Moderate-----	0.43			
	30-60	30-45	1.45-1.65	0.06-0.6	0.14-0.20	5.1-7.3	High---------	0.43			
279A, 279B-------	0-6	15-27	1.20-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	6	1-3
Rozetta	6-15	12-27	1.20-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37			
	15-50	27-35	1.35-1.55	0.6-2.0	0.18-0.22	4.5-6.0	Moderate-----	0.37			
	50-60	20-27	1.40-1.60	0.6-2.0	0.20-0.22	5.6-7.8	Low----------	0.37			
279C2----------	0-7	15-27	1.20-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	6	1-3
Rozetta	7-46	27-35	1.35-1.55	0.6-2.0	0.18-0.22	4.5-6.0	Moderate-----	0.37			
	46-60	20-27	1.40-1.60	0.6-2.0	0.20-0.22	5.6-7.8	Low----------	0.37			

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
280B, 280C2------	0-7	15-25	1.30-1.35	0.6-2.0	0.20-0.22	5.1-7.3	Low----------	0.37	5	6	1-2
Fayette	7-60	25-35	1.30-1.45	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-----	0.37			
333--------------	0-8	10-17	1.30-1.50	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	5	1-3
Wakeland	8-60	10-17	1.30-1.50	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37			
402--------------	0-9	20-26	1.25-1.30	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-----	0.28	5	6	3-5
Colo	9-60	30-35	1.25-1.35	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.28			
428A-------------	0-18	15-27	1.20-1.40	0.6-2.0	0.22-0.24	5.6-7.8	Low----------	0.32	5	6	2-3
Coffeen	18-60	10-18	1.40-1.60	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.32			
451--------------	0-7	10-27	1.20-1.55	0.6-2.0	0.22-0.24	6.1-7.8	Low----------	0.28	5	5	3-5
Lawson	7-35	10-30	1.20-1.55	0.6-2.0	0.18-0.22	6.1-7.8	Low----------	0.28			
	35-60	18-30	1.55-1.65	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-----	0.43			
470B-------------	0-10	20-27	1.30-1.40	0.6-2.0	0.22-0.24	5.6-7.8	Low----------	0.37	4	6	3-5
Keller	10-31	27-35	1.35-1.50	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37			
	31-60	30-42	1.50-1.70	0.06-0.2	0.10-0.19	5.1-7.8	High---------	0.37			
517--------------	0-11	9-18	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	3	5	1-2
Marine	11-48	35-48	1.45-1.70	0.06-0.2	0.11-0.18	4.5-6.5	High---------	0.37			
	48-60	15-35	1.45-1.65	0.2-0.6	0.18-0.22	5.1-6.5	Moderate-----	0.37			
536*.											
Dumps											
587B-------------	0-13	18-26	1.35-1.40	0.6-2.0	0.20-0.22	6.1-7.3	Low----------	0.24	5	6	4-5
Terril	13-60	15-30	1.45-1.70	0.6-2.0	0.16-0.18	6.1-7.8	Low----------	0.32			
620B-------------	0-8	10-27	1.30-1.50	0.06-0.2	0.22-0.24	5.1-7.3	Low----------	0.43	3	6	.5-2
Darmstadt	8-42	27-35	1.40-1.65	0.06-0.2	0.11-0.20	4.5-7.8	Moderate-----	0.43			
	42-60	27-35	1.40-1.65	<0.06	0.09-0.10	6.6-9.0	Moderate-----	0.43			
660C2------------	0-7	20-27	1.30-1.50	0.2-0.6	0.22-0.24	5.1-7.8	Moderate-----	0.37	3	6	3-5
Coatsburg	7-60	35-45	1.50-1.70	<0.06	0.09-0.13	5.1-6.5	High---------	0.37			
784G-------------	0-4	5-23	1.20-1.50	0.6-6.0	0.12-0.17	3.6-6.5	Low----------	0.24	3	5	.5-3
Berks	4-20	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low----------	0.17			
	20	---	---	---	---	---	----------	----			
802E.											
Orthents											
941*:											
Virden----------	0-19	25-30	1.20-1.40	0.6-2.0	0.21-0.24	5.6-7.8	Moderate-----	0.28	5	4	4-6
	19-60	35-42	1.20-1.45	0.2-0.6	0.11-0.20	5.6-7.8	High---------	0.28			
Piasa-----------	0-7	18-27	1.25-1.45	0.2-0.6	0.22-0.24	5.1-7.8	Moderate-----	0.37	3	6	2-4
	7-14	18-27	1.30-1.50	0.06-0.2	0.18-0.20	5.6-7.8	Moderate-----	0.37			
	14-60	35-43	1.35-1.55	<0.06	0.09-0.10	6.1-9.0	High---------	0.37			
993*:											
Cowden----------	0-8	17-27	1.20-1.40	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	3	6	2-3
	8-13	17-27	1.25-1.45	0.06-0.2	0.18-0.20	4.5-6.0	Low----------	0.37			
	13-55	35-42	1.35-1.60	0.06-0.2	0.12-0.20	4.5-7.3	High---------	0.37			
	55-60	20-27	1.50-1.70	0.2-0.6	0.17-0.22	5.6-7.8	Moderate-----	0.37			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
993*:											
Piasa	0-9	18-27	1.25-1.45	0.2-0.6	0.22-0.24	5.1-7.8	Moderate	0.37	3	6	2-4
	9-15	18-27	1.30-1.50	0.06-0.2	0.18-0.20	5.6-7.8	Moderate	0.37			
	15-52	35-43	1.35-1.55	<0.06	0.09-0.10	6.1-9.0	High	0.37			
	52-60	20-35	1.50-1.70	0.06-0.2	0.10-0.12	7.4-9.0	Moderate	0.37			
995*:											
Herrick	0-19	20-27	1.15-1.30	0.6-2.0	0.22-0.24	5.1-7.3	Moderate	0.28	5	6	3-4
	19-46	35-42	1.20-1.40	0.2-0.6	0.12-0.17	4.5-6.0	High	0.43			
	46-60	25-40	1.20-1.40	0.2-0.6	0.16-0.20	5.6-7.3	Moderate	0.43			
Piasa	0-7	18-27	1.25-1.45	0.2-0.6	0.22-0.24	5.1-7.8	Moderate	0.37	3	6	2-4
	7-15	18-27	1.30-1.50	0.06-0.2	0.18-0.20	5.6-7.8	Moderate	0.37			
	15-50	35-43	1.35-1.55	<0.06	0.09-0.10	6.1-9.0	High	0.37			
	50-60	20-35	1.50-1.70	0.06-0.2	0.10-0.12	7.4-9.0	Moderate	0.37			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "frequent," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > 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			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
6B2, 6C2---------- Fishhook	D	None--------	---	---	1.0-3.0	Perched	Mar-Jun	High-----	High-----	High.
7C2, 7C3, 7D2, 7E2---------- Atlas	D	None--------	---	---	1.0-2.0	Perched	Apr-Jun	High-----	High-----	Moderate.
8D2, 8E2, 8F, 8F2, 8G---------- Hickory	C	None--------	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
16---------- Rushville	D	None--------	---	---	+1-1.0	Perched	Mar-Jun	High-----	High-----	High.
17---------- Keomah	C	None--------	---	---	2.0-4.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
43A, 43B---------- Ipava	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
46---------- Herrick	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	High-----	High-----	High.
50---------- Virden	B/D	None--------	---	---	+.5-2.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
73---------- Ross	B	Frequent----	Very brief	Mar-May	4.0-6.0	Apparent	Feb-Apr	Moderate	Low------	Low.
76---------- Otter	B/D	Frequent----	Brief-----	Mar-May	+.5-2.0	Apparent	Mar-Jun	High-----	High-----	Low.
112---------- Cowden	D	None--------	---	---	+.5-2.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
113A, 113B--------- Oconee	C	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	High-----	High-----	High.
119B2, 119C2, 119D2---------- Elco	B	None--------	---	---	2.5-4.5	Perched	Mar-May	High-----	High-----	Moderate.
120---------- Huey	D	None--------	---	---	+.5-2.0	Perched	Mar-Jun	High-----	High-----	Low.
127B---------- Harrison	B	None--------	---	---	3.0-6.0	Perched	Feb-May	High-----	High-----	Moderate.
134C2---------- Camden	B	None--------	---	---	4.0-6.0	Apparent	Mar-Jun	High-----	Low------	Moderate.
214B---------- Hosmer	C	None--------	---	---	2.5-3.0	Perched	Mar-Apr	High-----	Moderate	High.
250D---------- Velma	B	None--------	---	---	>6.0	---	---	Moderate	High-----	High.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
259B, 259B2, 259C2---------- Assumption	B	None--------	---	---	2.5-4.5	Perched	Feb-May	High-----	High-----	Moderate.
279A, 279B, 279C2- Rozetta	B	None--------	---	---	4.0-6.0	Apparent	Mar-Jun	High-----	Moderate	Moderate.
280B, 280C2------- Fayette	B	None--------	---	---	>6.0	---	---	High-----	Moderate	Moderate.
333---------- Wakeland	C	Frequent----	Brief-----	Mar-May	1.0-3.0	Apparent	Jan-Apr	High-----	High-----	Low.
402---------- Colo	B/D	Frequent----	Brief-----	Mar-May	1.0-3.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
428A---------- Coffeen	B	Frequent----	Brief-----	Mar-May	1.0-3.0	Apparent	Jan-May	High-----	High-----	Moderate.
451---------- Lawson	C	Frequent----	Brief-----	Mar-May	1.0-3.0	Apparent	Mar-May	High-----	Moderate	Low.
470B---------- Keller	C	None--------	---	---	1.0-3.0	Perched	Mar-May	High-----	High-----	Moderate.
517---------- Marine	C	None--------	---	---	1.0-2.0	Perched	Jan-May	High-----	High-----	High.
536*. Dumps										
587B---------- Terril	B	None--------	---	---	>6.0	---	---	Moderate	Moderate	Low.
620B---------- Darmstadt	D	None--------	---	---	1.0-3.0	Perched	Feb-May	High-----	High-----	High.
660C2---------- Coatsburg	D	None--------	---	---	0-1.0	Perched	Apr-Jun	High-----	High-----	Moderate.
784G---------- Berks	C	None--------	---	---	>6.0	---	---	Low------	Low------	High.
802E. Orthents										
941*: Virden-----------	B/D	None--------	---	---	+.5-2.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
Piasa-----------	D	None--------	---	---	+.5-2.0	Perched	Feb-May	High-----	High-----	Low.
993*: Cowden-----------	D	None--------	---	---	+.5-2.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
Piasa-----------	D	None--------	---	---	+.5-2.0	Perched	Feb-May	High-----	High-----	Low.
995*: Herrick----------	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	High-----	High-----	High.
Piasa-----------	D	None--------	---	---	+.5-2.0	Perched	Feb-May	High-----	High-----	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--ENGINEERING INDEX TEST DATA

(MAX means maximum dry density; OPT, optimum moisture; LL, liquid limit; PI, plasticity index; and UN, Unified)

Soil name and location	Sample number	Horizon	Depth	Moisture density		Percentage passing sieve--				LL	PI	Classification	
				MAX	OPT	No. 4	No. 10	No. 40	No. 200			AASHTO	UN
			In	Lb/ft^3	Pct					Pct			
Cowden silt loam:													
620 feet east and	80IL117-2-1	Ap	0-8	105	17	100	99	97	95	30	6	A-4(6)	ML
1,100 feet north of	80IL117-2-4	Btg2	22-34	102	21	100	98	96	93	47	28	A-7-6	CL
the southwest	80IL117-2-7	Cg	55-60	108	18	100	99	98	96	41	24	A-7-6	CL
corner, sec. 23, T. 7 N., R. 7 W.													
Herrick silt loam:													
570 feet east and	82IL117-137-1	Ap	0-10	105	18	100	100	99	97	34	11	A-6	CL
240 feet north of	82IL117-137-4	Bt2	29-44	96	24	100	100	100	99	52	31	A-7-6	CH
the southwest	82IL117-137-5	C	44-60	108	18	100	100	99	98	37	16	A-6	CL
corner, sec. 29, T. 10 N., R. 7 W.													
Hickory silt loam:													
1,040 feet west and	81IL117-95-1	A, E	0-9	100	20	100	100	98	93	37	11	A-6	ML
2,400 feet north of	81IL117-95-3	Bt2	13-24	110	17	99	98	94	80	33	17	A-6	CL
the southeast corner, sec. 31, T. 9 N., R. 7 W.													
Keomah silt loam:													
280 feet east and	81IL117-89-1	Ap	0-8	102	20	100	100	99	98	29	6	A-4	CL
30 feet north of	81IL117-89-5	Bt2	31-41	95	24	100	100	99	98	51	31	A-7-6	CH
the southwest	81IL117-89-7	C	50-60	103	21	100	100	100	99	43	24	A-7-6	CL
corner, sec. 3, T. 8 N., R. 8 W.													
Oconee silt loam:													
2,080 feet west and	80IL117-14-1	Ap	0-9	103	17	100	100	98	97	28	4	A-4	ML
100 feet south of	80IL117-14-5	Bt3	24-30	93	26	100	100	100	98	65	43	A-7-6	CH
the center, sec. 27, T. 9 N., R. 6 W.	80IL117-14-8	C2	60-72	106	19	100	100	99	99	45	26	A-7-6	CL
Virden silty clay loam:													
1,220 feet east and	80IL117-19-1	Ap	0-7	100	21	100	100	100	99	46	27	A-7-6	CL
150 feet south of	80IL117-19-5	Btg2	25-30	102	23	100	100	100	99	48	30	A-7-6	CL
the northwest corner, sec. 23, T. 9 N., R. 6 W.													
Rushville silt loam:													
2,220 feet east and	80IL117-20-1	Ap	0-8	100	18	100	100	97	93	26	2	A-4	ML
2,160 feet north of	80IL117-20-5	Bt2	26-35	100	22	100	100	98	96	52	34	A-7-6	CH
the southwest corner, sec. 3, T. 7 N., R. 6 W.													

TABLE 19.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Assumption	Fine-silty, mixed, mesic Typic Argiudolls
Atlas	Fine, montmorillonitic, mesic, sloping Aeric Ochraqualfs
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Camden	Fine-silty, mixed, mesic Typic Hapludalfs
*Coatsburg	Fine, montmorillonitic, mesic, sloping Typic Argiaquolls
Coffeen	Coarse-silty, mixed, mesic Fluvaquentic Hapludolls
Colo	Fine-silty, mixed, mesic Cumulic Haplaquolls
Cowden	Fine, montmorillonitic, mesic Mollic Albaqualfs
*Darmstadt	Fine-silty, mixed, mesic Albic Natraqualfs
Elco	Fine-silty, mixed, mesic Typic Hapludalfs
Fayette	Fine-silty, mixed, mesic Typic Hapludalfs
Fishhook	Fine-silty, mixed, mesic Aquic Hapludalfs
Harrison	Fine-silty, mixed, mesic Typic Argiudolls
Herrick	Fine, montmorillonitic, mesic Aquic Argiudolls
Hickory	Fine-loamy, mixed, mesic Typic Hapludalfs
*Hosmer	Fine-silty, mixed, mesic Typic Fragiudalfs
Huey	Fine-silty, mixed, mesic Typic Natraqualfs
Ipava	Fine, montmorillonitic, mesic Aquic Argiudolls
Keller	Fine-silty, mixed, mesic Aquic Argiudolls
Keomah	Fine, montmorillonitic, mesic Aeric Ochraqualfs
Lawson	Fine-silty, mixed, mesic Cumulic Hapludolls
Marine	Fine, montmorillonitic, mesic Aeric Albaqualfs
Oconee	Fine, montmorillonitic, mesic Udollic Ochraqualfs
Orthents	Loamy, mixed, mesic Udorthents
Otter	Fine-silty, mixed, mesic Cumulic Haplaquolls
Piasa	Fine, montmorillonitic, mesic Mollic Natraqualfs
*Ross	Fine-loamy, mixed, mesic Cumulic Hapludolls
Rozetta	Fine-silty, mixed, mesic Typic Hapludalfs
Rushville	Fine, montmorillonitic, mesic Typic Albaqualfs
Terril	Fine-loamy, mixed, mesic Cumulic Hapludolls
Velma	Fine-loamy, mixed, mesic Typic Argiudolls
Virden	Fine, montmorillonitic, mesic Typic Argiaquolls
Wakeland	Coarse-silty, mixed, nonacid, mesic Aeric Fluvaquents

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