United States Department of Agriculture

Soil Conservation Service

In cooperation with Illinois Agricultural Experiment Station

Soil Survey of Macon County, Illinois

How To Use This Soil Survey

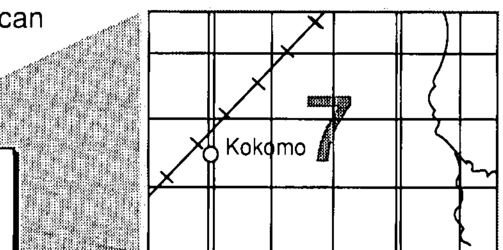
General Soil Map

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.

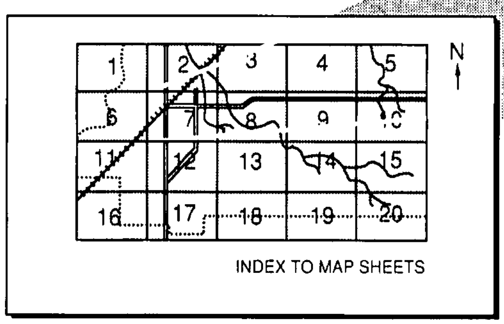
Detailed Soil Maps

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

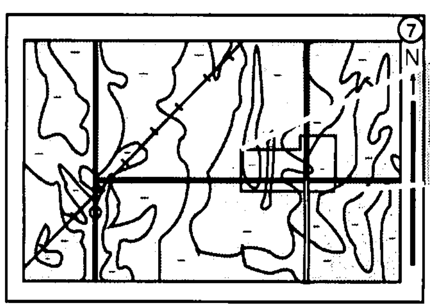


MAP SHEET

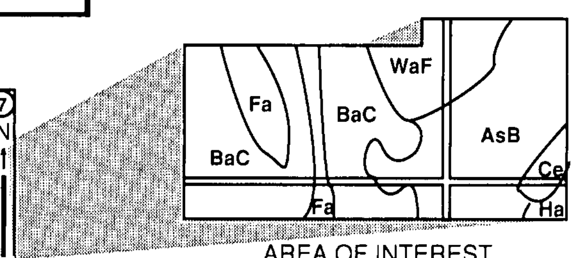
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



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. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, handicap, or age.

Major fieldwork for this soil survey was completed in July 1984. Soil names and descriptions were approved in March 1985. 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 Macon County Soil and Water Conservation District. The cost was shared by the Macon County Board. This soil survey is Illinois Agricultural Experiment Station Soil Report No. 127.

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

Cover: Corn in an area of gently sloping Plano soils.

Contents

Soil Series

Issued April 1990

Index to Map Units

Summary of Tables

Foreword

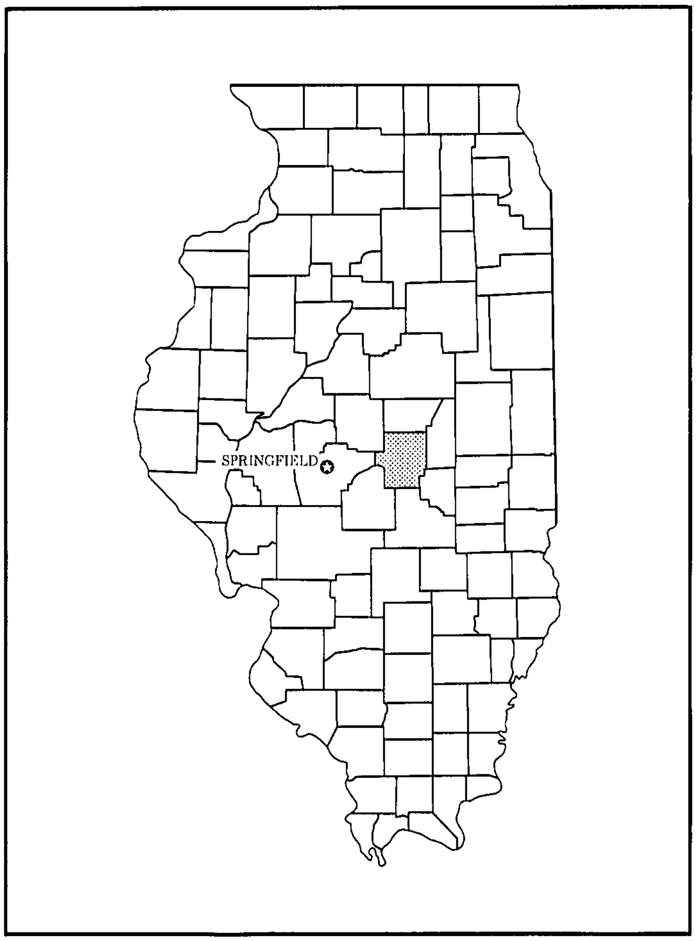
This soil survey contains information that can be used in land-planning programs in Macon County, Illinois. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the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

Soil Survey of
Macon County, Illinois

By J.C. Doll, Soil Conservation Service

Soils surveyed by J.C. Doll, S.W. Fischer, and C.E. Wacker, Soil Conservation Service, and S.J. Ernst and T.J. Endres, Macon County Board

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

MACON COUNTY is in the central part of Illinois. The total area of Macon County is 374,900 acres, or about 585 square miles. It is bounded on the north by DeWitt County, on the west by Christian, Logan, and Sangamon Counties, on the south by Christian and Shelby Counties, and on the east by Piatt and Moultrie Counties. Decatur is the county seat.

This soil survey updates the survey of Macon County published in 1929 (*9*) and the revision to that soil report published in 1954 (*14*). This soil survey provides more recent information and larger and more detailed maps.

General Nature of the County

In this section the history and development, the climate, the natural resources, and the relief, physiography, and drainage of Macon County are discussed.

History and Development

Steven W. Fischer, soil scientist, Soil Conservation Service, helped to prepare this section.

Settlement of the area now in Macon County began in the early 1800's. Following Illinois statehood, the population of the county grew rapidly. Macon County was formally organized in 1829. It originally included parts of Piatt and Moultrie Counties. It was named after Nathaniel Macon, a North Carolinian Congressman and Senator. The bluff areas along the Sangamon River and its tributaries were settled first and the rest of the land was settled as it was drained (*8*).

Expansion of the county was enhanced with the establishment of two railroad lines through the county in 1854, the Wabash and the Illinois Central (*8*). The county currently has an extensive network of railroads and highways. Interstate 72 and U.S. Highway 36 run east-west, and U.S. Highway 51 is the major north-south route. Six state highways and numerous improved county roads provide access to the entire state.

Farming has long been a major activity in the county. The area used for grain farming in the county expanded from 73,000 acres in 1860 to 147,000 acres in 1870, and by 1875 corn was planted on 156,000 acres (*8*). In recent years about 137,500 acres was planted to soybeans and 159,000 acres was planted to corn, according to the 1982 Census of Agriculture. The rest of the agricultural land is in small grain, hay, and pasture (*13*).

Several heavy and light industries are located in the county, mostly in the Decatur area. These include, among many, manufacturers of heavy equipment, tires, auto parts, glass, and steel plating and foundry operations. Also, large agricultural product processors, seed producers, and agricultural service industries are located here.

Climate

Peter Vinzani, weather observer, Illinois State Water Survey, Champaign, Illinois, helped to prepare this section.

Macon County is cold in winter and hot in summer. Winter precipitation, commonly snow, and early spring rains generally result in the replenishment of soil moisture. In most years the soil-stored moisture minimizes drought in summer on most soils. Normal annual precipitation is adequate for all crops that are suited to the temperature and length of growing season in the area.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Decatur in the period 1951 to 1980. 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 25.7 degrees F, and the average daily minimum temperature is 17.0 degrees. The lowest temperature on record, which occurred at Decatur on January 17, 1977, is -23.0 degrees. In summer the average temperature is 74.6 degrees, and the average daily maximum temperature is 86.2 degrees. The highest recorded temperature, which occurred at Decatur on July 9, 1954, is 113.0 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 (50.0 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 average annual precipitation is 39.0 inches. Of this, 22.7 inches, or 58.2 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 18.5 inches. The heaviest 1-day rainfall during the period of record was 4.76 inches.

The average seasonal snowfall is 21.5 inches. The greatest snow depth at any one time during the period of record was 22 inches.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 85 percent.

Natural Resources

Soil is a valuable natural resource in Macon County. An estimated 1,000 farms make up over 90 percent of the total acreage. The major crops are corn and soybeans. Secondary farm products include wheat, oats, hay, cattle, hogs, and eggs. The county has some of the most productive farmland in the state. Most of the soils are nearly level or gently sloping, and formed in medium textured soil material under tall prairie grasses. Combined with a favorable climate, these factors result in highly productive farmland.

About 3,500 acres in the county is woodland, mostly along drainageways of the major streams. More than 2,500 acres of manmade lakes and 40 miles of streams provide opportunities for fishing. Bluegill, bass, crappie, and catfish are the major game fish. Lake Decatur is largest, and is also used for boating and other recreational activities. The lake is also the principal source of water for both industrial and municipal uses in the Decatur area (fig. 1).

Subsurface natural resources in the county include water, sand and gravel, coal, and oil. Ground water potential in the county is relatively large. The highest water-yielding aquifer system is in the northeastern part of the county, and is part of the Mahomet Bedrock Valley (*3*). About 56,000 acres of the county is underlain by sand and gravel, and only a small percentage has been mined (*3*).

An estimated 1.9 billion tons of coal are underground in the county. Most of the coal is at a depth between 200 and 250 feet, and on average is about 6 feet thick. The coal mines are not active, but in prior mining about 11 million tons of coal were removed (*3*). As of 1982 in Macon County more than 2 million barrels of oil have been produced. In 1982, 337,186 barrels of crude oil were produced. By contrast, in 1976, only 76,000 barrels were produced (*14*).

Relief, Physiography, and Drainage

The relief in Macon County is low on the nearly level and gently sloping, broad uplands. Relief is greater in areas dissected by drainageways and in areas of the Shelbyville and Cerro Gordo moraines. The highest elevation in the county, 740 feet above sea level, is on the Cerro Gordo moraine in section 4 of Oakley Township. The lowest elevation is 540 feet above sea level where the Sangamon River leaves the county.

The county is divided by the Shelbyville moraine in the western part of the county. The moraine separates the Sangamon plain to the west from the Bloomington ridged plain to the east. A moderately thick layer of loess blankets most of the county. Absolute thickness varies from one area of the county to another.

Most of Macon County is drained by the Sangamon River and its tributaries, although some of the southeast corner drains into the Kaskaskia River system. In most areas of the county subsurface drains and surface ditches have been installed.

How This Survey Was Made

This survey was made to provide information about the soils in Macon County. 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; and the kinds of crops and native plants growing on the soils. 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

Figure 1.—Lake Decatur is the main water supply for Decatur and its environs.

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 greatly 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, acidity, 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 the soil survey was in progress, samples of some of the soils in the area generally were 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. The properties of similar inclusions are mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of 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.

The names of the associations on the General Soil Map of Macon County do not completely agree with those on the published general soil maps of adjacent Sangamon and Logan Counties because of differences in the extent of the major soils. These differences, however, do not affect broad land use planning because the soils and parent materials are similar in terms of use and behavior.

Soil Descriptions

Nearly Level to Steep Soils That Formed in Loamy Glacial Till, in Loess and the Underlying Glacial Till or Glacial Outwash, or Entirely in Loess; on Uplands

The soils in this group are in the steeper areas of the county. In these areas side slopes and ridges are adjacent to or near drainageways or on glacial moraines. The nearly level to moderately sloping areas commonly are used for crops. The steeper areas commonly are used as pasture or woodland. The major management concern is the erosion hazard.

1. Miami-Birkbeck-Russell Association

Gently sloping to steep, well drained and moderately well drained, loamy and silty soils that formed entirely in glacial till or in loess and the underlying glacial till; on side slopes and ridges on dissected till plains

This association consists of soils on prominent, narrow, gently sloping ridges and on adjacent, moderately sloping to steep, dominantly wooded side slopes. These soils have a light-colored surface layer. They are drained by a well defined, dendritic drainage system. Narrow bottom land is in this association. Areas of very steep Miami soils and escarpments are adjacent to the bottom land.

This association makes up about 10 percent of the county. It is about 30 percent Miami soils, 25 percent Birkbeck soils, 16 percent Russell soils, and 29 percent minor soils (fig. 2).

Miami soils are moderately sloping to steep, well drained, and on side slopes along drainageways. They formed in loamy glacial till. Typically, the surface layer of Miami soils is very dark grayish brown, friable loam about 6 inches thick. The subsurface layer is brown, friable loam about 2 inches thick. The subsoil is friable and about 28 inches thick. In the upper part it is yellowish brown loam, in the next part it is yellowish brown clay loam, and in the lower part it is light olive brown, mottled, calcareous loam. The underlying material is calcareous and extends to a depth of 60 inches or more. In the upper part it is light olive brown, mottled, firm loam and in the lower part it is dark brown, friable gravelly sandy loam.

Birkbeck soils are gently sloping, moderately well drained, and on convex ridge crests. They formed in 40 to 60 inches of loess and the underlying loamy glacial till. Typically, the surface layer of Birkbeck soils is very dark grayish brown, friable silt loam about 4 inches thick. The subsurface layer is dark brown, friable silt loam about 5 inches thick. The subsoil is dark yellowish brown, friable, and about 51 inches thick. In the upper part it is silty clay loam, in the next part it is mottled silty clay loam, and in the lower part it is mottled loam. The underlying material to a depth of 67 inches or more is light olive brown, mottled, firm, calcareous loam.

Russell soils are moderately sloping, well drained, and on eroded side slopes of drainageways. They formed in 20 to 40 inches of loess and the underlying loamy glacial till. Typically, the surface layer is dark brown, friable silt loam. Because of erosion it has been thinned to about 7 inches thick. The subsoil is friable and about 40 inches thick. In the upper part it is dark yellowish brown silty clay loam. In the next part it is dark yellowish brown, mottled clay loam. In the lower part it is yellowish brown, mottled, calcareous loam. The underlying material is

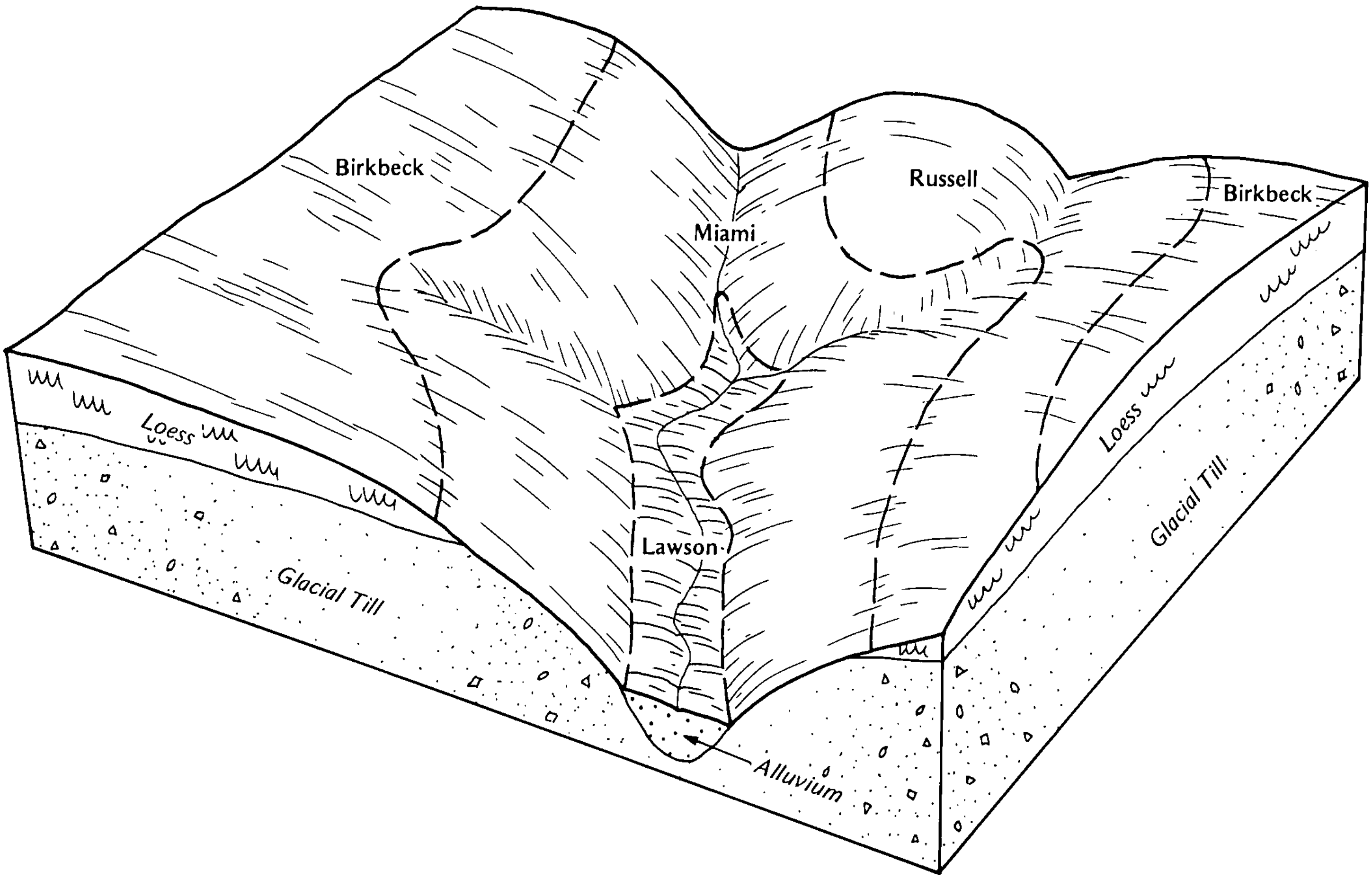


Figure 2.—Typical landscape pattern of soils and parent materials in the Miami-Birkbeck-Russell association.

yellowish brown, mottled, firm, calcareous loam to a depth of 60 inches or more.

Minor soils in this association are Lawson and Sabina soils. Lawson soils are somewhat poorly drained, subject to frequent flooding, and on bottom land. Sabina soils are somewhat poorly drained and on nearly level ridges and in drainageways.

The major soils in this association are used for cultivated crops, pasture, or hay. They are also the major portion of woodland that remains in the county.

In the gently sloping and moderately sloping areas, they are well suited to cultivated crops, pasture, and hay. Except for the steep areas of Miami soils, the soils in this association are also well suited to woodland. When the soils are cultivated, erosion is a hazard and after hard rains the surface tends to puddle and crust. Management needs include controlling erosion and maintaining or improving soil tilth and fertility.

These soils are moderately suited to use as a site for dwellings. Shrinking and swelling is a limitation. Birkbeck soils also have a seasonal high water table. In some areas of Miami soils slope is also a limitation.

These soils are generally poorly suited to use as a site for septic tank absorption fields. The seasonal high water table of Birkbeck soils and permeability of Miami and Russell soils are limitations. In some areas of Miami soils slope is also a limitation.

2. Catlin-Dana-Parr Association

Gently sloping and moderately sloping, moderately well drained and well drained, silty and loamy soils that formed in loess and the underlying glacial till or entirely in glacial till; on moraines and ridges on till plains

This association consists of soils on prominent, convex ridges, knolls, and side slopes along the heads of drainageways on till plains. These soils are also on similar landscapes on the Shelbyville and Cerro Gordo moraines. They have a dark colored surface layer.

This association makes up about 12 percent of the county. It is about 50 percent Catlin soils, 20 percent

Dana soils, 9 percent Parr soils, and 21 percent minor soils (fig. 3).

Catlin soils are gently sloping, moderately well drained, and on convex ridges, knolls, and side slopes. They formed in 40 to 60 inches of loess and the underlying loamy glacial till. Typically, the surface layer of Catlin soils is very dark brown, friable silt loam about 9 inches thick. The subsurface layer is very dark grayish brown, friable silt loam about 5 inches thick. The subsoil extends below a depth of 60 inches. In the upper part it is dark brown, friable silt loam; in the next part it is dark yellowish brown and yellowish brown, mottled, friable silty clay loam; and in the lower part it is dark brown, mottled, firm clay loam.

Dana soils are gently sloping and moderately sloping, moderately well drained, and on convex ridgetops and on side slopes, ridges, and knolls on moraines and till plains. They formed in 20 to 40 inches of loess and the underlying loamy glacial till. Typically, the surface layer of Dana soils is very dark grayish brown, friable silt loam about 10 inches thick. The subsoil is friable and about 39 inches thick. In the upper part it is yellowish brown silty clay loam; in the next part it is dark yellowish brown, mottled silty clay loam; and in the lower part it is brown and yellowish brown, mottled clay loam. The underlying material is brown, mottled, firm, calcareous loam to a depth of 60 inches or more.

Parr soils are gently sloping and moderately sloping, well drained, and on side slopes of drainageways and moraines. They formed in loamy glacial till. Typically, the surface layer of Parr soils is very dark grayish brown, friable loam about 8 inches thick. The subsoil is about 31 inches thick. In the upper part it is dark yellowish brown, friable clay loam; in the next part it is brown, friable and

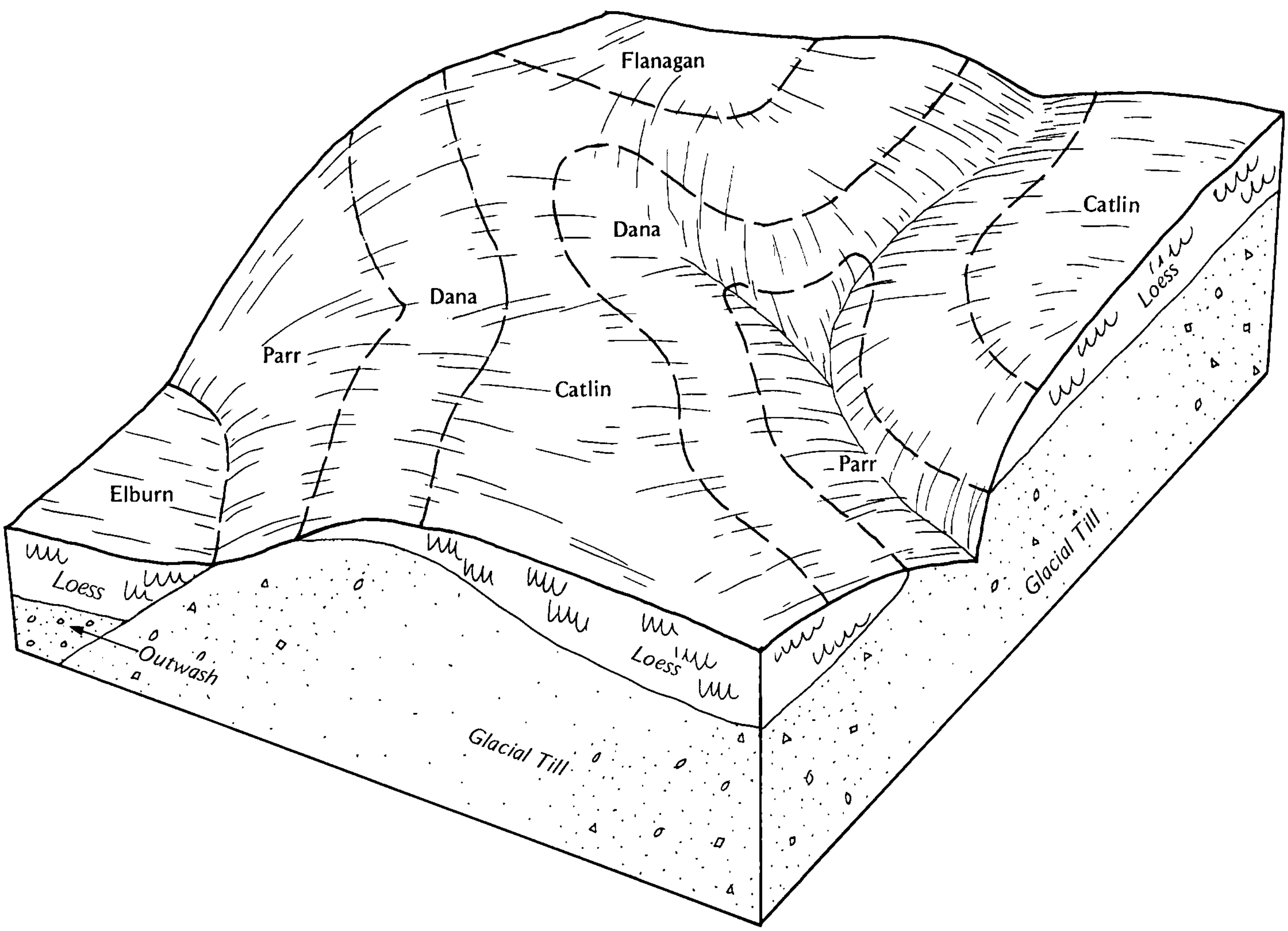


Figure 3.—Typical landscape pattern of soils and parent materials in the Catlin-Dana-Parr association.

firm clay loam; and in the lower part it is yellowish brown, mottled, firm, calcareous loam. The underlying material is yellowish brown, mottled, very firm, calcareous loam to a depth of 60 inches or more.

Minor soils in this association are Elburn, Flanagan, and Raub soils. Elburn soils are somewhat poorly drained and on nearly level outwash plains below the major soils. Flanagan and Raub soils are somewhat poorly drained, on nearly level, low, broad ridges, and closely intermingled with areas of Catlin soils near the edges of the association. Also included in the association are areas of Urban land.

In most areas the soils in this association are used for cultivated crops.

These soils are well suited to the cultivated crops commonly grown in the county. The main management need is controlling erosion.

These soils are moderately suited to use as a site for dwellings. Shrinking and swelling and the seasonal high water table are limitations. These soils are poorly suited to use as a site for septic tank absorption fields. The main limitations to this use are the seasonal high water table in Catlin and Dana soils and moderately slow permeability in Dana and Parr soils.

3. Plano-Proctor Association

Nearly level to moderately sloping, moderately well drained and well drained, silty soils that formed in loess and the underlying glacial outwash; on ridges and side slopes or on outwash plains and terraces

This association consists of soils on convex ridges and nearly level toe slopes. These soils have a dark colored surface layer. In some areas end moraines 30 to 80 feet in elevation are on the adjacent landscape.

This association makes up about 4 percent of the county. It is about 69 percent Plano soils, 17 percent Proctor soils, and 14 percent minor soils.

Plano soils are gently sloping and moderately sloping and on prominent convex ridges and side slopes. They are nearly level and on long toe slopes of ridges and end moraines. They formed in 40 to 60 inches of loess and the underlying stratified loamy outwash. Typically, the surface layer of Plano soils is friable silt loam about 17 inches thick. In the upper part it is very dark grayish brown and in the lower part it is dark brown. The subsoil is friable and extends below a depth of 60 inches. In the upper part it is brown silty clay loam; in the next part it is brown and yellowish brown, mottled silty clay loam; and in the lower part it is brown, mottled, stratified sandy clay loam and sandy loam.

Proctor soils are gently sloping and moderately sloping on side slopes of convex ridges and knolls. They formed in 20 to 40 inches of loess and the underlying loamy outwash. Typically, the surface soil is very dark grayish brown and dark brown, friable silt loam about 11 inches thick. The subsoil is dark brown and dark yellowish brown and friable and extends below a depth of 60 inches. In the upper part it is silty clay loam, in the next part it is clay loam, and in the lower part it is stratified clay loam to sandy loam.

Minor soils in this association are Elburn and Sparta soils. Elburn soils are somewhat poorly drained and on low, broad ridges intermingled with areas of Plano soils. Sparta soils are excessively drained and commonly are on side slopes of uplands near the Sangamon River.

In most areas the soils in this association are used for cultivated crops. They are well suited to the crops commonly grown in the county. The main management need is controlling erosion.

These soils are moderately suited to use as a site for dwellings. The seasonal high water table in Plano soils and shrinking and swelling in both Plano and Proctor soils are limitations. Mainly because of the seasonal high water table, Plano soils in this association are poorly suited to use as a site for septic tank absorption fields.

4. Clarksdale-Downs-Elco Association

Nearly level to sloping, somewhat poorly drained and moderately well drained, silty soils that formed entirely in loess or in loess and the underlying glacial till; on side slopes and ridges on till plains

This association consists of soils on ridges, knolls, and side slopes along drainageways. These soils have a moderately dark colored to light-colored surface layer that crusts after rains. Bottom land is adjacent to the drainageways.

This association makes up about 1 percent of the county. It is about 45 percent Clarksdale soils, 29 percent Downs soils, 12 percent Elco soils, and 14 percent minor soils.

Clarksdale soils are nearly level, somewhat poorly drained, and on low, broad ridges. They formed in loess more than 60 inches thick. Typically, the surface layer is very dark gray, friable silt loam about 7 inches thick. The subsurface layer is dark gray and grayish brown, mottled, friable silt loam about 10 inches thick. The subsoil is mottled silty clay loam and extends below a depth of 60 inches. In the upper part it is dark grayish brown and friable; in the next part it is yellowish brown, grayish brown, and light brownish gray and firm; and in the lower part it is yellowish brown and gray and friable.

Downs soils are gently sloping, moderately well drained, and on convex ridges on the highest parts of the landscape. They formed in loess more than 60 inches thick. Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsoil is friable and about 46 inches thick. It is brown silt loam to a depth of 13 inches and dark yellowish brown silty clay loam to a depth of 29 inches. Below that, it is yellowish brown, mottled silty clay loam to a depth of 37 inches and yellowish brown, mottled silt loam to a depth of 55 inches. The underlying material is yellowish brown, mottled, friable silt loam to a depth of 60 inches or more.

Elco soils are sloping, moderately well drained, and on side slopes. They have a light-colored surface layer. They formed in 20 to 40 inches of loess and the underlying loamy sediments of the Sangamon paleosol. Typically, the surface layer is dark yellowish brown, friable silt loam about 5 inches thick. The subsoil is silty clay loam and extends below a depth of 60 inches. In the upper part it is friable and dark yellowish brown and yellowish brown, and in the lower part it is friable or firm, yellowish brown, and mottled.

Minor soils in this association are Lawson soils. Lawson soils are somewhat poorly drained and on included bottom land.

In most areas the soils in this association are used for cultivated crops. Clarksdale and Downs soils are well suited to cultivated crops. Elco soils are moderately well suited to this use. The main management concerns are lowering the seasonal high water table in Clarksdale soils and controlling erosion on Downs and Elco soils.

Clarksdale soils are poorly suited and Downs and Elco soils are moderately suited to use as a site for dwellings. Shrinking and swelling and the seasonal high water table are limitations. Mainly because of the seasonal high water table in Clarksdale soils and moderately slow permeability in Clarksdale and Elco soils, the soils in this association are poorly suited to use as a site for septic tank absorption fields.

Nearly Level Soils That Formed in Loess and the Underlying Glacial Till or Glacial Outwash or Entirely in Loess; on Uplands

This group consists of somewhat poorly drained soils in broad, flat areas. These soils have a dark colored surface layer, and dominantly are used for cultivated crops. Numerous small circular depressions, locally called "ponds," are within areas of these soils. Also on the landscape are dredged drainage ditches that help to remove surface water and to provide outlets for subsurface drainage. The major management concern is the seasonal high water table.

5. Flanagan-Drummer Association

Nearly level, somewhat poorly drained and poorly drained, silty soils that formed in loess and the underlying glacial till or glacial outwash; on low ridges and broad flats on till plains

This association consists of soils in broad, flat areas and on low, broad ridges with long, even side slopes. These soils have a dark colored surface layer. Numerous small circular depressions, locally called "ponds," are within areas of these soils. Also on the landscape are dredged drainage ditches that help to remove surface water and to provide outlets for subsurface drainage.

This association makes up about 37 percent of the county. It is about 50 percent Flanagan soils, 43 percent Drummer soils, and 7 percent minor soils (fig. 4).

Flanagan soils are somewhat poorly drained and on low ridges, and have slopes 100 to more than 500 feet long. They formed in 40 to 60 inches of loess and the underlying loamy glacial till. Typically, the surface layer of Flanagan soils is very dark brown, friable silt loam about 9 inches thick. The subsurface layer is very dark grayish brown, friable silt loam about 5 inches thick. The subsoil is mottled, friable, and about 44 inches thick. It is dark grayish brown silty clay, yellowish brown silty clay loam, and yellowish brown, grayish brown, and strong brown, friable silty clay loam. The underlying material is brown, mottled, firm, calcareous loam to a depth of 70 inches or more.

Drummer soils are poorly drained and in broad, flat areas. During the wettest periods of most years water is ponded for brief periods on Drummer soils. These soils formed in 40 to 60 inches of loess and the underlying loamy outwash. Typically, the surface layer is black, friable silty clay loam about 7 inches thick. The subsurface layer is very dark gray, friable silty clay loam about 11 inches thick. The subsoil is mottled and about 38 inches thick. In the upper part it is dark grayish brown, firm silty clay loam; in the next part it is grayish brown, firm silty clay loam and grayish brown and yellowish brown, mottled, friable silty clay loam; and in the lower part it is gray, mottled, friable, stratified silt loam, loam, and clay loam. The underlying material to a depth of 65 inches or more is gray, mottled, friable, calcareous, stratified loam and sandy loam.

Minor in this association are Catlin, Harpster, Pella, and Peotone soils. Catlin soils are moderately well drained and on prominent convex ridges. Harpster and Pella soils are poorly drained, have carbonates at shallower depths, and are intermingled with Drummer soils. Peotone soils are very poorly drained and in rounded depressions in areas of Drummer soils.

The major soils in this association are used for cultivated crops. Because a drainage system has been installed, these soils are well suited to the crops commonly grown in the county. Management needs are maintaining or upgrading the drainage system and maintaining soil tilth and fertility.

Mainly because of the seasonal high water table, these soils are poorly suited to use as a site for both dwellings and septic tank absorption fields. Shrinking and swelling in Flanagan soils is also a limitation on sites for dwellings.

6. Drummer-Elburn Association

Nearly level, poorly drained and somewhat poorly drained, silty soils that formed in loess and the underlying glacial outwash; on broad flats and low ridges on outwash plains

This association consists of soils in broad, flat areas and on low convex ridges with long, even side slopes. These soils formed in 40 to 60 inches of loess and the

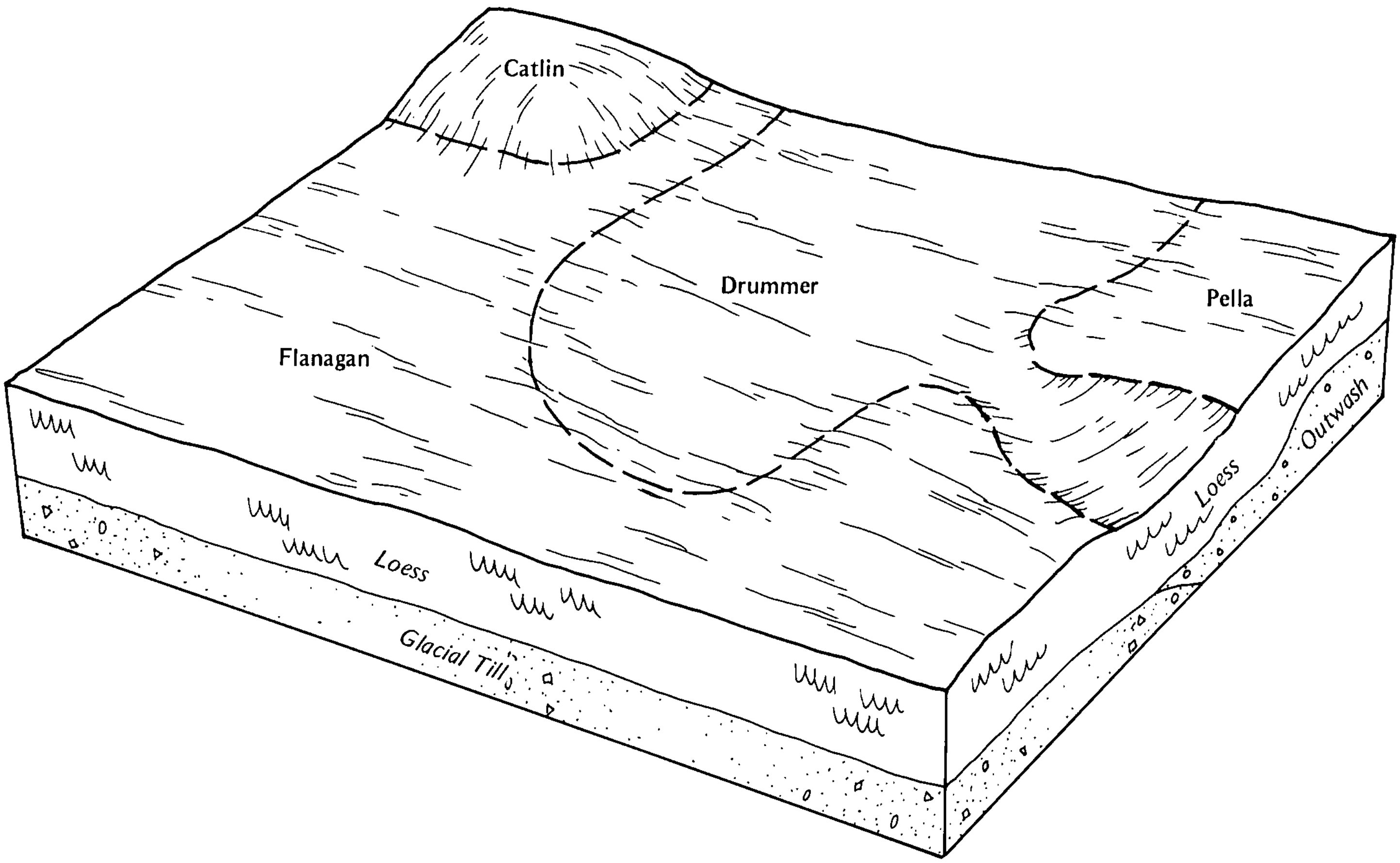


Figure 4.—Typical landscape pattern of soils and parent materials in the Flanagan-Drummer association.

underlying loamy outwash. These soils have a dark colored surface layer.

This association makes up about 9 percent of the county. It is about 51 percent Drummer soils, 38 percent Elburn soils, and 11 percent minor soils.

Drummer soils are poorly drained and in broad, flat areas. During the wettest periods of most years water is frequently ponded for brief periods on Drummer soils. These soils formed in 40 to 60 inches of loess and the underlying loamy outwash. Typically, the surface layer of Drummer soils is black, friable silty clay loam about 7 inches thick. The subsurface layer is very dark gray, friable silty clay loam about 11 inches thick. The subsoil is mottled and about 38 inches thick. In the upper part it is dark grayish brown, firm silty clay loam; in the next part it is grayish brown, firm silty clay loam and grayish brown and yellowish brown, mottled, friable silty clay loam; and in the lower part it is gray, mottled, friable, stratified silt loam, loam, and clay loam. The underlying material to a depth of 65 inches or more is gray, mottled, friable, calcareous, stratified loam and sandy loam.

Elburn soils are somewhat poorly drained and on low convex ridges with smooth slopes that are 100 to more than 500 feet in length. Typically, the surface layer is very dark brown, friable silt loam about 9 inches thick. The subsurface layer is very dark grayish brown, friable silt loam about 4 inches thick. The subsoil is mottled and about 41 inches thick. In the upper part it is dark yellowish brown and brown, friable silty clay loam; in the next part it is grayish brown, firm silty clay loam; and in the lower part it is strong brown, friable sandy loam. The underlying material to a depth of 60 inches or more is strong brown, mottled, friable sandy loam.

Minor soils in this association are Plano and Thorp soils. Plano soils are moderately well drained and on crests or side slopes of the more prominent ridges on the landscape. Thorp soils are poorly drained and in low areas on ridges or at the base of ridges. The surface tends to crust and puddle after hard rains.

The major soils in this association are used for cultivated crops. Because a drainage system has been installed, the soils are well suited to the crops commonly grown in the county. Management needs are maintaining or upgrading the drainage system and maintaining soil tilth and fertility.

Mainly because of the seasonal high water table, the major soils in this association are poorly suited to use as a site for both dwellings and septic tank absorption fields.

7. Sable-Ipava Association

Nearly level, poorly drained and somewhat poorly drained, silty soils that formed in loess; on broad flats and low ridges on outwash plains and till plains

This association consists of soils in broad, flat areas and on low convex ridges with long, even side slopes. These soils formed in more than 60 inches of loess. They have a dark colored surface layer. A few prominent ridges and numerous circular depressions, locally called "ponds," are on the landscape.

The association makes up about 22 percent of the county. It is about 55 percent Sable soils, 33 percent Ipava soils, and 12 percent minor soils (fig. 5).

Sable soils are poorly drained and in broad, flat areas. During the wettest periods of most years water is ponded for brief periods. Typically, the surface layer is black, friable silty clay loam about 9 inches thick. The subsurface layer is very dark gray, friable silty clay loam about 8 inches thick. The subsoil is mottled, friable, and about 35 inches thick. In the upper part it is dark grayish brown and grayish brown silty clay loam, in the next part it is gray and light olive brown silty clay loam, and in the lower part it is gray and light olive brown silt loam. The underlying material to a depth of 60 inches or more is gray and light olive brown, friable, calcareous silt loam.

Ipava soils are somewhat poorly drained and on broad convex ridges with slopes that are 100 to more than 500 feet long. Typically, the surface layer is black, friable silt loam about 9 inches thick. The subsurface layer is very dark grayish brown and dark brown, friable silt loam

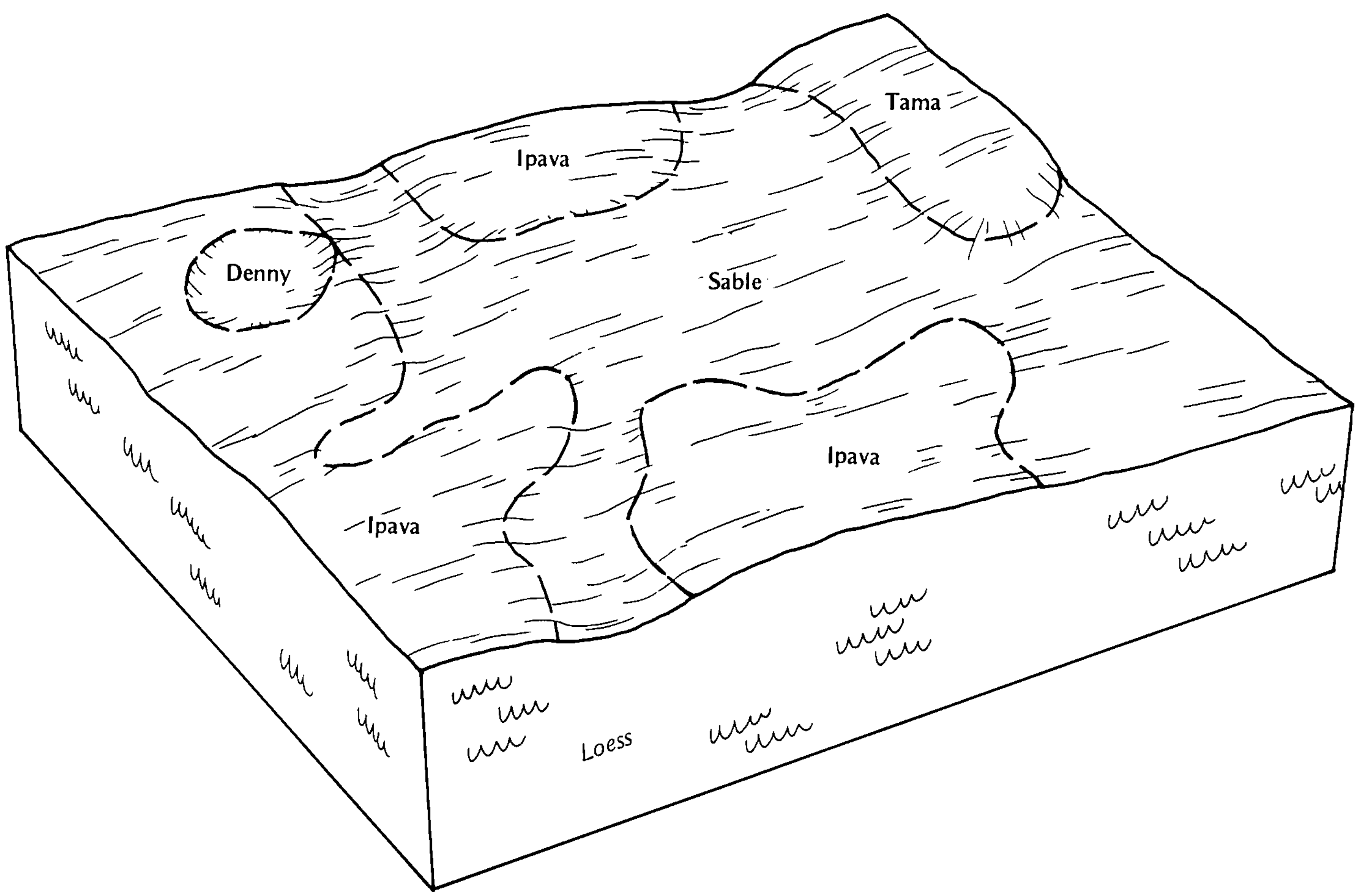


Figure 5.—Typical landscape pattern of soils and parent materials in the Sable-Ipava association.

about 7 inches thick. The subsoil is mottled and about 27 inches thick. In the upper part it is dark brown, friable silty clay loam; in the next part it is yellowish brown and grayish brown, firm and friable silty clay loam; and in the lower part it is light brownish gray, friable silt loam. The underlying material to a depth of 60 inches or more is mottled, light brownish gray and yellowish brown, friable silt loam.

Minor soils in this association are Catlin, Denny, Harpster, Shiloh, and Tama soils. Catlin and Tama soils are moderately well drained and on the more sloping, convex ridges and side slopes. Denny soils are poorly drained and have a light-colored surface layer that tends to crust after hard rains. They are in small, circular depressions on ridges or in larger, linear units at the base of ridges. Harpster soils are poorly drained, have carbonates at or near the surface, and are intermingled with Sable soils. Shiloh soils are very poorly drained and in depressional areas intermingled with areas of Sable soils.

In most areas the major soils in this association are used for cultivated crops. Because a drainage system has been installed, these soils are well suited to the crops commonly grown in the county. Management needs are maintaining or upgrading the drainage system and maintaining soil tilth and fertility.

Mainly because of the seasonal high water table, these soils are poorly suited to use as a site for both dwellings and septic tank absorption fields. Shrinking and swelling is also a limitation of these soils on a site for dwellings.

Nearly Level Soils That Formed in Silty Alluvium; on Bottom Land

The association in this group consists of soils on the bottom land of the Sangamon River and that of its major tributary streams. The soils are subject to frequent flooding for brief periods, generally in late winter and early spring. The areas of soils downstream from Lake Decatur commonly are cultivated. The areas upstream from Lake Decatur and the areas on narrow bottom land commonly are wooded. Sloughs are in old stream meanders. Adjacent to the bottom land are uplands commonly with steep and very steep side slopes.

8. Sawmill-Lawson-Tice Association

Nearly level, poorly drained and somewhat poorly drained, silty soils that formed in alluvium; on frequently flooded bottom land

This association consists of soils on wide flood plains that have broad, flat areas and low ridges that are generally parallel to present or previous stream channels. These soils dominantly have a dark colored surface layer.

This association makes up about 5 percent of the county. It is about 56 percent Sawmill soils, 30 percent Lawson soils, 9 percent Tice soils, and 5 percent minor soils.

Sawmill soils are poorly drained and in broad, flat areas and in some old stream meanders. Typically, the surface layer is black, friable silty clay loam about 9 inches thick. The subsurface layer is black and very dark gray, mottled, firm silty clay loam about 12 inches thick. The subsoil is firm and mottled, and extends below a depth of 60 inches. In the upper part it is black silty clay loam, in the next part it is dark gray and gray silty clay loam, and in the lower part it is dark gray and gray clay loam.

Lawson soils are somewhat poorly drained and on low broad ridges on wide flood plains. They are also on the narrower flood plains. Typically, the surface layer is black, friable silty clay loam about 10 inches thick. The subsurface layer is black, friable silt loam about 27 inches thick. The underlying material to a depth of 60 inches or more is dark grayish brown, mottled, friable loam.

Tice soils are somewhat poorly drained and on low, broad ridges on wide flood plains. Typically, the surface layer is very dark gray, friable silty clay loam about 6 inches thick. The subsurface layer is also very dark gray, friable silty clay loam about 15 inches thick. The subsoil is mottled, firm silty clay loam, and extends below a depth of 60 inches. In the upper part it is dark grayish brown, and in the lower part it is grayish brown.

Minor soils in this association are Allison and Wabash soils. Allison soils are moderately well drained and on low ridges, natural levees, and alluvial fans near the stream channel. Wabash soils are very poorly drained and in sloughs, marshes, and slack water areas.

Where the trees have been cleared and a drainage system has been installed, the major soils in this association are well suited to the cultivated crops commonly grown in the county. Management needs are protecting crops from floodwater, maintaining or upgrading the drainage system, and maintaining soil tilth and fertility.

The major soils in this association generally are suited to woodland use. The major limitations are the seasonal high water table and flooding. The main management need is protecting the woodland from fire and grazing.

Because of flooding, the soils in this association generally are not suited to use as a site for both dwellings and septic tank absorption fields.

Broad Land Use Considerations

The soils in Macon County vary widely in their suitability for major land uses. Nearly 85 percent of the acreage is used for cultivated crops, dominantly corn and soybeans (*13*). Most of the acreage in associations 2 through 7 is cultivated. Erosion is the main hazard in associations 1 through 4. The seasonal high water table is the main limitation in associations 5 through 7.

Birkbeck, Catlin, Drummer, Elburn, Flanagan, Ipava, Plano, and Sable soils are the main soils in associations 1 through 7. The soils in association 8 are subject to common flooding mainly in winter and early spring. Floodwater causes occasional slight or moderate crop damage. The seasonal high water table is also a major limitation to use of this association for crops. Lawson and Sawmill soils are the major soils in association 8.

A small acreage in the county is used as pasture. All associations have areas that are suitable for grasses and legumes. In association 1, Miami soils on steep slopes generally are not suited to grasses and legumes.

A very small acreage in the county is woodland. The woodland is mainly in areas adjacent to creeks and streams. Suitability for trees is good or excellent in all associations. Because of the seasonal high water table or slope, on some soils the equipment limitation is moderate or severe. The equipment limitation can be overcome by harvesting during drier periods or by using special equipment.

A few areas in the county have been developed or built up for urban uses. Generally, the gently sloping and sloping, and moderately well drained and well drained soils in associations 1 through 4 are the best soils for building site development. These include Birkbeck, Catlin, Downs, Miami, Proctor, and Russell soils. In most of the other associations, low strength, potential frost action, the seasonal high water table, shrinking and swelling, or some combination of these are limitations for building site development. Soils on flood plains, such as those in association 8, are generally not suitable for use as building sites because of flooding.

Much of the urban development in the rural areas of Macon County depends on the use of private sewage disposal systems. Miami, Parr, Proctor, and Russell soils, which are mainly in associations 1, 2, and 3, are suited to use as sites for septic tank absorption fields. On other soils in these associations and in the rest of the associations, the seasonal high water table is a major limitation to this use. On some building sites where the water table cannot be sufficiently lowered, alternative waste disposal systems are needed.

These associations are suited or poorly suited to recreation use, depending on the intensity of the expected use. Association 8 is poorly suited to many types of this use because of flooding. All of the associations are suitable for some types of recreation use, such as paths and trails for hiking or horseback riding. At least some small areas of minor soils are available for recreation development in associations that are otherwise poorly suited to this use.

Throughout the county these associations are generally well suited to use as habitat for wildlife. In all associations the major soils are generally well suited to use as habitat for openland wildlife, woodland wildlife, or both. In association 8 scattered areas are suited to use as 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, Miami silt loam, 10 to 15 percent slopes, eroded, is a phase of the Miami series.

Some map units are made up of a major soil and a miscellaneous area. These map units are called soil complexes. A *soil complex* consists of 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. Flanagan-Urban land complex, 0 to 3 percent slopes, is an example.

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

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, gravel, is an example. Miscellaneous areas are shown on the soil maps. Some areas 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

27C2—Miami silty clay loam, 5 to 10 percent slopes, eroded. This is a moderately sloping, well drained soil on convex, uneven side slopes on till plains. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is dark brown, friable silty clay loam. Erosion has thinned the surface layer to a thickness of about 6 inches. The subsoil is dark yellowish brown, friable clay loam about 34 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown, firm, calcareous loam. Some areas are more eroded, and the surface layer is predominantly subsoil material. In other areas the content of sand in the subsoil is less than 15 percent. In places the depth to the underlying material is greater.

Included with this soil in mapping are small areas of poorly drained Drummer soils in drainageways below the Miami soil. They make up 1 to 5 percent of the unit.

Water and air move through the upper part of the Miami profile at a moderate rate and through the lower part at a moderately slow rate. In cultivated areas surface runoff is medium. Available water capacity is moderate. Organic matter content is moderately low. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential and potential frost action are moderate.

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

In areas used for corn, soybeans, or small grain, further erosion is a hazard. A crop rotation that includes a forage crop, a conservation tillage system that leaves crop residue on the surface after planting, and contour farming help to control erosion and thus to maintain soil productivity. Terraces also help to control erosion, but are commonly difficult to install in areas with short, uneven side slopes. Leaving crop residue on the surface helps to reduce crusting and puddling and increases the rate of water intake.

Establishing pasture or hay on this soil helps to control erosion. Alfalfa, bromegrass, orchardgrass, and tall fescue are suitable for planting. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Pasture rotation, deferred grazing, and applications of fertilizer help to keep both the pasture and the soil in good condition and help to control erosion. On pasture and hayland, tilling on the contour when preparing a seedbed helps to control erosion.

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

If this soil is used as a site for septic tank absorption fields, moderately slow permeability is a limitation. Enlarging the absorption area improves the absorption of liquid waste. In the steeper areas slope is generally a limitation. Installing the distribution lines on the contour helps to overcome the slope.

The land capability classification is IIIe.

27D2—Miami silt loam, 10 to 15 percent slopes, eroded. This is a strongly sloping, well drained soil on uneven side slopes on till plains. Individual areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is dark brown, friable silt loam. Erosion has thinned the surface layer to a thickness of about 6 inches. The subsoil is friable and about 27 inches thick. In the upper part it is dark yellowish brown silty clay loam; in the next part it is yellowish brown silty clay loam; and in the lower part it is yellowish brown, calcareous loam. The underlying material to a depth of 60 inches or more is yellowish brown and light yellowish brown, mottled, firm, calcareous loam. Some areas are more eroded, and the surface layer has a higher content of clay. In other areas the content of sand in the subsoil is less than 15 percent. In places the depth to the underlying material is less than 20 inches.

Water and air move through the upper part of the Miami profile at a moderate rate and through the lower part at a moderately slow rate. In cultivated areas surface runoff is rapid. Available water capacity is moderate. Organic matter content is moderately low. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential and potential frost action are moderate.

In most areas this soil is used as woodland or for cultivated crops. It is well suited to use as woodland. It is poorly suited to cultivated crops. It is moderately suited to 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.

In areas used for corn, soybeans, or small grain, further erosion is a hazard. A crop rotation that includes a forage crop, a conservation tillage system that leaves crop residue on the surface after planting, and contour farming help to control erosion. Terraces help to control erosion but are difficult to install on this soil because of the short, uneven side slopes. Leaving crop residue on the surface helps to reduce crusting and puddling and increases the rate of water intake.

Alfalfa in a mixture with bromegrass, orchardgrass, or tall fescue grows well on this soil. Timely deferment of grazing helps to prevent overgrazing and thus also surface compaction, excessive runoff, and erosion. Tilling on the contour when a seedbed is prepared or when the pasture is renovated 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 affects the seedlings of desirable species and is a management concern. In openings where the timber has been harvested it can be controlled by using herbicides or by cultivating with conventional equipment. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of 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, slope and the shrink-swell potential are limitations. Cutting, filling, and land shaping help to overcome the slope. Extending foundation footings below the subsoil, or properly designing and reinforcing the foundations help 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. Subsurface tile drains lower the seasonal high water table. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste. Installing the filter lines on the contour or cutting and filling help to overcome the slope.

The land capability classification is IVe.

27E3—Miami clay loam, 15 to 20 percent slopes, severely eroded. This is a moderately steep, well drained soil on side slopes on till plains. Over most of the area erosion has removed the original surface layer and tillage has mixed the rest with the upper part of the subsoil. Individual areas are long or irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is dark brown, friable clay loam about 7 inches thick. The subsoil is dark yellowish brown, friable clay loam about 19 inches thick. The underlying material to a depth of 60 inches or more is brown, mottled, friable, calcareous loam. In some less eroded areas, the surface layer has less clay. A few areas are less sloping and have less sand in the surface layer and the upper part of the subsoil.

Included with this soil in mapping are small areas of the somewhat poorly drained Lawson soils on flood plains below the Miami soil. These soils make up 2 to 5 percent of the unit.

Water and air move through the upper part of the Miami profile at a moderate rate and through the lower part at a moderately slow rate. In cultivated areas surface runoff is rapid. Available water capacity is moderate. Organic matter content is low. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential and potential frost action are moderate.

In most areas this soil is used for cultivated crops. It is generally not suited to cultivated crops because of moderately steep slopes and the severe erosion hazard. It is well suited to use as woodland. It is moderately suited to pasture and hay. It is poorly suited to use as a site for dwellings and septic tank absorption fields.

Establishing pasture and hay crops, such as a mixture of alfalfa with bromegrass, orchardgrass, or tall fescue, helps to control erosion. Overgrazing causes surface compaction, excessive runoff, and erosion. Proper stocking rates and timely deferment of grazing help to prevent overgrazing. Applications of fertilizer are needed. The plants should not be grazed or clipped until they are sufficiently established. Tilling on the contour when a seedbed is prepared or when the pasture is renovated helps to keep the pasture in good condition and helps to control erosion.

If this soil is used as woodland, the erosion hazard and the equipment limitation are management concerns because of slope. Plant competition affects the seedlings of desirable species and is also a management concern. In openings where timber has been harvested it can be controlled by use of herbicides or by cultivating with conventional equipment. Establishing logging roads and skid trails on the contour if possible helps to control erosion. On steeper slopes, the logs or trees should be skidded uphill with a cable and winch. Firebreaks should be grass. Bare logging areas should be seeded to grass or to a grass-legume mixture. Use of machinery is restricted to periods when the soil is firm enough to support the equipment. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots.

If this soil is used as a site for dwellings, slope and the shrink-swell potential are limitations. Cutting, filling, and land shaping help to overcome the slope. Extending foundation footings below the subsoil, or properly designing and reinforcing the foundations help to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, moderately slow permeability and slope are limitations. Increasing the size of the filter field or replacing the soil with more permeable material 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 VIe.

27F—Miami loam, 18 to 30 percent slopes. This is a steep, well drained soil on side slopes on till plains. Individual areas are long and narrow or irregular in shape and range from 3 to 80 acres in size.

Typically, the surface layer is very dark grayish brown, friable loam about 6 inches thick. The subsurface layer is brown, friable loam about 2 inches thick. The subsoil is friable and about 28 inches thick. In the upper part it is yellowish brown loam, in the next part it is yellowish brown clay loam, and in the lower part it is light olive brown, mottled, calcareous loam. The underlying material to a depth of 60 inches or more is calcareous. In the upper part it is light olive brown, mottled, firm loam, and in the lower part it is dark brown, friable gravelly sandy loam. In some areas the subsoil is thinner and carbonates are nearer the surface. A few areas are more sloping.

Included with this soil in mapping are small areas of Birkbeck, Xenia, and Lawson soils. Birkbeck and Xenia soils are moderately well drained and on shoulder slopes and narrow ridges above the Miami soil. Lawson soils are somewhat poorly drained and in narrow drainageways below the Miami soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the upper part of the Miami profile at a moderate rate and through the lower part at a moderately slow rate. In wooded areas surface runoff is rapid. Available water capacity is moderate. Organic matter content is moderate. Shrink-swell potential and potential frost action are moderate.

In most areas this soil is used as woodland. It is well suited to this use. It is poorly suited to use as a site for dwellings and septic tank absorption fields. It generally is not suited to cultivated crops and hay because of the steep slope and the severe erosion hazard.

If this soil is used as woodland, the erosion hazard and the equipment limitation are management concerns because of slope. Plant competition affects the seedlings of desirable species and also is a management concern. In openings where timber has been harvested it can be controlled by using herbicides or by cultivating with conventional equipment. Establishing logging roads and skid trails on the contour if possible helps to control erosion. On the steeper slopes, the logs or trees should be skidded uphill with a cable and winch. Firebreaks should be grass. Seeding bare logging areas to grass or to a grass-legume mixture helps to control erosion. Use of machinery is restricted to periods when the soil is firm enough to support the equipment. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots.

Nature paths and trails can be established on this soil. In the steeper areas stairways and handrails are needed. Erosion is a hazard if the plant cover is removed, for example, during the construction of paths and trails.

If this soil is used as a site for dwellings, slope and the shrink-swell potential are limitations. Cutting, filling, and land shaping help to overcome the slope. Extending foundation footings below the subsoil, or properly designing and reinforcing the foundations help to prevent the structural damage caused by shrinking and swelling.

If this soil is used as a site for septic tank absorption fields, moderately slow permeability and slope are limitations. Increasing the size of the filter field or replacing the soil with more permeable material 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 VIe.

27G—Miami loam, 30 to 60 percent slopes. This is a very steep, well drained soil on side slopes along drainageways on till plains. Individual areas are long and narrow in shape and range from 3 to 40 acres in size.

Typically, the surface layer is very dark grayish brown, friable loam about 4 inches thick. The subsurface layer is brown and dark grayish brown, friable loam about 3 inches thick. The subsoil is about 27 inches thick. In the upper part it is yellowish brown, friable loam; in the next part it is dark yellowish brown, friable clay loam; and in the lower part it is dark yellowish brown and dark brown, firm clay loam. The underlying material to a depth of 60 inches or more is brown, mottled, firm, calcareous clay loam. Some areas are more sloping. Also, some areas are more eroded than typical. Other areas have a thinner subsoil and are calcareous at or near the surface.

Included with these soils in mapping are small areas of somewhat poorly drained Lawson soils and poorly drained Sawmill soils in drainageways and on bottom land below the Miami soil. Included soils make up 2 to 5 percent of the unit.

Water and air move through the upper part of the Miami profile at a moderate rate and through the lower part at a moderately slow rate. Surface runoff is very rapid. Available water capacity is moderate. Organic matter content is moderate. The shrink-swell potential and potential frost action are moderate.

In most areas this soil is used as woodland. It is moderately suited to use as woodland and well suited to use as habitat for woodland wildlife. It generally is not suited to use as a site for dwellings and septic tank absorption fields because of the very steep slope.

If this soil is used as woodland, the erosion hazard and the equipment limitation are management concerns because of slope. Plant competition affects the seedlings of desirable species and also is a management concern. In openings where timber has been harvested, it can be controlled by using herbicides or by cultivating with conventional equipment. Establishing logging roads and skid trails on the contour if possible helps to control erosion. On the steeper slopes, the logs or trees should be skidded uphill with a cable and winch. Firebreaks should be grass. Seeding bare logging areas to grass or to a grass-legume mixture helps to control erosion. Use of machinery is restricted to periods when the soil is firm enough to support the equipment. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots.

In areas used as habitat for woodland wildlife, measures that exclude livestock are needed. Excluding livestock helps to prevent the depletion of the trees, shrubs, and sprouts that provide food and cover for woodland wildlife. Hedges and rows of shrubs provide cover for doves and many songbirds.

The land capability classification is VIIe.

36B—Tama silt loam, 1 to 5 percent slopes. This is a gently sloping, moderately well drained soil on convex ridgetops and broad, even side slopes on loess-covered till plains. Individual areas are irregular or oblong in shape and range from 3 to 160 acres in size.

Typically, the surface layer is very dark grayish, friable silt loam about 10 inches thick. The subsurface layer is dark brown, friable silt loam about 3 inches thick. The subsoil is friable and about 42 inches thick. In the upper part it is brown silty clay loam, in the next part it is brown or yellowish brown, mottled silty clay loam, and in the lower part it is yellowish brown, mottled silt loam. The underlying material to a depth of 60 inches or more is light brownish gray, mottled, friable, calcareous silt loam. In some areas the underlying material contains more sand. In a few moderately eroded areas the surface layer is thinner. Some areas are well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Ipava soils in drainageways and in nearly level areas below the Tama soil. They make up 2 to 10 percent of the unit.

Water and air move through the Tama soil at a moderate rate. In cultivated areas surface runoff is medium. 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 moderate. Shrink-swell potential is moderate, and potential 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 well suited to use as a site for dwellings and septic tank absorption fields.

In areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil and adding other organic material improve tilth.

If this soil is used as a site for dwellings with basements, the seasonal high water table and the shrink-swell potential are limitations. The shrink-swell potential is also a limitation on a site for dwellings without basements. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil, or properly designing and reinforcing the foundations help 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 is a limitation. Subsurface tile drains lower the water table.

The land capability classification is IIe.

43A—Ipava silt loam, 0 to 3 percent slopes. This is a nearly level, somewhat poorly drained soil on low, broad ridges on till plains. Individual areas are irregular in shape and range from 3 to more than 300 acres in size.

Typically, the surface layer is black, friable silt loam about 9 inches thick. The subsurface layer is very dark grayish brown and dark brown, friable silt loam about 7 inches thick. The subsoil is mottled and about 27 inches thick. In the upper part it is dark brown, friable silty clay loam; in the next part it is yellowish brown and grayish brown, firm and friable silty clay loam; and in the lower part it is light brownish gray, friable silt loam. The underlying material to a depth of 60 inches or more is mottled, light brownish gray and yellowish brown, friable silt loam. In some areas the underlying material contains more sand. A few areas are moderately eroded.

Included with this soil in mapping are small areas of Sable and Tama soils. Sable soils are poorly drained and in broad, flat areas or in drainageways below the Ipava soil. Tama soils are moderately well drained and on side slopes below the Ipava soils or on convex ridgetops above the Ipava soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the Ipava soil at a moderately slow rate. In cultivated areas surface runoff is slow. The seasonal high water table is 1 to 3 feet below the surface in spring. Available water capacity is high. Organic matter content also is high. Shrink-swell potential and potential 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.

No major limitations affect 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. Measures that maintain the drainage system are needed. A conservation tillage system that leaves crop residue on the surface after planting helps to maintain productivity and tilth.

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil, or properly designing and reinforcing the foundations help 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 water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is I.

45—Denny silt loam. This is a nearly level, poorly drained soil in broad, flat areas and in shallow depressions on loess-covered till plains and outwash plains. It is subject to occasional ponding for brief periods in winter and spring. Individual areas are round or oblong in shape and range from 3 to 40 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is gray and dark gray, mottled, friable silt loam about 10 inches thick. The subsoil is dark gray and gray, and mottled and extends to below a depth of 60 inches. In the upper part it is firm silty clay, and in the lower part it is friable silty clay loam. In a few areas the subsoil contains less clay. In some areas the surface soil is dark colored and thicker. In places the lower part of the subsoil is stratified and contains more sand.

Included with this soil in mapping are small areas of somewhat poorly drained Ipava soils on low, broad ridges above the Denny soil. They make up 5 to 10 percent of the unit.

Water and air move through the Denny soil at a slow rate in the upper part of the subsoil and at a moderately slow rate in the lower part. In cultivated areas surface runoff is slow to ponded. The seasonal high water table ranges from 0.5 foot above the surface to 2 feet below in spring. Available water capacity is high. Organic matter content is moderate. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential and potential frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops. It is moderately well suited to pasture and hay. It generally is not suited to use as a site for dwellings and septic tank absorption fields because of ponding.

This soil is sufficiently drained for corn, soybeans, and small grain. Measures that maintain or improve the drainage system are needed. Surface drains and surface inlet tile drains function satisfactorily if suitable outlets are available. Land grading helps to control ponding. Applying a conservation tillage system that leaves crop residue on the surface after planting and returning crop residue to the soil help to improve tilth, to prevent surface compaction and crusting, and to increase the rate of water intake.

The land capability classification is IIw.

56B—Dana silt loam, 1 to 5 percent slopes. This is a gently sloping, moderately well drained soil on convex ridgetops and broad, even side slopes on till plains and moraines. Individual areas are oblong or irregular in shape and range from 3 to 50 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 10 inches thick. The subsoil is friable and about 39 inches thick. In the upper part it is yellowish brown silty clay loam; in the next part it is dark yellowish brown, mottled silty clay loam; and in the lower part it is yellowish brown and brown, mottled clay loam. The underlying material to a depth of 60 inches or more is brown, mottled, firm, calcareous loam. In places the surface soil is thinner or lighter in color. In some areas the upper part of the subsoil contains more sand. In a few areas stratified, loamy outwash overlies the loam till. Some areas are more sloping.

Included with this soil in mapping are small areas of somewhat poorly drained Flanagan soils in drainageways or in nearly level areas below the Dana soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the upper part of the Dana profile at a moderate rate and through the lower part at a moderately slow rate. In cultivated areas surface runoff is medium. The seasonal high water table is 3 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is moderate. Shrink-swell potential is moderate, and potential 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 well suited 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, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil and adding other organic material improve tilth.

If this soil is used as a site for dwellings with basements, the seasonal high water table and the shrink-swell potential are limitations. The shrink-swell potential also is a limitation for dwellings without basements. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil, or properly designing and reinforcing the foundations help 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 water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is IIe.

56C2—Dana silt loam, 4 to 6 percent slopes, eroded. This is a moderately sloping, moderately well drained soil on side slopes of moraines and drainageways on till plains. Individual areas are irregular or oblong in shape and range from 3 to 40 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam. Erosion has thinned the surface layer to a thickness of about 9 inches. The subsoil is friable and about 40 inches thick. In the upper part it is dark yellowish brown silty clay loam; in the next part it is dark yellowish brown, mottled silty clay loam; and in the lower part it is dark yellowish brown and yellowish brown, mottled loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm loam. In some areas the subsoil is thinner. In a few areas the subsoil and the underlying material is stratified loam and loamy sand. Some areas are less sloping. Also in places the subsoil contains more sand throughout.

Included with this soil in mapping are small areas of Drummer, Flanagan, and Raub soils. Drummer soils are poorly drained and in drainageways below the Dana soil. Flanagan and Raub soils are somewhat poorly drained and in nearly level areas above the Dana soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the upper part of the Dana profile at a moderate rate and through the lower part at a moderately slow rate. In cultivated areas surface runoff is medium. The seasonal high water table is 3 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is moderate. Shrink-swell potential is moderate, and potential 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 well suited 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 erosion is a hazard and tilth is a limitation. A conservation tillage system that leaves crop residue on the surface after planting, contour farming, or terraces help to control erosion. Incorporating crop residue into the soil or adding organic material helps to prevent crusting and improve tilth. A crop rotation that includes a deep-rooting legume, such as alfalfa or red clover, helps to improve soil tilth and to prevent surface compaction.

Alfalfa in a mixture with bromegrass, orchardgrass, or tall fescue grows well on this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases susceptibility to erosion. Proper stocking rates, 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 with basements, the seasonal high water table and the shrink-swell potential are limitations. The shrink-swell potential also is a limitation on sites for dwellings without basements. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil, or properly designing and reinforcing the foundations help 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 water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is IIe.

67—Harpster silty clay loam. This is a nearly level, poorly drained soil in shallow depressions and in broad, flat areas on outwash plains and till plains. It is subject to occasional ponding for brief periods in winter and spring. Individual areas are irregular in shape and range from 3 to 80 acres in size.

Typically, the surface layer is black, friable, calcareous silty clay loam about 12 inches thick. The subsurface layer is very dark gray, friable, calcareous silty clay loam about 6 inches thick. The subsoil is mottled, friable, calcareous, silty clay loam about 21 inches thick. In the upper part it is dark gray, in the next part it is grayish brown, and in the lower part it is light olive gray. The underlying material to a depth of 60 inches or more is mottled, friable, and calcareous. In the upper part it is light gray silt loam and in the lower part it is yellowish brown and pale olive, stratified silt loam, sandy loam, and loamy sand. In some areas the surface layer does not have carbonates. In other areas the subsoil contains more clay. In a few places the underlying material is not stratified and contains less sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Elburn, Flanagan, and Ipava soils on slight rises above the Harpster soil. They make up 2 to 10 percent of the unit.

Water and air move through the Harpster soil at a moderate rate. In cultivated areas surface runoff is slow to ponded. The seasonal high water table ranges from 0.5 foot above the surface to 2 feet below in winter and spring. Available water capacity is very high. Organic matter content is high. The surface soil and the subsoil are mildly alkaline or moderately alkaline. The surface layer is compact and cloddy if it has been plowed when too wet. Shrink-swell potential is moderate, and potential frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops. It is moderately well suited to pasture and hay. It generally is not suited to use as a site for dwellings and septic tank absorption fields because of ponding.

This soil is sufficiently drained for corn, soybeans, and small grain. Measures that maintain or improve the drainage system are needed. Surface drains, subsurface tile drains, and surface inlet tile drains function satisfactorily if suitable outlets are available. Land grading helps to control ponding. Applying a conservation tillage system that leaves crop residue on the surface after planting and returning crop residue to the soil help to maintain tilth and productivity.

The land capability classification is IIw.

68—Sable silty clay loam. This is a nearly level, poorly drained soil in broad, flat areas on loess-covered till plains and outwash plains. It is subject to occasional ponding for brief periods in winter and spring. Individual areas are irregular in shape and range from 5 to more than 1,000 acres.

Typically, the surface layer is black, friable silty clay loam about 9 inches thick. The subsurface layer is very dark gray, friable silty clay loam about 8 inches thick. The subsoil is mottled, friable, and about 35 inches thick. In the upper part it is dark grayish brown and grayish brown silty clay loam, in the next part it is gray and light olive brown silty clay loam, and in the lower part it is gray and light olive brown silt loam. The underlying material to a depth of 60 inches or more is gray and light olive brown, friable, calcareous silt loam. In a few places the subsoil is darker and contains more clay. In some areas the underlying material contains more sand. In a few areas carbonates are within a depth of 35 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Elburn and Ipava soils on ridges above the Sable soil. They make up 2 to 8 percent of the unit.

Water and air move through the Sable soil at a moderate rate. In cultivated areas surface runoff is slow to ponded. The seasonal high water table ranges from 0.5 foot above the surface to 2 feet below in spring. Available water capacity is very high. Organic matter content is high. The surface layer is compact and cloddy if it has been plowed when too wet. Shrink-swell potential is moderate, and potential frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops. It is moderately suited to pasture and hay. It is generally not suited to use as a site for dwellings and septic tank absorption fields because of ponding.

This soil is sufficiently drained for corn, soybeans, and small grain. Measures that maintain or improve the drainage system are needed. Surface drains, subsurface tile drains, and surface inlet tile drains function satisfactorily if suitable outlets are available. Land grading helps to control ponding. Applying a conservation tillage system that leaves crop residue on the surface after planting and returning crop residue to the soil help to maintain tilth and productivity.

The land capability classification is IIw.

88C—Sparta loamy sand, 4 to 12 percent slopes. This is a sloping, excessively drained soil on side slopes on uplands adjacent to the Sangamon River in the western part of the county. Individual areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is very dark grayish brown, very friable loamy sand about 12 inches thick. The subsoil is about 28 inches thick. In the upper part it is dark brown and yellowish brown, very friable loamy sand, and in the lower part it is yellowish brown fine sand. The underlying material to a depth of 60 inches or more is light yellowish brown fine sand. In places the surface layer is thinner and contains subsoil material. In some areas the subsoil contains less sand and more clay. In other areas the soil formed in as much as 20 inches of silty material over the sandier textures.

Included with this soil in mapping are small areas of Elburn and Sawmill soils. Elburn soils are somewhat poorly drained and in shallow depressions and drainageways below the Sparta soil. Sawmill soils are poorly drained and on the adjacent bottom land. Included soils make up 3 to 10 percent of the unit.

Water and air move through the Sparta soil at a rapid rate. In cultivated areas surface runoff is slow. Available water capacity is low. Organic matter content is moderately low. Shrink-swell potential and potential frost action are low.

In most areas this soil is used for cultivated crops. It is moderately suited to pasture and hay and to use as a site for dwellings. It is poorly suited to use as a site for septic tank absorption fields. It generally is not suited to cultivated crops because of slope and low available water capacity.

Establishing pasture or hay on this soil helps to control erosion and soil blowing. Seeding deep-rooting, drought-tolerant legumes and grasses, such as alfalfa, tall fescue, or bromegrass, helps to overcome low available water capacity. Timely deferment of grazing helps to prevent overgrazing and thus also helps to prevent surface compaction and excessive runoff and erosion. Tilling on the contour in preparing a seedbed or in renovating the pasture 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, erosion and soil blowing are hazards and slope is a limitation. Using a surface mulch helps to control erosion and soil blowing. Land shaping by cutting and filling helps to overcome the slope.

This soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity generally results in ground water pollution. The septic system functions satisfactorily if the site is leveled and if a sealed sand filter and a disinfection tank are installed.

The land capability classification is VIs.

107—Sawmill silty clay loam. This is a nearly level, poorly drained soil in low areas on flood plains and in broad drainageways on till plains and outwash plains. It is subject to frequent flooding for brief periods in winter and spring. Individual areas are irregular in shape and range from 5 to more than 500 acres in size.

Typically, the surface layer is black, friable silty clay loam about 9 inches thick. The subsurface layer is black and very dark gray, mottled, firm silty clay loam about 12 inches thick. The subsoil is mottled and firm and extends to below a depth of 60 inches. In the upper part it is black silty clay loam, in the next part it is dark gray and gray silty clay loam, and in the lower part it is dark gray and gray clay loam. In some areas the surface layer is thinner. In a few areas the lower part of the subsoil contains less sand. In places the subsoil contains more clay.

Included with this soil in mapping are small areas of somewhat poorly drained Lawson and Tice soils on slight rises above Sawmill soils. They make up 5 to 15 percent of the unit.

Water and air move through the Sawmill soil at a moderate rate. In cultivated areas surface runoff is slow. The seasonal high water table is within 2 feet of the surface in spring. Available water capacity is very high. Organic matter content is high. The surface layer is compact and cloddy if it has been plowed when too wet. Shrink-swell potential is moderate, and potential frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated corn and soybeans. It is moderately well suited to pasture and hay. It generally is not suited to use as a site for dwellings and septic tank absorption fields because of flooding.

If this soil is used for corn or soybeans, flooding is a hazard and the seasonal high water table is a limitation. Flooding occurs less often than once every 2 years during the growing season. The soil is sufficiently drained for corn and soybeans. 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 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 intake.

If this soil is used for pasture, overgrazing causes surface compaction and poor tilth. Pasture plants that are water tolerant, such as reed canarygrass, alsike clover, and ladino clover, are suitable for planting. Proper stocking rates, rotation grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition. In some years flooding delays harvesting of hay.

The land capability classification is IIIw.

119C2—Elco silt loam, 4 to 12 percent slopes, eroded. This is a sloping, moderately well drained soil on short, uneven side slopes on till plains in the western part of the county. Individual areas are irregular or linear in shape and range from 3 to 40 acres in size.

Typically, the surface layer is dark yellowish brown, friable silt loam. Erosion has thinned the surface layer to a thickness of about 5 inches. The subsoil is silty clay loam and extends to below a depth of 60 inches. In the upper part it is friable and dark yellowish brown and yellowish brown; and in the lower part it is friable, yellowish brown, and mottled. In some areas the subsoil contains more sand throughout or more sand in the lower part. Other areas are more eroded and commonly have a surface layer of silty clay loam.

Included with this soil in mapping are small areas of somewhat poorly drained Lawson soils on bottom land below the Elco soil. They make up 1 to 5 percent of the unit.

Water and air move through the upper part of the Elco profile at a moderate rate and through the lower part at a moderately slow rate. In cultivated areas surface runoff is medium. The seasonal high water table is 2.5 to 4.5 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential is moderate, and potential frost action is high.

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

If this soil is used for corn, soybeans, or small grain, further erosion is a hazard. A crop rotation that includes 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface after planting, and contour farming help to control erosion. Terraces help to control erosion but are difficult to install because of short, uneven side slopes. Returning crop residue to the soil and regularly adding other organic material help to maintain productivity and tilth.

Adapted pasture and hay plants, such as alfalfa, bromegrass, orchardgrass, and tall fescue, grow well on this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Proper stocking rates, 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 with basements, the seasonal high water table, the shrink-swell potential, and slope are limitations. The shrink-swell potential also is a limitation for dwellings without basements. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil, or properly designing and reinforcing the foundations help to prevent the structural damage caused by shrinking and swelling. Land shaping by cutting and filling helps to overcome the slope.

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

The land capability classification is IIIe.

132—Starks silt loam. This is a nearly level, somewhat poorly drained soil on low, broad ridges on uplands and on terraces adjacent to bottom land. Individual areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 5 inches thick. The subsurface layer is grayish brown, mottled, friable silt loam about 6 inches thick. The subsoil is mottled and extends to below a depth of 60 inches. In the upper part it is yellowish brown, firm silty clay loam; in the next part it is yellowish brown, firm clay loam; and in the lower part it is dark grayish brown and dark gray, friable sandy loam. In some areas the subsoil contains more clay. In a few areas the surface layer is darker and thicker. In places the subsoil is silty clay loam and is thicker.

Included with this soil in mapping are small areas of Camden and Drummer soils. Camden soils are well drained and on crests of ridges and on terraces above the Starks soil. Drummer soils are poorly drained and in drainageways and nearly level to slightly depressional areas below the Starks soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the Starks soil at a moderate rate. In cultivated areas surface runoff is slow. The seasonal high water table is 1 to 3 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential is moderate, and potential 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.

In the areas used for corn, soybeans, or small grain, in some years the seasonal high water table delays planting. It can be reduced, however, by surface ditches. Tilling when the soil is wet causes surface cloddiness and compaction and excessive runoff and erosion. Returning crop residue to the soil and regularly adding other organic material help to maintain tilth and fertility.

Adapted forage and hay plants, such as alfalfa, alsike clover, bromegrass, and tall fescue, grow well on this soil. Overgrazing or grazing when the soil is too wet reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Proper stocking rates, 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 the shrink-swell potential are limitations. Installing either tile drains near the foundations or interceptor drains higher on the side slopes than the building helps to lower the water table. Extending the footings below the subsoil or properly designing and reinforcing the foundations help 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 moderate permeability are limitations. Subsurface tile drains lower the water table. Grading and land shaping help to remove excess surface water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is IIw.

134B—Camden silt loam, 1 to 5 percent slopes. This is a gently sloping, well drained soil on convex ridgetops on outwash plains and stream terraces. Individual areas are oblong or irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 5 inches thick. The subsurface layer is brown and pale brown, mottled, friable silt loam about 3 inches thick. The subsoil is about 41 inches thick. In the upper part it is dark yellowish brown, friable and firm silty clay loam, and in the lower part it is dark yellowish brown and pale brown, friable, stratified loam, sandy loam, clay loam, sandy clay loam, and loamy sand. The underlying material to a depth of 60 inches or more is dark yellowish brown and pale brown, mottled, friable, stratified loam, sandy loam, and loamy sand. In some areas the lower part of the subsoil and the underlying material are not stratified and contain less sand. In other areas the upper part of the subsoil contains less silt and more sand. A few areas are more sloping and eroded. Some areas are moderately well drained and have a seasonal high water table within a depth of 6 feet.

Included with this soil in mapping are small areas of the somewhat poorly drained Starks and Lawson soils. Starks soils are in nearly level areas and drainageways below the Camden soil. Lawson soils are on flood plains below the Camden soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the upper part of the Camden profile at a moderate rate and through the lower part at a moderately rapid rate. In cultivated areas surface runoff is medium. Available water capacity is high. Organic matter content is moderately low. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential is moderate, and potential 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 a site for dwellings with basements and septic tank absorption fields. It is moderately suited to use as a site for dwellings without basements.

In areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil and adding other organic material improve tilth.

Adapted pasture and hay plants, such as alfalfa, bromegrass, orchardgrass, and tall fescue, grow well on this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Proper stocking rates, 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 without basements, the shrink-swell potential is a limitation. Properly designing and reinforcing the foundation, or extending the foundation below the subsoil helps to overcome this limitation.

The land capability classification is IIe.

136—Brooklyn silt loam. This is a level, poorly drained soil on flat, nearly depressional areas on till plains and outwash plains. It is occasionally ponded for brief periods in winter and spring. Individual areas are round or oblong in shape and range from 3 to 25 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is grayish brown, mottled, friable silt loam about 7 inches thick. The subsoil is grayish brown, mottled, and about 41 inches thick. In the upper part it is firm silty clay, in the next part it is firm silty clay loam, and in the lower part it is friable silt loam. The underlying material to a depth of 60 inches or more is grayish brown, mottled, friable, stratified clay loam, loam, and sandy loam. In a few areas the subsoil contains less clay. In some areas the dark colored surface soil is thicker. Some areas have a dark surface layer but do not have a grayish brown subsurface layer. In places the lower part of the subsoil is loam or clay loam glacial till.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn and Flanagan soils on low, broad ridges above the Brooklyn soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the upper part of the Brooklyn profile at a slow rate and through the lower part at a moderately slow rate. In cultivated areas surface runoff is slow to ponded. The seasonal high water table ranges from 0.5 foot above the surface to 2 feet below in spring. Available water capacity is high. Organic matter content is moderate. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential and potential frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and moderately well suited to pasture and hay. It generally is not suited to use as a site for dwellings and septic tank absorption fields because of ponding.

This soil is sufficiently drained for corn, soybeans, and small grain. Measures that maintain the drainage system are needed. Surface drains and surface inlet tile drains function satisfactorily if suitable outlets are available. Land grading helps to control ponding. A conservation tillage system that leaves crop residue on the surface after planting and returning crop residue to the soil help to improve tilth, to prevent surface compaction and crusting, and to increase the rate of water intake.

The land capability classification is IIw.

138—Shiloh silty clay loam. This is a nearly level, very poorly drained soil in shallow depressions and in broad, flat areas on outwash plains and till plains. It is frequently ponded for brief periods in winter and spring. Individual areas are oval or irregular in shape and range from 3 to 100 acres in size.

Typically, the surface soil is black, friable silty clay loam about 12 inches thick. The subsoil is friable silty clay loam about 32 inches thick. In the upper part it is very dark gray, in the next part it is very dark gray and mottled, and in the lower part it is gray and mottled. The underlying material to a depth of 60 inches or more is light gray, mottled, friable silty clay loam. In places the upper part of the subsoil is lighter in color. In some areas the subsoil contains less clay. In a few areas the underlying material is stratified with sandier textures.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn and Ipava soils on low, broad ridges above the Shiloh soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the Shiloh soil at a moderately slow rate. In cultivated areas surface runoff is slow to ponded. The seasonal high water table ranges from 1 foot above the surface to 2 feet below in spring. Available water capacity is high. Organic matter content also is high. The surface layer is compact and cloddy if it has been plowed when too wet. Shrink-swell potential and potential frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops. It is moderately well suited to pasture and hay. It generally is not suited to use as a site for dwellings and septic tank absorption fields because of ponding.

This soil is sufficiently drained for corn, soybeans, and small grain. Measures that maintain the drainage system are needed. Surface drains, subsurface tile drains, and surface inlet tile drains function satisfactorily if suitable outlets are available. Land grading helps to control ponding. Applying a conservation tillage system that leaves crop residue on the surface after planting and returning crop residue to the soil help to improve tilth and increase the rate of water intake.

The land capability classification is IIw.

148B—Proctor silt loam, 1 to 5 percent slopes. This is a gently sloping, well drained soil on convex ridgetops and broad, even side slopes on outwash plains and high stream terraces. Individual areas are oblong or irregular in shape and range from 3 to 20 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is dark brown, friable silt loam about 2 inches thick. The subsoil is friable and extends to below a depth of 60 inches. In the upper part it is dark brown and dark yellowish brown silty clay loam; in the next part it is dark brown clay loam; and in the lower part it is dark yellowish brown and dark brown stratified clay loam, loam, and sandy loam. In places the surface layer is thinner and lighter in color. A few areas are eroded. In some areas part of the underlying material is calcareous loam or silty clay loam till. In other areas the surface layer, the subsurface layer, and the upper part of the subsoil contain more sand.

Included with this soil in mapping are small areas of Elburn and Drummer soils. Elburn soils are somewhat poorly drained, and Drummer soils are poorly drained. Both are in shallow depressions and drainageways below the Proctor soil. Also included are small areas of somewhat excessively drained and excessively drained, droughty soils in positions similar to those of the Proctor soil. Included soils make up 3 to 12 percent of the unit.

Water and air move through the upper part of the Proctor profile at a moderate rate and through the lower part at a moderately rapid rate. In cultivated areas surface runoff is medium. Available water capacity is high. Organic matter content is moderate. Shrink-swell potential is moderate, and potential 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 a site for septic tank absorption fields. It is moderately suited to use as a site for dwellings.

In areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil and adding other organic material improve tilth.

If this soil is used as a site for dwellings without basements, the shrink-swell potential is a limitation. Properly designing and reinforcing the foundation, or extending the footings below the subsoil helps to overcome this limitation.

The land capability classification is IIe.

148C2—Proctor silt loam, 5 to 10 percent slopes, eroded. This is a moderately sloping, well drained soil on convex side slopes on loess-covered outwash plains. Individual areas are irregular or oblong in shape and range from 3 to 20 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam. Erosion has thinned the surface layer to a thickness of about 6 inches. The subsoil is friable and about 49 inches thick. In the upper part it is dark yellowish brown silty clay loam, and in the lower part it is dark brown and dark yellowish brown silty clay loam and sandy loam. The underlying material to a depth of 60 inches or more is yellowish brown stratified sandy loam, loamy sand, and silt loam. Some areas are less sloping. In a few areas the surface layer is thicker. In places the surface layer and the upper part of the subsoil contain more sand.

Included in this soil in mapping are small areas of Drummer and Elburn soils. Drummer soils are poorly drained and in narrow, nearly level drainageways below the Proctor soil. Elburn soils are somewhat poorly drained and in gently sloping drainageways or in nearly level areas above or below the Proctor soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the upper part of the Proctor profile at a moderate rate and through the lower part at a moderately rapid rate. In cultivated areas surface runoff is medium. Available water capacity is high. Organic matter content is moderate. Shrink-swell potential is moderate, and potential 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 a site for septic tank absorption fields. It is moderately suited to use as a site for dwellings.

If this soil is used for corn, soybeans, or small grain, further erosion is a hazard. A crop rotation that includes 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface after planting, contour farming, or terraces help to control erosion. Returning crop residue to the soil and regularly adding other organic material help to maintain productivity and tilth.

Adapted pasture and hay plants, such as alfalfa, bromegrass, orchardgrass, and tall fescue, grow well on this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Proper stocking rates, 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 without basements, the shrink-swell potential is a limitation. Properly designing and reinforcing the foundation, or extending the foundation below the subsoil helps to overcome this limitation.

The land capability classification is IIIe.

152—Drummer silty clay loam. This is a nearly level, poorly drained soil on broad, flat areas and in drainageways on outwash plains and till plains. It is occasionally ponded for brief periods in winter and early in spring. Individual areas are irregular in shape and range from 5 to more than 2,000 acres in size.

Typically, the surface layer is black, friable silty clay loam about 7 inches thick. The subsurface layer is very dark gray, friable silty clay loam about 11 inches thick. It is mottled in the lower part. The subsoil is mottled and extends to a depth of about 56 inches. It is dark grayish brown, firm silty clay loam to a depth of 24 inches and grayish brown, firm silty clay loam to a depth of 30 inches. Below that, it is grayish brown and yellowish brown, friable silty clay loam to a depth of 45 inches and gray, friable, stratified silt loam, loam, and clay loam to a depth of 56 inches. The underlying material to a depth of 65 inches or more is gray, mottled, friable, stratified clay loam, loam, and sandy loam. In a few places the upper part of the subsoil is darker and contains more clay. In some areas the underlying material is loam or clay loam glacial till. In a few areas carbonates are within a depth of 35 inches. Also, in some places the lower part of the subsoil and the underlying material contain less sand.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn and Flanagan soils and the moderately well drained Catlin and Dana soils. These soils are on ridges and side slopes above the Drummer soil. Also included are very poorly drained soils in small, round depressions that are ponded for longer periods and where in most years some crops are damaged (fig. 6). Included soils make up 2 to 10 percent of the unit.

Water and air move through the Drummer soil at a moderate rate. In cultivated areas surface runoff is slow to ponded. The seasonal high water table ranges from 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 surface layer is compact and cloddy if it has been plowed when too wet. Shrink-swell potential is moderate, and potential frost action is high.

Figure 6.—In most years crops are damaged in this depression in an area of Drummer silty clay loam. A small round depression like this one is identified on soil maps by a spot symbol.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops and moderately suited to pasture and hay. It generally is not suited to use as a site for dwellings and septic tank absorption fields because of ponding.

This soil is sufficiently drained for corn, soybeans, and small grain. Measures that maintain the drainage system are needed. Surface drains, subsurface tile drains, and surface inlet tile drains function satisfactorily if suitable outlets are available. Land grading helps to control ponding. Applying a conservation tillage system that leaves crop residue on the surface after planting and returning crop residue to the soil help to maintain tilth and productivity.

The land capability classification is IIw.

153—Pella silty clay loam. This is a nearly level, poorly drained soil in shallow depressions and broad, flat areas on till plains in the southeastern part of the county. It is subject to occasional ponding for brief periods in winter and spring. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface soil is very dark gray, friable silty clay loam about 11 inches thick. The subsoil is mottled, friable, and about 39 inches thick. In the upper part it is dark grayish brown and grayish brown silty clay loam. In the next part it is olive gray and gray, calcareous silty clay loam. In the lower part it is gray, calcareous silt loam with a noticeable increase in sand content. The underlying material to a depth of 60 inches or more is gray, firm, calcareous loam. In some places carbonates are at shallower depths. In other places carbonates are at greater depths. A few areas contain more clay in the subsoil.

Included with this soil in mapping are small areas of somewhat poorly drained Flanagan soils on low ridges above the Pella soil. They make up 5 to 10 percent of the unit.

Water and air move through the Pella soil at a moderate rate. In cultivated areas surface runoff is slow to ponded. The seasonal high water table ranges from 0.5 foot above the surface to 2 feet below in the spring. Available water capacity is very high. Organic matter content is high. The surface layer is compact and cloddy if it has been plowed when too wet. Shrink-swell potential is moderate, and potential frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops. It is moderately well suited to pasture and hay. It generally is not suited to use as a site for dwellings and septic tank absorption fields because of ponding.

This soil is sufficiently drained for corn, soybeans, and small grain. Measures that maintain the drainage system are needed. Surface drains, subsurface tile drains, and surface inlet tile drains function satisfactorily if suitable outlets are available. Land grading helps to control ponding. Applying a conservation tillage system that leaves crop residue on the surface after planting and returning crop residue to the soil help to maintain tilth and productivity.

The land capability classification is IIw.

154A—Flanagan silt loam, 0 to 3 percent slopes. This is a nearly level, somewhat poorly drained soil on low, broad ridges on till plains and moraines. Individual areas are irregular in shape and range from 3 to more than 300 acres in size.

Typically, the surface layer is very dark brown, friable silt loam about 9 inches thick. The subsurface layer is very dark grayish brown, friable silt loam about 5 inches thick. The subsoil is mottled, friable, and about 44 inches thick. It is dark grayish brown silty clay loam to a depth of 19 inches and yellowish brown silty clay loam to a depth of 48 inches. Below that, it is yellowish brown, grayish brown, and strong brown silty clay loam to a depth of 52 inches and brown clay loam to a depth of 58 inches. The underlying material to a depth of 70 inches or more is brown, mottled, firm, calcareous loam. In some areas the subsoil is thicker and the depth to calcareous loam is more than 60 inches. In other areas a clay loam subsoil is within a depth of 40 inches. In some places the lower part of the subsoil and the underlying material are in stratified, loamy glacial outwash as much as 20 inches thick. In other places the underlying material is firm, calcareous silt loam.

Included with this soil in mapping are small areas of Catlin, Dana, and Drummer soils. Catlin and Dana soils are moderately well drained and on slight rises above the Flanagan soil. Drummer soils are poorly drained and in low areas and drainageways below the Flanagan soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the upper part of the Flanagan profile at a moderate rate and through the lower part at a moderately slow rate. In cultivated areas surface runoff is slow. The seasonal high water table is 1.5 to 3.5 feet below the surface in spring. Available water capacity is high. Organic matter content also is high. Shrink-swell potential and potential 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.

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

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil, or properly designing and reinforcing the foundations help 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 water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is I.

171B—Catlin silt loam, 1 to 5 percent slopes. This is a gently sloping, moderately well drained soil on convex ridges and on broad, even side slopes on till plains and moraines. Individual areas are oblong or irregular in shape and range from 3 to 160 acres in size.

Typically, the surface layer is very dark brown, friable silt loam about 9 inches thick. The subsurface layer is very dark grayish brown, friable silt loam about 5 inches thick. The subsoil extends to below a depth of 60 inches. In the upper part it is dark brown, friable silt loam; in the next part it is dark yellowish brown and yellowish brown, mottled, friable silty clay loam; and in the lower part it is dark brown, mottled, firm clay loam. In some areas the lower part of the subsoil and the upper part of the underlying material are stratified, loamy outwash as much as 20 inches thick. In a few places the subsoil is thinner and glacial till is closer to the surface. A few more sloping areas are moderately eroded. Some areas are well drained. Also, in places the underlying material contains less sand.

Included with this soil in mapping are small areas of somewhat poorly drained Flanagan soils in drainageways or in nearly level areas below the Catlin soil. They make up 2 to 10 percent of the unit.

Water and air move through the Catlin soil at a moderate rate. In cultivated areas surface runoff is medium. The seasonal high water table is 3.5 to 6 feet below the surface in late winter to spring. Available water capacity is high. Organic matter content is moderate. Shrink-swell potential is moderate, and potential 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.

In areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil and adding other organic material improve tilth.

If this soil is used as a site for dwellings with basements, the seasonal high water table and the shrink-swell potential are limitations. The shrink-swell potential also is a limitation for dwellings without basements. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil, or properly designing and 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 seasonal high water table and moderate permeability are limitations. Subsurface tile drains lower the water table. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is IIe.

198A—Elburn silt loam, 0 to 3 percent slopes. This is a nearly level, somewhat poorly drained soil on low, broad ridges on outwash plains. Individual areas are irregular in shape and range from 3 to 200 acres in size.

Typically, the surface layer is very dark brown, friable silt loam about 9 inches thick. The subsurface layer is very dark grayish brown, friable silt loam about 4 inches thick. The subsoil is mottled and about 41 inches thick. In the upper part it is dark yellowish brown and brown, friable silty clay loam; in the next part it is grayish brown, firm silty clay loam; and in the lower part it is strong brown, friable sandy loam. The underlying material to a depth of 60 inches or more is strong brown, mottled, friable sandy loam. In some areas the underlying material contains less sand. In a few areas the subsoil contains more clay. In a few moderately eroded areas the surface layer is thinner.

Included with this soil in mapping are small areas of Sable, Drummer, and Plano soils. Sable and Drummer soils are poorly drained and in broad, flat areas below the Elburn soil. Plano soils are moderately well drained and on convex ridgetops above the Elburn soil or on side slopes below the Elburn soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the Elburn soil at a moderate rate. In cultivated areas surface runoff is slow. The seasonal high water table is 1 to 3 feet below the surface in spring. Available water capacity is high. Organic matter content also is high. Shrinking and swelling is moderate, and potential 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.

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

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

The seasonal high water table is a limitation if this soil is used as a site for septic tank absorption fields. Subsurface tile drains lower the water table.

The land capability classification is I.

199A—Plano silt loam, 0 to 2 percent slopes. This is a nearly level, moderately well drained soil on broad ridges on outwash plains. Individual areas are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface soil is very dark grayish brown and dark brown, friable silt loam about 20 inches thick. The subsoil is friable and extends to below a depth of 60 inches. In the upper part it is dark brown and dark yellowish brown silty clay loam; in the next part it is dark yellowish brown, mottled silty clay loam; and in the lower part it is dark yellowish brown, stratified clay loam, loam, and gravelly sandy loam. In places the upper part of the subsoil contains more sand. A few areas are well drained. In some areas the lower part of the subsoil contains less sand.

Included with this soil in mapping are small areas of poorly drained Drummer soils in shallow depressions and drainageways below the Plano soil. They make up less than 5 percent of the unit.

Water and air move through the Plano soil at a moderate rate. In cultivated areas surface runoff is slow. The seasonal high water table is 3 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content also is high. Shrink-swell potential is moderate, and potential 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.

No major limitations affect the use of this soil for corn, soybeans, or small grain. Returning crop residue to the soil helps to maintain soil tilth and productivity.

If this soil is used as a site for dwellings with basements, the seasonal high water table and the shrink-swell potential are limitations. The shrink-swell potential also is a limitation for dwellings without basements. 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.

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

The land capability classification is I.

199B—Plano silt loam, 2 to 5 percent slopes. This is a gently sloping, moderately well drained soil on convex ridges and short, even side slopes on outwash plains. Individual areas are oblong or irregular in shape and range from 3 to 60 acres in size.

Typically, the surface soil is friable silt loam about 17 inches thick. In the upper part it is very dark grayish brown, and in the lower part it is dark brown. The subsoil is friable and extends to below a depth of 60 inches. In the upper part it is brown silty clay loam; in the next part it is yellowish brown and brown, mottled silty clay loam; and in the lower part it is brown, mottled stratified sandy loam and sandy clay loam. In places the surface soil is thinner and light colored. In some areas the upper part of the subsoil contains more sand. A few areas are well drained.

Included with this soil in mapping are small areas of the poorly drained Drummer soils and the somewhat poorly drained Elburn soils. These soils are on nearly level toe slopes and in drainageways below the Plano soil. They make up 2 to 10 percent of the unit.

Water and air move through the Plano soil at a moderate rate. In cultivated areas surface runoff is medium. The seasonal high water table is 3 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is high. Shrink-swell potential is moderate, and potential 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.

In areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil and adding other organic material improve tilth.

If this soil is used as a site for dwellings with basements, the seasonal high water table and the shrink-swell potential are limitations. The shrink-swell potential also is a limitation for dwellings without basements. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil, or properly designing and reinforcing the foundations help 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 is a limitation. Subsurface tile drains lower the water table.

The land capability classification is IIe.

199C2—Plano silt loam, 5 to 10 percent slopes, eroded. This is a moderately sloping, moderately well drained soil on convex ridgetops and side slopes on outwash plains. Individual areas are irregular or oblong in shape and range from 3 to 40 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam. Erosion has thinned the surface layer to a thickness of about 9 inches. The subsoil is friable and about 39 inches thick. In the upper part it is dark yellowish brown silty clay loam; in the next part it is dark yellowish brown, mottled silt loam; and in the lower part it is yellowish brown sandy loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, friable silt loam. Some areas are less sloping. A few areas have more sand in the underlying material. Some areas are well drained.

Included with this soil in mapping are small areas of Drummer and Elburn soils. Drummer soils are poorly drained and in narrow, nearly level drainageways below the Plano soil. Elburn soils are somewhat poorly drained and in shallow, gently sloping drainageways or in nearly level areas below the Plano soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the Plano soil at a moderate rate. In cultivated areas surface runoff is medium. The seasonal high water table is 3 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is moderate. Shrink-swell potential is moderate, and potential frost action is high.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops. It is well suited to 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.

In areas used for corn, soybeans, or small grain, further erosion is a hazard and tilth is a limitation. A conservation tillage system that leaves crop residue on the surface after planting, contour farming, or terraces help to control erosion. Incorporating crop residue into the soil or adding organic material helps to prevent crusting and improve tilth. A crop rotation that includes a deep-rooted legume improves soil tilth and helps to prevent surface compaction.

Adapted pasture and hay plants, such as alfalfa, bromegrass, orchardgrass, and tall fescue, grow well on this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Proper stocking rates, 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 with basements, the seasonal high water table and the shrink-swell potential are limitations. The shrink-swell potential also is a limitation for dwellings without basements. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil, or properly designing and reinforcing the foundations help to prevent the structural damage caused by shrinking and swelling.

The seasonal high water table is a limitation if this soil is used as a site for septic tank absorption fields. Subsurface tile drains lower the water table.

The land capability classification is IIIe.

206—Thorp silt loam. This is a nearly level, poorly drained soil in broad, flat areas on till plains and outwash plains. It is occasionally ponded for brief periods in winter and spring. Individual areas are rounded or oblong in shape and range from 2 to 80 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 10 inches thick. The subsurface layer is grayish brown, mottled, friable silt loam about 5 inches thick. The subsoil is mottled and about 47 inches thick. In the upper part it is brown, friable silt loam; in the next part it is grayish brown to gray, friable and firm silty clay loam; and in the lower part it is gray and strong brown, friable silt loam. The underlying material to a depth of 66 inches or more is strong brown, mottled, friable sandy loam. In some areas the subsoil contains more clay. In a few places the surface layer contains more clay and the subsurface layer is darker.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn, Flanagan, and Ipava soils on slight rises above the Thorp soil. They make up 2 to 10 percent of the unit.

Water and air move through the Thorp soil at a slow rate. In cultivated areas surface runoff is slow to ponded. The seasonal high water table ranges from 0.5 foot above the surface to 2 feet below in winter and spring. Available water capacity is high. Organic matter content is high. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential is moderate, and potential frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops. It is moderately suited to pasture and hay. It generally is not suited to use as a site for dwellings and septic tank absorption fields because of ponding.

This soil is sufficiently drained for corn, soybeans, and small grain. Measures that maintain the drainage system are needed. Surface drains, subsurface tile drains, and surface inlet tile drains function satisfactorily if suitable outlets are available. Land grading helps to control ponding. Applying a conservation tillage system that leaves crop residue on the surface after planting and returning crop residue to the soil help to improve tilth, to prevent surface compaction and crusting, and to increase the rate of water intake.

The land capability classification is IIw.

221B2—Parr silt loam, 2 to 5 percent slopes, eroded. This is a gently sloping, well drained soil on ridges and side slopes on till plains and moraines. Individual areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam. Erosion has thinned the surface layer to a thickness of about 8 inches. The subsoil is friable and about 31 inches thick. In the upper part it is dark yellowish brown clay loam, and in the lower part it is yellowish brown, mottled, calcareous loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm, calcareous loam. In places the surface layer is lighter in color. In some areas the upper part of the subsoil contains less sand. In other areas the underlying material is stratified loam and loamy sand.

Included with this soil in mapping are small areas of poorly drained Drummer soils and somewhat poorly drained Raub soils. These soils are in drainageways or on toe slopes below the Parr soil. They make up 2 to 8 percent of the unit.

Water and air move through the upper part of the Parr profile at a moderate rate and through the lower part at a moderately slow rate. In cultivated areas surface runoff is medium. Available water capacity is moderate. Organic matter content also is moderate. Shrink-swell potential and potential frost action are moderate.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops, pasture, and hay. It is also well suited to use as a site for dwellings with basements. It is moderately suited to use as a site for dwellings without basements. It is poorly suited to use as a site for septic tank absorption fields.

In areas used for corn, soybeans, or small grain, further erosion is a hazard and tilth is a limitation. A conservation tillage system that leaves crop residue on the surface after planting, contour farming, or terraces help to control erosion. Incorporating crop residue into the soil or adding organic material helps to prevent crusting and improve tilth. A crop rotation that includes a deep-rooting legume, such as alfalfa or red clover, helps to improve soil tilth and to prevent surface compaction.

If this soil is used as a site for dwellings without basements, the shrink-swell potential is a limitation. Properly designing and reinforcing the foundation, or extending the foundation below the subsoil helps to overcome this limitation.

If this soil is used as a site for septic tank absorption fields, the moderately slow permeability is a limitation. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is IIe.

221C2—Parr loam, 5 to 10 percent slopes, eroded. This is a moderately sloping, well drained soil on uneven side slopes on till plains and on smooth side slopes on moraines. Individual areas are irregular in shape and range from 3 to 80 acres in size.

Typically, the surface layer is very dark grayish brown, friable loam about 8 inches thick. The subsoil is about 31 inches thick. In the upper part it is dark yellowish brown, friable clay loam; in the next part it is brown, friable and firm clay loam; and in the lower part it is yellowish brown, mottled, firm, calcareous loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, very firm, calcareous loam. In places the surface layer is thicker and the surface layer and the upper part of the subsoil contain less sand. In some areas the subsoil is thinner and carbonates are nearer the surface. In a few more eroded areas the surface layer is thinner and contains more clay.

Included with this soil in mapping are small areas of poorly drained Drummer soils and somewhat poorly drained Flanagan soils in drainageways and on side slopes below the Parr soil. They make up 2 to 12 percent of the unit.

Water and air move through the upper part of the Parr profile at a moderate rate and through the lower part at a moderately slow rate. In cultivated areas surface runoff is medium. Available water capacity is moderate. Organic matter content also is moderate. Shrink-swell potential and potential frost action are moderate.

In most areas this soil is used for cultivated crops. It is moderately suited to cultivated crops and to use as a site for dwellings without basements. It is well suited to pasture and hay and to use as a site for dwellings with basements. It is poorly suited to septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, further erosion is a hazard. A crop rotation that includes 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface after planting, contour farming, or terraces help to control erosion. Terraces are more easily installed in areas with smooth, even side slopes than in areas with short, uneven side slopes. Returning crop residue to the soil and regularly adding other organic material help to maintain productivity and tilth.

Adapted pasture and hay plants, such as alfalfa, bromegrass, orchardgrass, and tall fescue, grow well on this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Proper stocking rates, 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 without basements, the shrink-swell potential is a limitation. Properly designing and reinforcing the foundation, or extending the foundation below the subsoil helps to overcome this limitation.

If this soil is used as a site for septic tank absorption fields, moderately slow permeability is a limitation. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is IIIe.

233B—Birkbeck silt loam, 1 to 5 percent slopes. This is a gently sloping, moderately well drained soil on convex ridges with broad, even side slopes on till plains. Individual areas are irregular or oblong in shape and range from 3 to 300 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 4 inches thick. The subsurface layer is dark brown, friable silt loam about 5 inches thick. The subsoil is dark yellowish brown, friable, and about 51 inches thick. In the upper part it is silty clay loam, in the next part it is mottled silty clay loam, and in the lower part it is mottled loam. The underlying material to a depth of 67 inches or more is light olive brown, mottled, firm, calcareous loam. In some areas the lower part of the subsoil contains less sand. In other areas the loamy glacial till is within a depth of 40 inches. More sloping areas commonly are eroded and have more clay in the surface layer. Some areas on narrow ridgetops are well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Sabina soils and well drained, eroded Miami soils. Sabina soils are in drainageways and in nearly level areas below the Birkbeck soil. Miami soils are on steeper side slopes below the Birkbeck soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the upper part of the Birkbeck profile at a moderate rate and through the lower part at a moderately slow rate. In cultivated areas surface runoff is medium. The seasonal high water table is 3 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential is moderate, and potential frost action is high.

In most areas this soil is used for cultivated crops or for woodland. This soil 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.

In areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil and adding other organic material improve tilth.

If this soil is used as woodland, plant competition for new, desirable seedlings is a management concern. In openings created by timber harvesting it can be reduced by using herbicides or by cultivating with conventional equipment. Controlling livestock prevents reduction or destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots. Fire protection prevents injury to trees and maintains the leaf mulch.

If this soil is used as a site for dwellings with basements, the seasonal high water table and the shrink-swell potential are limitations. The shrink-swell potential also is a limitation for dwellings without basements. Installing subsurface tile drains near the foundations helps to overcome the water table. Extending the footings below the subsoil or 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 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 water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is IIe.

234—Sunbury silt loam. This is a nearly level, somewhat poorly drained soil on low, broad ridges on till plains. Individual areas are irregular in shape and range from 3 to 60 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is brown, friable silt loam about 4 inches thick. The subsoil is mottled and about 42 inches thick. In the upper part it is yellowish brown, friable or firm silty clay loam; in the next part it is light olive brown, friable or firm silty clay loam; and in the lower part it is light olive brown, friable loam. The underlying material to a depth of 72 inches or more is grayish brown, mottled, friable, calcareous sandy loam and light olive brown, firm, calcareous loam. In some areas the subsoil contains less clay. In other areas the surface layer is lighter in color, thinner, or both. In a few places the dark colored surface layer is thicker.

Included with this soil in mapping are small areas of Drummer and Birkbeck soils. Drummer soils are poorly drained and in drainageways or nearly level to slightly depressional areas below the Sunbury soil. Birkbeck soils are moderately well drained and on slight rises above the Sunbury soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the upper part of the Sunbury profile at a moderate rate and through the lower part at a moderately slow rate. In cultivated areas surface runoff is slow. The seasonal high water table is 1.5 to 3.5 feet below the surface in spring. Available water capacity is high. Organic matter content is moderate. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential and potential 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 tanks 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 can delay planting. Subsurface tile drains function satisfactorily if suitable outlets are available. Measures that maintain the drainage system are needed. A conservation tillage system that leaves crop residue on the surface after planting helps to maintain productivity and tilth.

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil, or properly designing and reinforcing the foundations help 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 moderate permeability are limitations. Subsurface tile drains lower the water table. Grading and land shaping help to remove excess surface water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is I.

236A—Sabina silt loam, 0 to 3 percent slopes. This is a nearly level, somewhat poorly drained soil on low, broad ridges on till plains. Individual areas are irregular in shape and range from 3 to 200 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is brown, mottled, friable silt loam about 2 inches thick. The subsoil is friable and about 47 inches thick. In the upper part it is dark brown and yellowish brown, mottled silty clay loam, and in the lower part it is yellowish brown, mottled loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm, calcareous loam. In some areas the underlying material contains less sand. In other areas the subsoil contains more sand or less clay.

Included with this soil in mapping are small areas of Birkbeck, Xenia, and Drummer soils. Birkbeck and Xenia soils are moderately well drained and in more sloping areas above or below the Sabina soil. Drummer soils are poorly drained and in drainageways or in nearly level to slightly depressional areas below the Sabina soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the Sabina soil at a moderately slow rate. In cultivated areas surface runoff is slow. The seasonal high water table is 1.5 to 3.5 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential and potential 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.

This soil is sufficiently drained for corn, soybeans, and small grain. Measures that maintain the drainage system are needed. Surface drains and subsurface tile drains function satisfactorily if suitable outlets are available. A conservation tillage system that leaves crop residue on the surface after planting and returning crop residue to the soil help to improve tilth, to prevent surface compaction and crusting, and to increase the rate of water intake.

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil, or properly designing and reinforcing the foundations help 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 water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is IIw.

244—Hartsburg silty clay loam. This is a nearly level, poorly drained soil in shallow depressions and in broad, flat areas on loess-covered outwash plains and till plains in the western and northern parts of the county. It is occasionally ponded for brief periods in winter and spring. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface soil is black, friable silty clay loam about 12 inches thick. It is mottled in the lower part. The subsoil is mottled, friable, silty clay loam about 24 inches thick. In the upper part it is very dark gray and dark grayish brown, in the next part it is dark grayish brown and calcareous, and in the lower part it is gray and calcareous. The underlying material to a depth of 60 inches or more is gray, mottled, friable, calcareous silt loam. In some areas the subsoil and the underlying material contain more clay. In a few places the subsoil does not contain carbonates or the surface soil is calcareous.

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

Water and air move through the Hartsburg soil at a moderate rate. In cultivated areas surface runoff is slow to ponded. The seasonal high water table ranges from 0.5 foot above the surface to 2 feet below in spring. Available water capacity is very high. Organic matter content is high. The surface layer is compact and cloddy if it has been plowed when too wet. Shrink-swell potential is moderate, and potential frost action is high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops. It is moderately suited to pasture and hay. It generally is not suited to use as a site for dwellings and septic tank absorption fields because of ponding.

This soil is sufficiently drained for corn, soybeans, and small grain. Measures that maintain the drainage system are needed. Surface drains, subsurface tile drains, and surface inlet tile drains function satisfactorily if suitable outlets are available. Land grading helps to control ponding. A conservation tillage system that leaves crop residue on the surface after planting and returning crop residue to the soil improve tilth, help to prevent surface compaction and crusting, and increase the rate of water intake.

The land capability classification is IIw.

257—Clarksdale silt loam. This is a nearly level, somewhat poorly drained soil on foot slopes, at heads of drainageways, and on low ridges on till plains and outwash plains. Individual areas are irregular in shape and range from 5 to 60 acres in size.

Typically, the surface layer is very dark gray, friable silt loam about 7 inches thick. The subsurface layer is dark gray and grayish brown, mottled, friable silt loam about 10 inches thick. The subsoil is mottled silty clay loam and extends to below a depth of 60 inches. In the upper part it is dark grayish brown and friable; in the next part it is yellowish brown, grayish brown, and light brownish gray and firm; and in the lower part it is yellowish brown and gray and friable. In places the dark colored surface layer is thicker. In some areas the subsoil has less clay. A few areas do not have the grayish subsurface layer. Also, in some areas the lower part of the subsoil formed in loamy outwash.

Included with this soil in mapping are small areas of moderately well drained Rozetta soils on the higher rises and poorly drained Denny soils in shallow depressions and drainageways. Included soils make up 5 to 10 percent of the unit.

Water and air move through the Clarksdale soil at a moderately slow rate. In cultivated areas surface runoff is slow. 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. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential and potential 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.

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

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil, or properly designing and reinforcing the foundations help 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 water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is I.

279B—Rozetta silt loam, 1 to 5 percent slopes. This is a gently sloping, moderately well drained soil on broad upland ridges in the southwest part of the county. Individual areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsoil is friable and extends to below a depth of 60 inches. In the upper part it is dark yellowish brown silt loam, in the next part it is dark yellowish brown silty clay loam, and in the lower part it is yellowish brown mottled silt loam. In some areas the surface layer is darker. In a few places the lower part of the profile contains more sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Ipava soils and the poorly drained Sable soils. Sable soils are in shallow depressions and drainageways below Rozetta soils. Ipava soils are nearly level and lower on the landscape than Rozetta soils. Included soils make up 2 to 7 percent of the unit.

Water and air move through the Rozetta soil at a moderate rate. In cultivated areas surface runoff is medium. 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. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential is moderate, and potential 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.

In areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil and adding other organic material improve tilth.

If this soil is used as a site for dwellings with basements, the seasonal high water table and the shrink-swell potential are limitations. The shrink-swell potential also is a limitation for dwellings without basements. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil, or properly designing and 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 seasonal high water table and moderate permeability are limitations. Subsurface tile drains lower the water table. Grading and land shaping help to remove excess surface water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is IIe.

284—Tice silty clay loam. This is a nearly level, somewhat poorly drained soil on low, broad ridges on the flood plain of the Sangamon River. It is subject to frequent flooding for brief periods in winter and spring. Individual areas are irregular in shape and range from 5 to 300 acres in size.

Typically, the surface layer is very dark gray, friable, silty clay loam about 6 inches thick. The subsurface layer also is very dark gray, friable silty clay loam about 15 inches thick. The subsoil is mottled, firm silty clay loam and extends to below a depth of 60 inches. In the upper part it is dark grayish brown, and in the lower part it is grayish brown. In some areas, the surface soil is thicker. In a few areas, the lower part of the subsoil contains more sand.

Included with this soil in mapping are small areas of Allison and Sawmill soils. Allison soils are moderately well drained and on narrow natural levees above the Tice soil. Sawmill soils are poorly drained and in areas below the Tice soil. Included soils make up 10 to 15 percent of the unit.

Water and air move through the Tice soil at a moderate rate. In cultivated areas surface runoff is slow. The seasonal high water table is 1.5 to 3 feet below the surface in spring. Available water capacity is very high. Organic matter content is moderate. Shrink-swell potential is moderate, and potential 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 flooding, it generally is not suited to use as a site for dwellings and septic tank absorption fields.

If this soil is used for corn, soybeans, or small grain, flooding is a hazard. Also, in some years the seasonal high water table can delay planting. During the growing season flooding is less frequent than once every year. Dikes or diversions reduce the extent of the crop damage caused by floodwater. Selecting varieties adapted to shorter growing seasons and wetter conditions also reduces the extent of this damage. Subsurface tile drains function satisfactorily if suitable outlets are available. Minimizing tillage and returning crop residue to the soil help to maintain tilth and productivity.

If this soil is 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. Ladino clover or alsike clover in a mixture with reed canarygrass or tall fescue is suitable for planting. In some years the flooding delays harvesting of hay.

The land capability classification is IIw.

291B—Xenia silt loam, 1 to 5 percent slopes. This is a gently sloping, moderately well drained soil on convex ridgetops and side slopes on till plains. Individual areas are irregular in shape and range from 3 to 80 acres in size.

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 5 inches thick. The subsoil is about 40 inches thick. In the upper part it is dark yellowish brown and yellowish brown, friable silty clay loam; in the next part it is yellowish brown, mottled, friable silty clay loam; and in the lower part it is yellowish brown, mottled, firm clay loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm, calcareous loam. In some areas the surface layer is darker in color. In other areas the upper part of the subsoil contains more sand. A few areas are well drained or have mottles in the lower part of the subsoil. Some more sloping areas are moderately eroded.

Included with this soil in mapping are small areas of poorly drained Drummer soils and somewhat poorly drained Sabina soils. These soils are in nearly level areas and in drainageways below the Xenia soil. They make up 5 to 10 percent of the unit.

Water and air move through the Xenia soil at a moderately slow rate. In cultivated areas surface runoff is medium. The seasonal high water table is 2 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential is moderate, and potential frost action is high.

In most areas this soil is used for cultivated crops or as woodland. This soil 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 without basements and is poorly suited to use as a site for dwellings with basements and septic tank absorption fields.

In areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil and adding other organic material improve tilth.

Adapted pasture and hay plants, such as alfalfa, bromegrass, orchardgrass, and tall fescue, grow well on this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Proper stocking rates, 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 affects the seedlings of desirable species and is a management concern. In openings where the timber has been harvested it can be controlled by using herbicides or by cultivating with conventional equipment. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots.

If this soil is used as a site for dwellings with basements, the seasonal high water table and the shrink-swell potential are limitations. The shrink-swell potential also is a limitation for dwellings without basements. Installing subsurface tile drains near the foundations helps to overcome the seasonal high water table. Extending the footings below the subsoil or 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 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 water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is IIe.

306—Allison silt loam. This is a nearly level, moderately well drained soil on low ridges, natural levees, and alluvial fans on flood plains. It is subject to occasional flooding for brief periods in winter and spring. Individual areas are irregular in shape and range from 3 to 80 acres in size.

Typically, the surface layer is black and very dark grayish brown, friable silt loam about 9 inches thick. The subsurface layer is dark brown and very dark gray, friable silt loam about 15 inches thick. The subsoil extends to below a depth of 60 inches. It is dark brown, mottled, friable silty clay loam. In some areas the profile contains more sand. Other areas have a thinner, dark colored surface soil. In places the subsoil contains less clay.

Included with this soil in mapping are small areas of somewhat poorly drained Lawson and Tice soils and poorly drained Sawmill soils. These soils are in lower positions on the flood plain than those of the Allison soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the Allison soil at a moderate rate. In cultivated areas surface runoff is slow. The seasonal high water table is 3 to 6 feet below the surface in spring. Available water capacity is very high. Organic matter content is moderate. Shrink-swell potential is moderate, and potential 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 it is subject to flooding, it generally is not suited to use as a site for dwellings and septic tank absorption fields.

No major limitations affect the use of this soil for corn or soybeans. Flooding occasionally delays planting or damages crops. Dikes or diversions help to reduce the extent of the crop damage caused by floodwater. A conservation tillage system that leaves crop residue on the surface after planting helps to maintain productivity and tilth.

The land capability classification is I.

322C2—Russell silt loam, 4 to 10 percent slopes, eroded. This is a moderately sloping, well drained soil on convex ridges and uneven side slopes on till plains. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is dark brown, friable silt loam. Erosion has thinned the surface layer to a thickness of about 7 inches. The subsoil is friable and about 40 inches thick. In the upper part it is dark yellowish brown silty clay loam; in the next part it is dark yellowish brown, mottled clay loam; and in the lower part it is yellowish brown, mottled, calcareous loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm, calcareous loam. Some areas are more sloping, are severely eroded, and have more clay in the surface layer. Other areas are less eroded. The thickness of the subsoil and depth to carbonates are greater in some areas and less in other areas. Many areas are moderately well drained.

Included with this soil in mapping are small areas of Drummer and Sabina soils. Drummer soils are poorly drained and in narrow, nearly level drainageways below the Russell soil. Sabina soils are somewhat poorly drained and in shallow, gently sloping drainageways or in nearly level areas below the Russell soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the upper part of the Russell soil at a moderate rate and through the lower part at a moderately slow rate. In cultivated areas surface runoff is medium. Available water capacity is high. Organic matter content is low. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential is moderate, and potential frost action is high.

In most areas this soil is used for cultivated crops. Some areas are used as woodland. This soil is moderately suited to cultivated crops. It is well suited to 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.

If this soil is used for corn, soybeans, or small grain, further erosion is a hazard. A crop rotation that includes 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface after planting, contour farming, or terraces help to control erosion. Returning crop residue to the soil and regularly adding other organic material help to maintain productivity and tilth.

Adapted pasture and hay plants, such as alfalfa, bromegrass, orchardgrass, and tall fescue, grow well on this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Proper stocking rates, 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 affects the seedlings of desirable species and is a management concern. In openings where timber has been harvested it can be controlled by chemical or mechanical means. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of 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 shrink-swell potential is a limitation. 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, moderately slow permeability is a limitation. Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome this limitation.

The land capability classification is IIIe.

330—Peotone silty clay loam. This is a nearly level, very poorly drained soil in depressions on outwash plains and till plains. It is subject to occasional ponding for brief periods in winter and early in spring. Individual areas are round or oval in shape and range from 2 to 20 acres in size.

Typically, the surface soil is black, firm silty clay loam about 22 inches thick. The subsoil extends to below a depth of 60 inches. It is very dark gray, dark gray, and gray, mottled, firm silty clay loam. In places the surface soil is thinner. In some areas the subsoil contains less clay. In other areas the lower part of the subsoil contains more sand. Also, in places the subsoil has carbonates above a depth of 35 inches.

Included with this soil in mapping are small areas of somewhat poorly drained Flanagan and Ipava soils that are not subject to ponding and that are on slight rises above the Peotone soil. Also included are soils in depressions that are ponded for long periods in the growing season. Included soils make up 2 to 5 percent of the unit.

Water and air move through the Peotone soil at a moderately slow rate. In cultivated areas surface runoff is very slow or ponded. The seasonal high water table is 0.5 foot above the surface to 1 foot below from February through July. Available water capacity is high. Organic matter content also is high. The surface layer is compact and cloddy if it has been plowed when too wet. Shrink-swell potential and potential frost action are high.

In most areas this soil is used for cultivated crops. It is well suited to cultivated crops. It is moderately suited to pasture and hay. It generally is not suited to use as a site for dwellings and septic tank absorption fields because of ponding.

This soil is sufficiently drained for corn, soybeans, and small grain. Measures that maintain the drainage system are needed. Subsurface drains and surface inlet tile drains function satisfactorily if suitable outlets are available. Land grading helps to control ponding. A conservation tillage system that leaves crop residue on the surface after planting and returning crop residue to the soil help to improve tilth, to prevent surface compaction and crusting, and to increase the rate of water intake.

The land capability classification is IIw.

333—Wakeland silt loam. This is a nearly level, somewhat poorly drained soil on bottom land. It is subject to frequent flooding for brief periods in winter and spring. Individual areas are irregular in shape and range from 10 to 25 acres in size.

Typically, the surface soil is very dark gray and dark grayish brown, friable silt loam about 10 inches thick. The underlying material to a depth of 60 inches or more is dark grayish brown and dark gray, mottled, friable silt loam that has thin strata of sandier textures. In some areas the surface soil is darker. In other areas the profile contains more sand. In places a black silty clay loam buried soil is as shallow as a depth of 30 inches. A few areas have more clay throughout.

Included with this soil in mapping are small areas of Sawmill and Allison soils. Allison soils are moderately well drained and on slight rises above the Wakeland soil. Sawmill soils are poorly drained and in narrow sloughs below the Wakeland soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the Wakeland soil at a moderate rate. Surface runoff is slow. 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. In cultivated areas the surface tends to crust and puddle after hard rains. Shrink-swell potential is low, and potential frost action is high.

In most areas this soil is used as woodland. In some areas it is used for cultivated crops. It is well suited to use as woodland, to cultivated crops, and to pasture and hay. It generally is not suited to use as a site for dwellings and septic tank absorption fields because of flooding.

If this soil is used for corn or soybeans, flooding is a hazard. Also, in some years the seasonal high water table can delay planting. During the growing season flooding is less frequent than once every 2 years. Dikes or diversions reduce the extent of the crop damage caused by floodwater. Selecting varieties adapted to shorter growing seasons and wetter conditions also reduces the extent of this damage. Subsurface tile drains function satisfactorily if suitable outlets are available. Minimizing tillage and returning crop residue to the soil help to maintain tilth and productivity.

If this soil is 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. Alsike clover or ladino clover in a mixture with reed canarygrass or tall fescue are suitable for planting. In some years flooding delays harvesting of hay.

If this soil is used as woodland, plant competition affects the seedlings of desirable species and is a management concern. In openings where the timber has been harvested it can be controlled by using herbicides or by cultivating with conventional equipment. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots.

The land capability classification is IIw.

348B—Wingate silt loam, 1 to 5 percent slopes. This is a gently sloping, moderately well drained soil on convex ridgetops and broad, even side slopes on till plains and moraines. Individual areas are oblong or irregular in shape and range from 3 to 25 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 7 inches thick. The subsoil is mottled, friable, and about 42 inches thick. In the upper part it is dark yellowish brown and yellowish brown silty clay loam, and in the lower part it is yellowish brown clay loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm, calcareous loam. In places the surface layer is thinner or lighter in color. A few areas are eroded. In some areas the upper part of the subsoil contains more sand. In other areas the lower part of the subsoil contains more silt and less sand. In a few areas stratified, loamy outwash overlies the loam till.

Included with this soil in mapping are small areas of somewhat poorly drained Flanagan soils in drainageways or nearly level areas below the Wingate soil. They make up 2 to 10 percent of the unit.

Water and air move through the Wingate soil at a moderately slow rate. In cultivated areas surface runoff is medium. The seasonal high water table is 3 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is moderate. Shrink-swell potential is moderate, and potential 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.

In areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil and adding other organic material improve tilth.

If this soil is used as a site for dwellings with basements, the seasonal high water table and the shrink-swell potential are limitations. The shrink-swell potential also is a limitation for dwellings without basements. 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.

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 water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is IIe.

352—Palms silty clay loam, overwash. This is a nearly level, very poorly drained soil in shallow depressions on a flood plain. It is subject to frequent ponding or flooding for brief periods in winter and spring. It is in one area that is elongated and about 30 acres in size.

Typically, the surface soil is very dark gray, friable silty clay loam about 8 inches thick. The organic layers are black, very friable muck about 38 inches thick. The underlying material to a depth of 60 inches or more is gray, calcareous fine sandy loam. In some areas the underlying material contains more sand. In other areas the organic layer contains more mineral material.

Water and air move through the Palms soil at a moderate rate. Surface runoff is very slow or ponded. The seasonal high water table ranges from 1 foot above the surface to 1 foot below in winter and spring. Available water capacity is very high. Organic matter content also is very high. Potential frost action is high. The soil is unstable. It is highly compressible when supporting loads and is subject to subsidence if it is drained.

The area of this soil is used for pasture. It is moderately suited to pasture. It is well suited to use as habitat for wetland wildlife. It generally is not suited to cultivated crops and to use as a site for dwellings and septic tank absorption fields because of long periods of flooding and ponding.

In the area used for pasture, alsike clover, ladino clover, and reed canarygrass are suitable for planting. Overgrazing or grazing when the soil is too wet reduces forage production and 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.

The land capability classification is Vw.

386B—Downs silt loam, 1 to 5 percent slopes. This is a gently sloping, moderately well drained soil on convex ridgetops and broad, even side slopes on the Illinoian till plain. Individual areas are irregular or oblong in shape and range from 3 to 20 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 9 inches thick. The subsoil is friable and about 46 inches thick. It is brown silt loam to a depth of 13 inches and dark yellowish brown silty clay loam to a depth of 29 inches. Below that, it is yellowish brown, mottled silty clay loam to a depth of 37 inches and yellowish brown, mottled silt loam to a depth of 55 inches. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, friable silt loam. In some areas the underlying material contains more sand. A few areas have a thicker dark surface layer. In places the surface layer is not as dark.

Included with this soil in mapping are small areas of somewhat poorly drained Ipava soils in drainageways and in nearly level areas below the Downs soil. They make up 2 to 5 percent of the unit.

Water and air move through the Downs soil at a moderate rate. In cultivated areas surface runoff is medium. The seasonal high water table is 4 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is moderate. Shrink-swell potential is moderate, and potential 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.

In areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil and adding other organic material improve tilth.

If this soil is used as a site for dwellings with basements, the seasonal high water table and the shrink-swell potential are limitations. The shrink-swell potential also is a limitation for dwellings without basements. 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.

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

The land capability classification is IIe.

440C2—Jasper silt loam, 4 to 12 percent slopes, eroded. This is a sloping, well drained soil on side slopes of knolls and prominent ridges on outwash plains and till plains. Individual areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam. Erosion has thinned the surface layer to a thickness of about 7 inches. The subsoil is about 48 inches thick. In the upper part it is dark yellowish brown, friable silt loam; in the next part it is yellowish brown, friable loam; and in the lower part it is yellowish brown, friable and very friable fine sandy loam. The underlying material to a depth of 60 inches or more is yellowish brown, very friable and loose fine sandy loam. In places the surface layer and the upper part of the subsoil contain more sand. In other areas the subsoil contains less sand. In some areas the subsoil and the underlying material contain coarser sand and gravel. Also, in places the surface layer is not as dark.

Included with this soil in mapping are small areas of poorly drained Sable and Sawmill soils in shallow depressions and drainageways below the Jasper soil. They make up 2 to 5 percent of the unit.

Water and air move through the Jasper soil at a moderate rate. In cultivated areas surface runoff is medium. Available water capacity is high. Organic matter content is moderate. Shrink-swell potential is low, and potential frost action is moderate.

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

If this soil is used for corn, soybeans, or small grain, further erosion is a hazard. A crop rotation that includes 1 or more years of forage crops, a conservation tillage system that leaves crop residue on the surface after planting, contour farming, or terraces help to control erosion. Returning crop residue to the soil and regularly adding other organic material help to maintain productivity and tilth.

Adapted pasture and hay plants, such as alfalfa, bromegrass, orchardgrass, and tall fescue, grow well on this soil. Overgrazing reduces forage yields, causes surface compaction and excessive runoff, and increases the hazard of erosion. Proper stocking rates, 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 or septic tank absorption fields, erosion is a hazard during construction. Mulching the surface helps to control erosion.

The land capability classification is IIIe.

451—Lawson silty clay loam. This is a nearly level, somewhat poorly drained soil on low, broad ridges on flood plains of the Sangamon River and on narrower flood plains of tributary streams. It is subject to frequent flooding for brief periods in spring. Individual areas are irregular in shape on broad flood plains and are long and narrow on smaller flood plains. These areas range from 5 to 300 acres in size.

Typically, the surface layer is black, friable silty clay loam about 10 inches thick. The subsurface layer is black, friable silt loam about 27 inches thick. The underlying material to a depth of 60 inches or more is dark grayish brown, mottled, friable loam. In some areas the surface layer contains more sand and in other areas less clay. Some places have a thinner subsurface layer and a silty clay loam subsoil.

Included with this soil in mapping are small areas of Allison and Sawmill soils. Allison soils are moderately well drained and on natural levees and alluvial fans above the Lawson soil. Sawmill soils are poorly drained and in depressions and narrow sloughs below the Lawson soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the Lawson soil at a moderate rate. In cultivated areas surface runoff is slow. 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. Shrink-swell potential is moderate, and potential frost action is high.

In most areas this soil is used for cultivated crops. Some areas on smaller flood plains commonly are used as woodland. This soil is well suited to cultivated crops, pasture, and hay, and to use as woodland. It generally is not suited to use as a site for dwellings and septic tank absorption fields because of flooding.

If this soil is used for corn or soybeans, flooding is a hazard. Also, in some years the seasonal high water table can delay planting. During the growing season flooding is less frequent than once every 2 years. Dikes or diversions reduce the extent of the crop damage caused by floodwater. Selecting varieties adapted to shorter growing seasons and wetter conditions also reduces the extent of this damage. Subsurface tile drains function satisfactorily if suitable outlets are available. Minimizing tillage and returning crop residue to the soil help to maintain tilth and productivity.

If this soil is used for pasture, alsike clover or ladino clover in a mixture with reed canarygrass or tall fescue is suitable for planting. 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. In some years the flooding delays harvesting of hay.

In the areas used as woodland, excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots. Measures that protect the woodland from fire are needed.

The land capability classification is IIw.

481A—Raub silt loam, 0 to 3 percent slopes. This is a nearly level, somewhat poorly drained soil on low, broad ridges and even side slopes on till plains and moraines. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is very dark gray, friable silt loam about 8 inches thick. The subsurface layer is very dark grayish brown, friable silt loam about 4 inches thick. The subsoil is mottled and about 38 inches thick. In the upper part it is yellowish brown and brown, friable silty clay loam; in the next part it is yellowish brown, friable sandy clay loam; and in the lower part it is yellowish brown, firm clay loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm, calcareous loam. In places the surface layer is thinner and lighter in color. In some areas the upper part of the subsoil contains more sand. In other areas part of the underlying material is stratified loam, sandy loam, and sand. Also, a few areas have a higher clay content in the subsoil.

Included with this soil in mapping are small areas of Dana and Drummer soils. Dana soils are moderately well drained and on ridges and side slopes above Raub soils. Drummer soils are poorly drained and in drainageways below Raub soils. Included soils make up 2 to 6 percent of the unit.

Water and air move through the Raub soil at a moderately slow rate. In cultivated areas surface runoff is slow. 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. Shrink-swell potential is moderate, and potential 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.

If this soil is used for corn, soybeans, or small grain, the seasonal high water table can delay planting in spring. Subsurface tile drains function satisfactorily if suitable outlets are available. Measures that maintain the drainage system are needed. A conservation tillage system that leaves crop residue on the surface after planting helps to maintain productivity and tilth.

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations lowers the water table. Extending the footings below the subsoil, or properly designing and reinforcing the foundations help 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 water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

The land capability classification is IIw.

533—Urban land. This map unit consists of areas covered by pavement and buildings. Because of extensive land smoothing, it generally is nearly level and gently sloping. Most of the areas are in Decatur, Forsyth, and Mt. Zion. They commonly are square or rectangular, but some are long and narrow. They range from 5 to 300 acres in size.

More than 85 percent of this map unit is covered by buildings and pavement. Most of the paved areas are parking lots adjacent to shopping centers, industrial plants, and other commercial buildings.

Included with this unit in mapping are small areas of Drummer and Flanagan soils and Orthents, loamy, undulating. Drummer soils are poorly drained and in low areas. Flanagan soils are somewhat poorly drained and on low ridges adjacent to urban areas. Orthents consist of moderately fine to moderately coarse textured soils that have been modified during urban development. Included soils make up less than 15 percent of the unit.

Surface runoff generally is rapid on Urban land. Because of the design of most paved areas, the water commonly is diverted into storm drainage systems. In some areas it is diverted onto and causes erosion on adjacent soils, and aggravates flooding.

The vegetation in this map unit is confined to areas of included soils and to large planter boxes. Special management is needed when trees and shrubs are planted and after they are established. Periodic supplemental watering is needed in most areas. Red maple, silver maple, hackberry, green ash, and sycamore trees are suitable for planting along streets.

This map unit has not been assigned a land capability classification.

684B—Broadwell silt loam, 1 to 7 percent slopes. This is a gently sloping, well drained soil on prominent ridges and side slopes on till plains and outwash plains adjacent to the Sangamon River in the western part of the county. Individual areas are rounded or irregular in shape and range from 5 to 40 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 8 inches thick. The subsurface layer is very dark grayish brown, friable silt loam about 3 inches thick. The subsoil is about 49 inches thick. In the upper part it is dark yellowish brown and yellowish brown, friable silty clay loam; in the next part it is yellowish brown, friable silty clay loam that is noticeably sandier; and in the lower part it is yellowish brown, very friable loamy fine sand. In places the surface layer is thinner and lighter in color. In some areas the loamy fine sand is nearer the surface. In other areas the upper part of the subsoil contains more sand.

Included with this soil in mapping are small areas of Drummer and Elburn soils. Drummer soils are poorly drained and in drainageways below the Broadwell soil. Elburn soils are somewhat poorly drained and on nearly level toe slopes below the Broadwell soil. Included soils make up 3 to 10 percent of the unit.

Water and air move through the upper part of the Broadwell profile at a moderate rate and through the lower part at a rapid rate. In cultivated areas surface runoff is medium. Available water capacity is high. Organic matter content is moderate. Shrink-swell potential is moderate, and potential 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.

In areas used for corn, soybeans, or small grain, erosion is a hazard. It can be controlled by a conservation tillage system that leaves crop residue on the surface after planting, by contour farming, or by terraces. Returning crop residue to the soil and adding other organic material improve tilth.

If this soil is used as a site for dwellings without basements, the shrink-swell potential is a limitation. Properly designing and reinforcing the foundation, or extending the foundation below the subsoil helps to overcome this limitation.

The land capability classification is IIe.

802B—Orthents, loamy, undulating. This map unit consists of moderately fine textured to moderately coarse textured, moderately well drained and somewhat poorly drained soils that have been modified by cutting, filling, and leveling. Slope ranges from 1 to 7 percent. Individual areas are square, rectangular, or irregular in shape and range from 5 to more than 200 acres in size.

These soils are in residential and industrial areas, near interstate interchanges, along railroads and airports, and in fill areas. Typically, the surface layer is grayish brown, friable clay loam about 10 inches thick. The underlying material to a depth of 60 inches or more consists of layers of grayish brown, brown, yellowish brown, and very dark gray, firm clay loam and loam. In places the soils are less than 20 inches thick.

Included with these soils in mapping are small areas where as much as 65 percent of the surface is covered by concrete, asphalt, buildings, streets, and parking lots. Also included are some poorly drained areas in drainageways. Included areas make up 2 to 25 percent of the unit.

Water and air move through these soils at a moderate to slow rate, depending largely on the degree of compaction by construction equipment. Surface runoff is medium. The seasonal high water table is at a depth of 1 to 4 feet in spring. Available water capacity generally is moderate. Organic matter content and fertility are low. Reaction in the rooting zone generally is favorable for plant growth.

Most areas are idle or are developed for residential or other nonfarm uses. Newly exposed areas do not have plant cover, but have a good cover of sod. Unless a good plant cover protects the surface, erosion is a hazard. In the more sloping areas the hazard of erosion is especially severe. Special management is needed to establish and maintain plant cover that helps to reduce runoff and to control erosion. Onsite investigation is needed to determine the limitations or hazards affecting the development of areas for specific uses.

This map unit has not been assigned a land capability classification.

802D—Orthents, loamy, rolling. This map unit consists of moderately fine textured to moderately coarse textured, moderately well drained soils that have been modified by filling and leveling. Slope ranges from 7 to 20 percent. Individual areas are rectangular or are irregular in shape and range from 5 to 80 acres in size.

These soils are along interstate highways, in revegetated gravel pits, and in fill areas. Typically, the surface layer is dark yellowish brown, friable clay loam about 5 inches thick. The underlying material to a depth of 32 inches consists of layers of brown and dark brown friable loam, clay loam, and silty clay loam. The material to a depth of 60 inches or more is the subsoil of a buried soil profile. It is dark yellowish brown, friable silty clay loam and silt loam. In places the buried soil profile is at a depth of more than 60 inches or less than 20 inches.

Included with these soils in mapping are highway surfaces, gravel pits, and a few small areas of intermittent water. They make up 10 to 25 percent of the unit.

Water and air move through this soil at a moderate rate. Surface runoff is medium or rapid. Available water capacity is moderate. Organic matter content and fertility generally are low. Reaction in the rooting zone generally is favorable for plant growth.

Most areas are idle and are vegetated. Areas along interstate highways are seeded to grasses and are planted to ornamental shrubs and trees that add beauty and that help to control erosion. Other areas are covered naturally with trees, shrubs, herbaceous plants, and grasses. Unless a good plant cover protects the surface, erosion is a severe hazard. Special management is needed to establish and maintain plant cover that helps to reduce runoff and to control erosion. Onsite investigation is needed to determine the limitations or hazards affecting the development of areas for specific uses.

This map unit has not been assigned a land capability classification.

865—Pits, gravel. This map unit consists of open excavations from which gravel and sand have been removed. Most pits are on terraces near the Sangamon River or along Interstate Highway 72. Slopes range from 0 to more than 60 percent. Individual areas generally are blocky and range from 3 to 100 acres in size.

The excavations are commonly 10 to 30 feet deep. Typically, the soil material is gravelly or sandy and has been mixed or compacted during excavation. In some pits the soil material supports vegetation, such as trees, shrubs, weeds, and grasses.

Included in mapping are perennial or intermittent water areas smaller than 1 acre and small areas of Orthents, loamy, undulating, adjacent to the pits. Included areas make up 10 to 15 percent of the unit.

Permeability varies because of different soil textures, but generally is moderate. Surface runoff is slow to very rapid. Available water capacity varies, but commonly is low. Organic matter content and fertility commonly are low.

Areas of Pits, gravel, are idle unless currently being excavated. Without major reclamation, gravel pits generally are not suited to farming and building site development. Some areas are a good source of gravel and sand, or are well suited to use as a landfill or recreation area. If the unit is used as a site for solid waste disposal, special precautions are generally needed to prevent ground water pollution. Some areas are well suited to hiking, camping, and fishing. Establishing vegetation generally requires special preparation, such as land smoothing, land leveling, and topdressing with surface soil material. The feasibility of reclamation depends on conditions at the site and the proposed alternative use.

This map unit has not been assigned a land capability classification.

1083—Wabash silty clay loam, wet. This is a level, slightly depressional, very poorly drained soil in sloughs and in low areas on the Sangamon River flood plain. It is subject to frequent ponding or flooding for long periods from the late fall to early summer. Individual areas are long and narrow or irregular in shape and range from 5 to 50 acres in size.

Typically, the surface layer is black, friable silty clay loam about 4 inches thick. The subsurface layer is black, mottled, firm silty clay about 12 inches thick. The subsoil is about 38 inches thick. It is black, mottled, firm and very firm silty clay. The underlying material to a depth of 60 inches or more is dark gray, mottled, very firm silty clay. In some areas the subsoil and the underlying material contain less clay. In places the subsoil is not as dark.

Included with this soil in mapping are small areas of somewhat poorly drained Lawson and Tice soils on slight rises above the Wabash soil. They make up 2 to 10 percent of the unit.

Water and air move through the Wabash soil at a very slow rate. Surface runoff is very slow or ponded. The seasonal high water table ranges from 0.5 foot above the surface to 1 foot below in winter and spring. Available water capacity is moderate. Organic matter content is moderate. Shrink-swell potential is very high, and potential frost action is high.

Most areas support wetland vegetation. This soil is well suited to use as habitat for wetland wildlife. Because of the frequency and duration of flooding, it is generally not suited to cultivated crops and to use as a site for dwellings and septic tank absorption fields.

Areas of this soil provide good habitat for wetland wildlife. Shallow water areas and grain and seed crops are available for use as resting and feeding areas by migrating ducks and geese.

The land capability classification is Vw.

2027C—Miami-Urban land complex, 5 to 10 percent slopes. This moderately sloping map unit consists of the well drained Miami soil and areas of Urban land on side slopes on till plains. It is 50 to 75 percent Miami soil and 20 to 50 percent Urban land. The Miami soil and Urban land are in areas so intricately mixed that they could not be separated at the scale used for mapping. Individual areas of this unit range from 5 to 70 acres in size.

Typically, the surface layer of the Miami soil is very dark grayish brown, friable loam about 4 inches thick. The subsurface layer is brown, friable loam about 3 inches thick. The subsoil is about 35 inches thick. In the upper part it is dark brown, friable loam, and in the lower part it is strong brown, friable clay loam. The underlying material to a depth of 60 inches or more is yellowish brown, firm, calcareous clay loam. Some areas have been cut, filled, or leveled during construction. In other areas the upper part of the soil contains more silt and less sand. In a few areas the dark surface layer is thicker.

Urban land is covered by streets, parking lots, buildings, and other structures that so obscure the soils that they cannot be identified.

Included with this unit in mapping are small areas of Drummer, Sabina, and Sunbury soils. Sabina and Sunbury soils are somewhat poorly drained and on nearly level ridges above the Miami soil. Drummer soils are poorly drained and in drainageways below the Miami soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the upper part of the Miami profile at a moderate rate and through the lower part at a moderately slow rate. Surface runoff is medium. Available water capacity is moderate. Organic matter content is moderately low. Shrink-swell potential and potential frost action are moderate.

The Miami soil, or open part of the map unit, is used for parks, paths and trails, lawns and gardens, and building sites. Some areas are wooded. The soil is well suited to lawns, gardens, and ornamental trees and shrubs, and to use as nature paths and trails. It is moderately well suited to use as a site for dwellings. It is poorly suited to use as a site for septic tank absorption fields.

In areas where the Miami soil is used for grasses, flowers, vegetables, shrubs, wild herbaceous plants, hardwood trees, and coniferous plants, measures are needed to control the competing plants. Erosion is a hazard where the surface is bare. During establishment periods, protecting the soil surface with a mulch or vegetative cover helps to control erosion.

If the Miami soil is used as a site for dwellings, the shrink-swell potential is a limitation. Properly designing and reinforcing the foundations help to prevent the structural damage caused by shrinking and swelling. During construction erosion and sedimentation are hazards, especially if the surface is bare for a considerable period. Establishing a vegetative cover or mulching the surface helps to control erosion.

Most areas of this map unit have access to municipal sanitary facilities. In areas not served by sanitary sewers, moderately slow permeability limits use of the soil as a site for septic tank absorption fields. Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome this limitation.

If the Miami soil is used as a site for local roads and streets, low strength and potential frost action are limitations. These limitations can be overcome by providing suitable subgrade material. Grading the roads to shed water reduces the wetness and helps to prevent damage by frost action.

The Miami soil is well suited to paths and trails. If the soil is developed for other recreation uses, such as playgrounds and athletic fields, in some areas land leveling is needed.

This map unit has not been assigned a land capability classification.

2027D—Miami-Urban land complex, 10 to 18 percent slopes. This strongly sloping map unit consists of the well drained Miami soil on side slopes on till plains and gently sloping and moderately sloping areas of Urban land. It is 50 to 75 percent Miami soil and 20 to 50 percent Urban land. The Miami soil and Urban land are in areas so intricately mixed that they could not be separated at the scale used for mapping. Individual areas of the unit range from 3 to 70 acres in size.

Typically, the surface layer of the Miami soil is very dark grayish brown, friable loam about 4 inches thick. The subsurface layer is brown, friable loam about 3 inches thick. The subsoil is yellowish brown, friable clay loam about 33 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm, calcareous loam. Some areas have been cut, filled, or leveled during construction. In other areas the upper part of the soil contains more silt and less sand. In a few areas the dark surface layer is thicker.

Urban land is covered by streets, parking lots, buildings, and other structures that so obscure the soils that they cannot be identified.

Included with the Miami soil in mapping are small areas of Drummer and Birkbeck soils. Birkbeck soils are moderately well drained and on gently sloping shoulder slopes and narrow ridgetops above the Miami soil. Drummer soils are poorly drained and in drainageways below the Miami soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the upper part of the Miami profile at a moderate rate and through the lower part at a moderately slow rate. Surface runoff is rapid. Available water capacity is moderate. Organic matter content is moderately low. Shrink-swell potential and potential frost action are moderate.

The Miami soil, or open part of the map unit, is used for parks, paths and trails, lawns and gardens, and building sites. It is well suited to nature paths and trails. It is moderately suited to use as a site for dwellings, local roads and streets, lawns, gardens, and ornamental trees and shrubs. It is poorly suited to use as a site for septic tank absorption fields.

In areas where the Miami soil is used for grasses, flowers, vegetables, shrubs, wild herbaceous plants, hardwood trees, and coniferous plants, measures are needed to control the competing plants. Land leveling and protecting the soil surface with a mulch or vegetative cover help to control erosion when establishing lawns or ornamental trees and shrubs.

If this soil is used as a site for dwellings, slope and the shrink-swell potential are limitations. Cutting, filling, and land shaping help to overcome the slope. Extending foundation footings below the subsoil, or properly designing and reinforcing the foundations help to prevent the structural damage caused by shrinking and swelling. During construction erosion and sedimentation are hazards, especially if the surface is bare for a considerable period. Establishing a vegetative cover or mulching helps to control erosion.

Most areas of this map unit have access to municipal sanitary facilities. In areas not served by sanitary sewers, if the Miami soil is used as a site for septic tank absorption fields, moderately slow permeability and slope are limitations. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste. Installing the filter lines on the contour or cutting and land shaping help to overcome the slope.

If the Miami soil is used as a site for local roads and streets, low strength, slope, and potential frost action are limitations. Low strength and potential frost action are limitations that can be overcome by providing suitable subgrade material. Grading the roads to shed water reduces the wetness and thus helps to prevent damage by frost action. Cutting and filling help to overcome the slope.

The Miami soil is well suited to paths and trails. If the soil is developed for other recreation uses, such as playgrounds and athletic fields, some land leveling is needed.

This map unit has not been assigned a land capability classification.

2027F—Miami-Urban land complex, 18 to 35 percent slopes. This map unit consists of areas of steep, well drained Miami soil on side slopes on till plains and areas of gently sloping and moderately sloping Urban land. It is 50 to 70 percent Miami soil and 20 to 40 percent Urban land. The Miami soil and Urban land are in areas so intricately mixed that they could not be separated at the scale used for mapping. Individual areas of the unit range from 3 to 20 acres in size.

Typically, the Miami soil has a surface layer of very dark grayish brown, friable loam about 5 inches thick. The subsurface layer is brown, friable loam about 6 inches thick. The subsoil is dark brown and brown, friable, and about 42 inches thick. In the upper part it is loam, in the next part it is clay loam, and in the lower part it is mottled, calcareous loam. The underlying material to a depth of 60 inches or more is brown, mottled, firm, calcareous clay loam. Some areas have been cut, filled, or leveled during construction. In other areas the subsoil is thinner and carbonates are nearer the surface. A few areas are more sloping.

Urban land is covered by streets, parking lots, buildings, and other structures. In many areas Urban land is in areas on the less sloping, narrow ridges included in the map unit. The soils are so obscured by Urban land that they cannot be identified.

Included with the Miami soil in mapping are small areas of Birkbeck and Lawson soils. Birkbeck soils are moderately well drained and on gently sloping shoulder slopes and narrow ridges above the Miami soil. Lawson soils are somewhat poorly drained and in narrow drainageways below the Miami soil. Included soils make up 10 to 15 percent of the unit.

Water and air move through the upper part of the Miami profile at a moderate rate and through the lower part at a moderately slow rate. Surface runoff is rapid. Available water capacity is moderate. Organic matter content is moderate. Shrinking and swelling and potential frost action are moderate.

The Miami soil, or the open part of the map unit, is used for parks, paths and trails, lawns and gardens, and building sites. It is moderately suited to nature paths and trails. It is poorly suited to use as a site for dwellings and septic tank absorption fields, to local roads and streets, to lawns and gardens, and to ornamental trees and shrubs.

In areas where the Miami soil is used for grasses, flowers, vegetables, shrubs, wild herbaceous plants, hardwood trees, and coniferous plants, measures are needed to control the competing plants. Land leveling and protecting the soil surface with a mulch or vegetative cover helps to control erosion when establishing lawns and ornamental trees and shrubs.

If the Miami soil is used as a site for dwellings, slope and the shrink-swell potential are limitations. Cutting, filling, and land shaping help to overcome the slope. Extending foundation footings below the subsoil, or properly designing and reinforcing the foundations help to prevent the structural damage caused by shrinking and swelling. During construction erosion and sedimentation are hazards, especially if the surface is bare for a considerable period. Establishing a vegetative cover or mulching helps to control erosion.

Most areas of this map unit have access to municipal sanitary facilities. In areas not served by sanitary sewers, if the Miami soil is used as a site for septic tank absorption fields, slope and moderately slow permeability are limitations. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste. Installing the filter lines on the contour or cutting and land shaping help to overcome the slope.

If the Miami soil is used as a site for local roads and streets, low strength, slope, and potential frost action are limitations. Low strength and potential frost action are limitations that can be overcome by providing suitable subgrade material. Grading the roads to shed water reduces the wetness and helps to prevent damage caused by frost action. Cutting and filling help to overcome the slope.

Nature paths and trails can be established on this soil. In steeper areas stairways and handrails are needed. Erosion is the main hazard if the plant cover is removed, for example, during construction of paths and trails.

This map unit has not been assigned a land capability classification.

2152—Drummer-Urban land complex. This nearly level map unit consists of the poorly drained Drummer soil and areas of Urban land. It is on broad, flat areas and in drainageways. It is subject to occasional ponding for brief periods. It is 45 to 75 percent Drummer soil and 25 to 40 percent Urban land. The Drummer soil and Urban land are in areas so intricately mixed or so small in size that they could not be separated at the scale used for mapping. Individual areas of the unit range from 5 to more than 400 acres in size.

Typically, the Drummer soil has a surface soil of black, friable silty clay loam about 11 inches thick. The subsoil is friable and about 43 inches thick. In the upper part it is very dark gray silty clay loam; in the next part it is dark gray and gray, mottled silty clay loam; and in the lower part it is gray, mottled, calcareous, stratified silty clay loam to sandy loam. The underlying material to a depth of 60 inches or more is gray, mottled, calcareous loam. Some areas have been filled or leveled during construction. In a few places the subsoil is calcareous within a depth of 40 inches.

Urban land is covered by streets, parking lots, buildings, and other structures. The soils are so obscured by Urban land that they cannot be identified.

Included with the Drummer soil in mapping are small areas of somewhat poorly drained Elburn, Flanagan, and Sabina soils and moderately well drained Catlin and Dana soils. These soils are on knobs or ridges above the Drummer soil. They make up 10 to 15 percent of the unit.

Water and air move through the Drummer soil at a moderate rate. Surface runoff is slow. Excess surface water is drained through storm sewers, gutters, and, to a lesser extent, surface ditches. The seasonal high water table ranges from 0.5 foot above the surface to 2 feet below in spring. Available water capacity is very high. Organic matter content is high. Shrink-swell potential is moderate, and potential frost action is high.

The Drummer soil, or open part of the map unit, is used for parks, building site development, lawns, and gardens. It is poorly suited to use as a site for dwellings and septic tank absorption fields, and to local roads and streets.

Because of the seasonal high water table, the Drummer soil is poorly suited to lawns, vegetable and flower gardens, and trees, and to recreation uses. Lowering the water table with underground drains and installing surface drains help to reduce the wetness.

If the Drummer soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Extending the footings below the subsoil, or properly designing and reinforcing the foundations help to prevent the structural damage caused by shrinking and swelling. Installing subsurface tile drains near the foundations lowers the water table. In areas used as watercourses, erosion is a hazard where the surface is bare. Establishing a vegetative cover helps to control erosion.

Most areas of this map unit have access to municipal sanitary treatment facilities. In the areas not served by sanitary sewers, ponding is a hazard and moderate permeability is a limitation to use of the Drummer soil as a site for septic tank absorption fields. Grading, land shaping, and installing a drainage system help to control ponding. Also, providing as much as 2 feet of loamy fill material is beneficial because it increases the depth to the seasonal high water table. Enlarging the absorption area improves the absorption of liquid waste. Installing a sealed sand filter and disinfection tank is an alternative method of waste disposal.

If the Drummer soil is used as a site for local roads and streets, low strength, ponding, potential frost action, and the shrink-swell potential are limitations. Providing suitable subgrade material helps to prevent damage caused by low strength, frost action, and shrinking and swelling. Installing a drainage system and then grading the roads so that they shed water helps to prevent damage caused by ponding and frost action.

This map unit has not been assigned a land capability classification.

2154A—Flanagan-Urban land complex, 0 to 3 percent slopes. This nearly level map unit consists of the somewhat poorly drained Flanagan soil and areas of Urban land. It is on slight rises and low ridges on till plains. It is 40 to 65 percent Flanagan soil and 25 to 45 percent Urban land. The Flanagan soil and Urban land are in areas so intricately mixed that they could not be separated at the scale used for mapping. Individual areas of the unit range from 10 to more than 600 acres in size.

Typically, the Flanagan soil has a surface soil of very dark gray, friable silt loam about 18 inches thick. The subsoil is about 45 inches thick. In the upper part it is dark brown, friable silty clay loam; in the next part it is yellowish brown, mottled, friable silty clay loam; and in the lower part it is yellowish brown, mottled, firm clay loam. The underlying material to a depth of 70 inches or more is yellowish brown, mottled, firm, calcareous loam. In some areas the surface layer is thinner and lighter in color. In other areas the underlying material is stratified loam, silt loam, and sandy loam. Some areas have been cut, filled, or leveled during construction.

Urban land is covered by streets, parking lots, buildings, and other structures. The soils were so obscured or modified that they could not be identified.

Included with the Flanagan soil in mapping are small areas of Catlin, Dana, and Drummer soils. Catlin and Dana soils are moderately well drained and on convex ridges above the Flanagan soil. Drummer soils are poorly drained and in drainageways below the Flanagan soil. Included soils make up 10 to 15 percent of the unit.

Water and air move through the upper part of the Flanagan profile at a moderate rate and through the lower part at a moderately slow rate. Surface runoff is slow. Excess surface water is drained through storm sewers, gutters, and, to a lesser extent, surface ditches. The seasonal high water table is 1.5 to 3.5 feet below the surface in spring. Available water capacity is high. Organic matter content also is high. Shrink-swell potential and potential frost action are high.

The Flanagan soil, or open part of the map unit, is used for parks, building sites, lawns, and gardens. It is moderately well suited to lawns and landscaping, vegetable and flower gardens, trees, and shrubs. It is poorly suited to most recreation uses, to use as a site for dwellings and septic tank absorption fields, and to local roads and streets.

If the Flanagan soil is used for lawns, gardens, or ornamental trees and shrubs, the seasonal high water table is a limitation. Lowering the water table with underground drains, installing surface drains, or both, help to overcome this limitation.

If the Flanagan soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations helps to overcome the seasonal high water table. Extending the footings below the subsoil, or properly designing and reinforcing the foundations help to prevent the structural damage caused by shrinking and swelling. Erosion is a hazard on construction sites where the surface is bare and in areas used as watercourses. Establishing a vegetative cover or using a mulch helps to control erosion.

Most areas of this map unit have access to municipal sanitary facilities. In areas not served by sanitary sewers, the seasonal high water table and moderately slow permeability are limitations to use of the Flanagan soil as a site for septic tank absorption fields. Installing subsurface tile drains lowers the water table. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

If the Flanagan soil is used as a site for local roads and streets, low strength, potential frost action, and the shrink-swell potential are limitations. Providing suitable subgrade material helps to prevent damage caused by low strength, frost action, and shrinking and swelling. Installing a drainage system and then grading the roads to shed water reduces the wetness and thus helps to prevent the damage to pavement caused by frost action.

This map unit is not assigned a land capability classification.

2171B—Catlin-Urban land complex, 1 to 7 percent slopes. This gently sloping map unit consists of areas of moderately well drained Catlin soil and areas of Urban land. It is on ridges on till plains. It is 40 to 65 percent Catlin soil and 35 to 45 percent Urban land. The Catlin soil and Urban land are in areas so intricately mixed that they could not be separated at the scale used for mapping. Individual areas of the unit range from 5 to 200 acres in size.

Typically, the Catlin soil has a surface soil of very dark grayish brown and dark yellowish brown, friable silt loam about 21 inches thick. The subsoil is friable and extends to below a depth of 60 inches. In the upper part it is dark yellowish brown and yellowish brown silty clay loam; in the next part it is yellowish brown, mottled silty clay loam; and in the lower part it is yellowish brown and brown, mottled clay loam. In some areas the surface layer is thinner and lighter in color. In other areas the lower part of the subsoil formed in stratified outwash. In a few places calcareous loam till is within a depth of 40 inches. Small areas have been cut, built up, or smoothed.

Urban land is covered by streets, parking lots, buildings, and other structures. The soils are so obscured by Urban land or modified that they cannot be identified.

Included with the Catlin soil in mapping are small areas of Drummer and Flanagan soils. The Drummer soils are poorly drained and in nearly depressional areas and drainageways. Flanagan soils are somewhat poorly drained and on lower ridges. Included soils make up 10 to 15 percent of the unit.

Water and air move through the Catlin soil at a moderate rate. Surface runoff is medium. The seasonal high water table is 3.5 to 6.0 feet below the surface in spring. Available water capacity is high. Organic matter content is moderate. Shrink-swell potential is moderate, and potential frost action is high. The soil can be easily tilled throughout a wide range in moisture content.

The Catlin soil, or open part of the map unit, is used for parks, golf fairways, building sites, lawns, and gardens. It is well suited to lawns, vegetable and flower gardens, and ornamental trees and shrubs. It also is well suited to recreation use. It is moderately well suited to use as a site for dwellings. It is poorly suited to use as a site for septic tank absorption fields and to local roads and streets. In areas where the surface is bare for considerable periods, erosion is a hazard. Establishing a vegetative cover helps to control erosion.

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

Most areas of this map unit have access to municipal sanitary facilities. In areas not served by sanitary sewers, the seasonal high water table and moderate permeability are limitations to use of the Catlin soil as a site for septic tank absorption fields. Subsurface tile drains lower the water table. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

If the Catlin soil is used as a site for local roads and streets, low strength and potential frost action are limitations. Strengthening or replacing the subgrade material helps to prevent damage to the pavement caused by low strength and frost action. Installing a drainage system and then grading the roads to shed water reduce the wetness and help to prevent the damage to the pavement caused by frost action.

This map unit has not been assigned a land capability classification.

2233B—Birkbeck-Urban land complex, 1 to 5 percent slopes. This gently sloping map unit consists of the moderately well drained Birkbeck soil and areas of Urban land. It is on ridges on till plains. It is 40 to 65 percent Birkbeck soil and 35 to 45 percent Urban land. The Birkbeck soil and Urban land are in areas so intricately mixed that they could not be separated at the scale used for mapping. Individual areas range from 5 to 300 acres in size.

Typically, the Birkbeck soil has a surface layer of mixed, very dark grayish brown and dark yellowish brown, friable silt loam about 6 inches thick. The subsoil is friable and extends to below a depth of 60 inches. In the upper part it is dark yellowish brown silty clay loam; in the next part it is yellowish brown, mottled silty clay loam; and in the lower part it is brown, mottled clay loam and loam. In some areas the dark surface layer is thicker. In other areas the lower part of the subsoil formed in stratified outwash. In a few places calcareous loam till is within a depth of 40 inches. Small areas have been cut, built up, or smoothed.

Urban land is covered by streets, parking lots, buildings, and other structures. The soils have been so obscured by Urban land or modified that they could not be identified.

Included with the Birkbeck soil in mapping are small areas of Drummer and Sabina soils. Drummer soils are poorly drained and in nearly depressional areas and drainageways. Sabina soils are somewhat poorly drained and on broader ridgetops. Included soils make up 10 to 15 percent of the unit.

Water and air move through the upper part of the Birkbeck profile at a moderate rate and through the lower part at a moderately slow rate. Surface runoff is medium. The seasonal high water table is 3 to 6 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. Shrink-swell potential is moderate, and potential frost action is high. The surface layer can be easily tilled throughout a wide range in moisture content.

The Birkbeck soil, or open part of the map unit, is used for parks, golf fairways, building sites, lawns, and gardens. It is well suited to lawns, vegetable and flower gardens, and trees and shrubs. It also is well suited to recreation uses. It is moderately well suited to use as a site for dwellings. It is poorly suited to use as a site for septic tank absorption fields and local roads and streets. Erosion is a hazard in areas where the surface is bare for considerable periods. Establishing a vegetative cover helps to control erosion.

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

Most areas of this map unit have access to municipal sanitary facilities. In areas not served by sanitary sewers, the seasonal high water table and moderately slow permeability are limitations to use of the Birkbeck soil as a site for septic tank absorption fields. Installing subsurface tile drains higher on the side slopes than the absorption field helps to intercept seepage water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

If the Birkbeck soil is used as a site for local roads and streets, low strength and potential frost action are limitations. Strengthening or replacing the subgrade material helps to prevent the damage to the pavement caused by low strength and frost action. Installing a drainage system and then grading the roads to shed water reduce the wetness and help to prevent the damage to the pavement caused by frost action.

This map unit has not been assigned a land capability classification.

2236A—Sabina-Urban land complex, 0 to 3 percent slopes. This nearly level map unit consists of the somewhat poorly drained Sabina soil and areas of Urban land. It is on slight rises and broad ridges on till plains. It is 40 to 75 percent Sabina soil and 15 to 45 percent Urban land. The Sabina soil and Urban land are in areas so intricately mixed or so small that they could not be separated at the scale used for mapping. Individual areas of the unit range from 10 to 200 acres in size.

Typically, the Sabina soil has a surface layer of dark grayish brown, friable silt loam about 3 inches thick. The subsurface layer is grayish brown, mottled, friable silt loam about 5 inches thick. The subsoil is mottled and extends to below a depth of 60 inches. In the upper part it is brown, friable silt loam, and in the next part it is grayish brown, firm silty clay. Below that, it is light olive brown and yellowish brown, firm or friable silty clay loam, and in the lower part it is yellowish brown, friable silt loam and loam. In a few places the surface soil is darker. In some areas the lower part of the subsoil formed in loamy, stratified outwash. During construction some areas have been cut, filled, or leveled.

Urban land is covered by streets, parking lots, buildings, and other structures. The soils are so obscured or modified that they cannot be identified.

Included with the Sabina soil in mapping are small areas of Drummer, Birkbeck, and Xenia soils. Birkbeck and Xenia soils are moderately well drained and on slight rises above the Sabina soil. Drummer soils are poorly drained and in nearly depressional areas and in drainageways below the Sabina soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the Sabina soil at a moderately slow rate. Surface runoff is slow. Excess surface water is drained through sewer systems, gutters, and, to a lesser extent, surface ditches. The seasonal high water table is 1.5 to 3.5 feet below the surface in spring. Available water capacity is high. Organic matter content is moderately low. Shrink-swell potential and potential frost action are high.

The Sabina soil, or open part of the map unit, is used for parks, building sites, lawns, and gardens. It is moderately well suited to lawns and landscaping, flower and vegetable gardens, and trees and shrubs. It is poorly suited to most recreation uses, to use as a site for dwellings and septic tank absorption fields, and to local roads and streets.

If the Sabina soil is used for lawns, gardens, or ornamental trees and shrubs, the seasonal high water table is a limitation. Lowering the water table with underground drains, installing surface drains, or both help to overcome this limitation.

If the Sabina soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundations lowers the water table. Extending footings below the subsoil or reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling. Erosion is a hazard on construction sites where the surface is bare for considerable periods and in areas used as watercourses. Establishing a vegetative cover or mulching helps to control erosion.

Most areas of this map unit have access to municipal sanitary facilities. In areas not served by sanitary sewers, the seasonal high water table and moderately slow permeability are limitations to use of the Sabina soil as sites for septic tank absorption fields. Installing subsurface tile drains higher on the side slopes than the absorption field helps to intercept seepage water. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

Low strength and potential frost action are limitations if the Sabina soil is used as a site for local roads and streets. Providing suitable subgrade material helps to prevent the damage to the pavement caused by low strength and frost action. Installing a drainage system and then grading the roads to shed water reduce the wetness and help to prevent the damage to the pavement caused by frost action.

This map unit has not been assigned a land capability classification.

2322C—Russell-Urban land complex, 5 to 10 percent slopes. This moderately sloping map unit consists of the well drained Russell soil and areas of Urban land on convex ridges and side slopes on till plains. It is 50 to 75 percent Russell soil and 20 to 50 percent Urban land. The Russell soil and Urban land are in areas so intricately mixed that they could not be separated at the scale used for mapping. Individual areas of the unit range from 5 to 100 acres in size.

Typically, the Russell soil has a surface layer of dark brown, friable silt loam about 3 inches thick. The subsurface layer is brown, friable silt loam about 4 inches thick. The subsoil is dark yellowish brown, friable, and about 48 inches thick. In the upper part it is silty clay loam, and in the lower part it is clay loam and mottled. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm, calcareous loam. During construction some areas have been cut, filled, or leveled. In other areas the upper part of the soil has more sand.

Urban land is covered by streets, parking lots, buildings, and other structures. The soils are so obscured by Urban land that they cannot be identified.

Included with the Russell soil in mapping are small areas of Drummer, Sabina, and Sunbury soils. Sabina and Sunbury soils are somewhat poorly drained and in shallow, gently sloping drainageways and in nearly level areas below the Russell soil. Drummer soils are poorly drained and in drainageways below the Russell soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the upper part of the Russell profile at a moderate rate and through the lower part at a moderately slow rate. Surface runoff is medium. Available water capacity is high. Organic matter content is moderately low. Shrink-swell potential is moderate and potential frost action is high.

The Russell soil, or open part of the map unit, is used for parks, paths and trails, lawns and gardens, and building sites. It is well suited to lawns, gardens, and ornamental trees and shrubs, and to use for nature paths and trails. It is moderately suited to use as a site for dwellings and septic tank absorption fields. It is poorly suited to local roads and streets.

In areas where the Russell soil is used for grasses, flowers, vegetables, shrubs, wild herbaceous plants, hardwood trees, and coniferous plants, measures are needed to control the competing plants. Erosion is a hazard if the surface is bare. Protecting the soil surface with a mulch or vegetative cover helps to control erosion.

If the Russell soil is used as a site for dwellings, the shrink-swell potential is a limitation. Properly designing and reinforcing the foundations help to prevent the structural damage caused by shrinking and swelling. During construction erosion and sedimentation are hazards, especially if the surface is bare for a considerable period. Establishing a vegetative cover or mulching helps to control erosion.

Most areas of this map unit have access to municipal sanitary facilities. In areas not served by sanitary sewers, the moderately slow permeability is a limitation to use of the Russell soil as a site for septic tank absorption fields. Increasing the size of the filter field or replacing the soil with more permeable material improves the absorption of liquid waste.

If the Russell soil is used as a site for local roads and streets, low strength and potential frost action are limitations. They can be overcome by providing suitable subgrade material. Grading the roads to shed water reduces the wetness and helps to prevent damage to the pavement caused by frost action.

The Russell soil is well suited to paths and trails. If the soil is developed for other recreation uses, such as playgrounds or athletic fields, in some areas land leveling is needed.

This map unit has not been assigned a land capability classification.

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 326,000 acres in Macon County, nearly 87 percent of the total acreage, meets the requirements for prime farmland. Associations 2, 3, 5, 6, 7, and 8, which are described under the heading, "General Soil Map Units," have the highest percentage, but the prime farmland is throughout the county. About 315,000 acres of the prime farmland is used for crops, mainly corn and soybeans, which account for most of the local agricultural income each year (*13*).

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 Macon 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."

Soils that have limitations, such as a seasonal high water table or frequent flooding during the growing season, qualify for prime farmland only in areas where these limitations have been overcome by such measures as drainage 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 Macon 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 wetness or unstable cutbanks 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

Tom Collins, district conservationist, Soil Conservation Service, and Tonie J. Endres, soil scientist, Macon County, helped to 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.

In 1982, about 305,850 acres in Macon County were cultivated and 3,614 acres were pastured (*13*). The climatic conditions and the soils are particularly well suited to the production of grain and forage crops. The soils in the county have good potential for increased production of crops and pasture grasses, particularly as the latest crop management techniques are applied. This soil survey can greatly facilitate the application of such techniques.

Soil erosion is the major management concern on about 22 percent of the cropland and pastureland in Macon County. Erosion is a hazard if slopes are more than 2 percent. It also is a hazard in areas where slopes are long and less than 2 percent.

Loss of the surface layer by sheet and rill erosion is damaging for three reasons. First, the organic matter content and natural fertility levels are lowered as the surface layer is lost and part of the subsoil is incorporated into the plow layer. As a result, soil productivity is reduced.

Second, severe erosion on sloping soils reduces tilth of the surface layer and, consequently, the intake of water. Surface layers mixed with subsoil material tend to clod if tilled when wet. As a result of the cloddiness, preparing a good seedbed is more difficult. Also, the surface tends to crust after hard rains, and this crusting results in an increased amount of runoff.

Third, sediment from erosion enters road ditches, Lake Decatur, the Sangamon River, and other streams and bodies of water. Deposition of sediment reduces the water storage capacity and reduces the ability of these water systems to accommodate floodwaters. Removing the sediment is expensive. Water quality also is impaired from herbicides, pesticides, and fertilizers that are washed into water along with the soil particles.

A good management system maintains or improves natural fertility, removes excess water, controls erosion, maintains good tilth, and increases infiltration. A cropping system that keeps plant cover and crop residue on the surface for extended periods helps to control erosion and to maintain the productive capacity of the soils. Including grasses and legumes in the crop rotation helps to reduce crusting, improve tilth, and provides nitrogen for the following crop.

Conservation tillage systems, such as chisel plowing, no-till, and ridge planting, help to control excessive soil loss, to reduce runoff, and to increase the rate of infiltration.

Chisel plowing is suitable on most of the tillable soils in the county. No-till is most suited to well drained or moderately well drained soils, such as Catlin, Plano, and Tama soils. Ridge planting is a suitable tillage system on most of the nearly level soils. The use of conservation tillage systems that leave crop residue on the surface after planting is becoming more common in Macon County. Conservation tillage systems are effective in reducing erosion on sloping soils and can be used on most soils in the survey area.

Crop rotations that include oats, wheat, other small grain, and hay are needed to control erosion on the sloping to steep slopes common on such soils as Miami and Parr soils. Such rotations, in addition to reducing soil losses, generally increase organic matter levels, soil nitrogen, and water retention. They can also improve soil tilth. The levels of crop-damaging weeds and insects in the soil are generally also naturally reduced because of the annually changing soil environment provided by crop rotations.

Terraces, diversions, and contour farming also help to control erosion. By reducing the length of slopes, these systems reduce the runoff rate and increase the rate of water intake. They are best suited to soils that have smooth, uniform slopes, such as Catlin, Dana, and Parr soils on the Cerro Gordo and Shelbyville moraines. Soils on short slopes with irregular topography, such as Miami soils, are best managed for erosion control by using conservation tillage systems or crop rotations that provide adequate plant cover.

Grassed waterways help to carry excess rainwater safely downslope to the nearest stream, or other watercourse. Grassed waterways are generally installed in conjunction with other conservation practices, such as terraces, diversions, conservation tillage systems, and contour farming operations, to effectively manage rainfall, to increase water retention, and to reduce soil loss on cropland and other areas. Grassed waterways are most effective on slopes of 2 percent or more.

In Macon County, drainage systems have been installed in most of the poorly drained and somewhat poorly drained soils (fig. 7). The poorly drained soils, such as Drummer and Sable soils, require some form of drainage system for the common crops of the area to be grown (fig. 8). The somewhat poorly drained soils, such as Flanagan and Ipava soils, are wet enough in some years to delay planting, and thus generally to reduce yields. Because of the drainage systems, these soils are sufficiently drained for the crops commonly grown in the county. Measures that maintain or upgrade the drainage system are needed.

The design of the drainage system varies with the kind of soil. On some poorly drained soils, a combination of surface drainage ditches and tile drains, not just tile drains, is needed to improve crop production.

Natural fertility is high for most soils in Macon County. Exceptions are soils that have a light-colored surface layer and that formed under forest vegetation, such as Birkbeck, Russell, and Miami soils. Some crops, particularly corn and wheat, respond well to applications of nitrogen fertilizer. Planting legumes, which take nitrogen from the air and fix it in the soil, and adding livestock waste help to maintain the soil's nitrogen supply.

The soil reaction in the rooting zone of most soils in Macon County ranges from medium acid to mildly alkaline. Before best plant growth and production can be achieved on acidic soils, applications of limestone are needed to raise the pH level.

On all soils, the addition of lime, nitrogen, phosphorus, potassium, or any other element needed for optimum yields should be based on the results of soil tests and the needs of the crop. The Cooperative Extension Service can help in determining the rates of lime and fertilizer applications after tests are made.

Soil tilth is an important factor affecting the germination of seeds, the amount of runoff, and the intake of water into the soil. Poor tilth is a problem on most soils that are low in organic matter content and that have a light-colored surface layer. Generally, the structure of such soils is weak and intensive rainfall causes the surface to crust. The crust is hard when dry and is nearly impervious to water. Once the crust forms, it decreases infiltration and increases runoff. Regular incorporation of crop residue, manure, and other organic material into the surface layer improves soil structure. Leaving residue on the surface helps to reduce crusting by absorbing the impact of falling raindrops.

Poor tilth is also a problem in poorly drained and very poorly drained soils that have a silty clay loam surface layer, such as Drummer, Sable, Peotone, and Shiloh soils. In most years these soils stay wet until late in spring; consequently, the opportunity for primary tillage is limited. If tilled when wet, the surface layer tends to form clods, which make preparing a good seedbed difficult. Chisel tillage in fall on these nearly level soils results in good tilth in spring.

The major crops grown in the survey area are corn and soybeans. Small grain and forage crops are also grown, but can be used more extensively on the sloping cropland for effective erosion control and improvement of soil productivity.

Suitable pasture and hay plants include several legumes, cool-season grasses, and warm-season native

Figure 7.—Nearly 145,000 acres of poorly drained soils and 115,000 acres of somewhat poorly drained soils are in the county. Drainage ditches like this one provide outlets for subsurface drainage.

grasses. Alfalfa and red clover are the common legumes grown for hay. They are also used in mixtures with bromegrass, orchardgrass, and tall fescue for hay and pasture.

Warm-season native grasses adapted to this area are big bluestem, little bluestem, indiangrass, and switchgrass. These grasses produce well in the summer. They need different management techniques for establishment and grazing than cool-season grasses.

Alfalfa is best suited to deep, moderately well drained and well drained soils, such as Birkbeck, Miami, Parr, and Russell soils. The other legumes and grasses do well on these and other upland soils that are somewhat poorly drained. Sabina, Sunbury, and Xenia soils are examples of soils suited to most pasture and hay plants. For poorly drained soils, moisture-tolerant plants, such as reed canarygrass and ladino clover, should be selected.

Well managed stands of forages are effective in controlling erosion. Overgrazing and the lack of adequate lime and fertilizer are common concerns. The amount of lime and fertilizer added should be based on the results of soil tests, the needs of the plants, and the expected production.

Overgrazing reduces the vigor and production of pasture. It also allows weedy and brushy species to

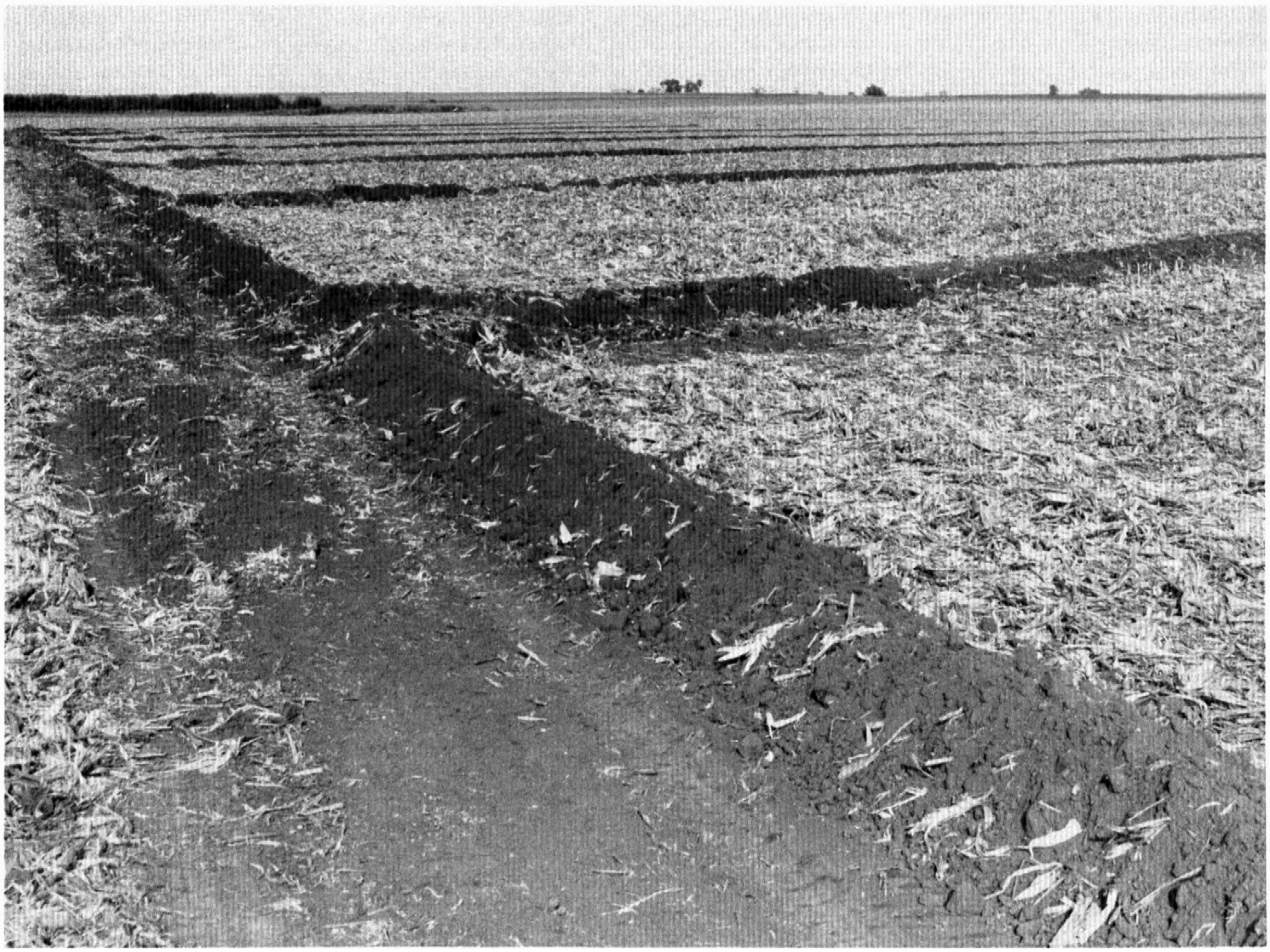


Figure 8.—Subsurface tile drains have been installed to lower the water table in this area of poorly drained Drummer soils.

increase. It can be prevented by maintaining fertility, by deferred grazing, by rotation grazing, and by reducing the number of animals. Deferred grazing gives the forages a rest and allows them to build up carbohydrate reserves. Rotation grazing among several areas of pasture gives each area a rest period. The information in table 6 can be helpful in estimating the number of animals that can be carried in a pasture. Many soils in the survey area have a high water table in spring. Where possible, grazing on these soils should be avoided when the surface layer is wet. Delaying grazing during wet periods helps to reduce surface compaction. Pasture renovation helps to overcome surface compaction where it is a concern. Frost heaving of alfalfa and red clover is also more of a hazard on the soils that have a high water table. Stubble, 4 to 6 inches in height, left in winter helps to reduce frost heaving. Grass-legume mixtures also can help to reduce frost heaving.

The latest information and recommendations for row crop and forage production can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

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 (*5*). 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. 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 (*11*). 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 limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is 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

Kevin McSherry, executive director, Macon County Soil and Water Conservation District, helped to prepare this section.

When the first European settlers arrived in Macon County, virgin hardwood forest covered about 38,000 acres. The trees have mostly been cleared from the land suitable for cultivation. Much of the remaining woodland is in areas that are too steep or too wet for cultivation. The soils in these areas have fair to good potential for growing trees of high quality.

About 3,510 acres, or less than 1 percent of the acreage in the county, is currently woodland (*13*). The largest areas of woodland are in soil associations 1 and 8, which are described under the heading "General Soil Map Units." The main species are shagbark hickory, white oak, and red oak on uplands and cottonwood, sycamore, and silver maple on bottom land.

The erosion hazard, the equipment limitation, and plant competition are the major management concerns in the sloping, woodland areas. Skid trails should be on or as near the contour as possible. On steeper slopes, logs or trees should be skidded uphill with a cable and winch. Bare areas created by logging operations should be seeded to a grass or grass-legume mixture. Machinery use should be limited to periods when the soil is firm enough to support the equipment. The competition of undesirable vegetation in openings created by timber harvesting operations can be reduced by chemical or mechanical means.

Seedling mortality, windthrow hazard, the equipment limitation, and plant competition are management concerns in woodland on bottom land. Soil wetness is the major soil property contributing to the management concerns. Seedling mortality can be reduced by planting nursery stock that is larger than typical. Additional benefit can be gained by killing or eliminating all vegetation within 2 feet of the existing or planted seedlings and by planting seedlings on ridges. Harvesting methods that do not leave isolated or widely spaced trees reduce the windthrow hazard. High value trees only should be removed from a strip 50 feet wide along the west and south edges of woodland.

Many woodland stands can be improved by measures that include the harvesting of trees and the removing of undesirable species. Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, surface compaction, and damage to tree roots. Measures that protect the woodland from fire are needed.

Additional information on planning for woodland management and production can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service.

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 7 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 7 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

The demand for land and facilities for boating, swimming, picnicking, fishing, hunting, hiking, camping, and other forms of outdoor recreation is increasing throughout the county. Facilities for these activities are available in city and state parks, county conservation district lands, and a few privately owned tracts.

The potential for further recreational development is favorable throughout the county. The soils having the best potential are on uplands along the Sangamon River and its major tributaries. These soils are in areas where a hilly terrain, wooded slopes, and numerous streams provide a variety of opportunities for recreation.

The soils of the survey area are rated in table 8 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 8, 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 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

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 (fig. 9). 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 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.

Figure 9.—Gently sloping Birkbeck soils are well suited to most recreation uses, such as this camping area in Friends Creek County Park.

Wildlife Habitat

Steven J. Brady, biologist, Soil Conservation Service, helped to prepare this section.

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

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

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

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and 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 grama.

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

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, squirrels, gray fox, raccoon, deer, and bear.

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

The kind and abundance of wildlife in Macon County reflect the soil types, land use, and vegetation. Originally, on about 35 percent of the acreage the seasonal high water table was within 1 foot of the surface, and on about 40 percent of the acreage the water table was at or above the surface. Although some areas were wooded, especially those along rivers, the native plant communities were dominantly tall prairie grasses. Because they were influenced by the seasonal high water table, they included many wet prairie or marsh plants.

Wildlife that were formerly abundant include waterfowl, shore birds, muskrat, mink, raccoons, prairie chickens, upland sandpipers, and other grassland birds and mammals. The transition areas between prairie and woodland provided habitat for cottontail rabbits, bobwhite quail, cardinals, brown thrashers, and many others. Less conspicuous, but a very important part of the natural fauna, were the reptiles and amphibians of the wet prairie.

After the county was settled, drainage systems, intensive cultivation, and urbanization altered the wildlife communities. They tended to favor the more adaptable species and those more tolerant of human settlements, such as horned larks, cardinals, mourning doves, raccoons, and white-tailed deer.

Areas used as wildlife habitat are not necessarily set aside for this purpose. Wildlife habitat commonly is a secondary use in areas used for other purposes, such as farming. For example, the large areas of nearly level and gently sloping soils used for cultivated crops and pasture in Macon County are also well suited to use as habitat for openland wildlife.

The woodland habitat in the county generally is restricted to areas along streams. These areas provide habitat for woodland wildlife, including beaver, deer, squirrel, and other wildlife having these special habitat requirements. Woodland borders dominated by shrubs also provide excellent habitat for many wildlife species.

In the following paragraphs the associations in Macon County, which are described under the heading, "General Soil Map Units," are grouped into three wildlife areas. The plants and animals common in each area are specified.

Wildlife area 1 is on the Catlin-Dana-Parr, Plano-Proctor, Clarksdale-Downs-Elco, Flanagan-Drummer, Drummer-Elburn, and Sable-Ipava associations. It does not include areas where a significant part of the acreage is urban land. The soils are nearly level to moderately sloping, and range from poorly drained to well drained. They are on uplands.

This area is mainly cropland. A few small areas are used as pasture or woodland. The areas along field borders and the minor streams, the meadows, and the pasture areas provide habitat for openland wildlife. The wildlife attracted to this area include cottontail rabbit, red fox, pheasant, and many types of songbirds.

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

Wildlife area 2 is on the Miami-Birkbeck-Russell and Sawmill-Lawson-Tice associations. It does not include areas where a significant part of the acreage is urban land. The soils are nearly level to steep and range from poorly drained to well drained. This area is mainly forested uplands and bottom lands along the major streams. Soils in the Sawmill-Lawson-Tice association are subject to flooding. Some of the acreage in this area is cropland, open meadows, or wetland. The wildlife population is more diversified than that in the other wildlife areas. The wildlife includes a variety of wetland, woodland, and openland wildlife. Examples are deer, squirrels, raccoons, pheasants, rabbits, muskrats, frogs, snakes, and many types of birds.

Native trees, shrubs, and prairie plants provide the best cover if measures that exclude grazing livestock are applied. Establishing hedgerows, farm windbreaks, and strips of grass or grass-legume mixtures improve the area.

Wildlife area 3 is on parts of the associations where much of the acreage is urban land. The soils are nearly level to steep and range from poorly drained to well drained. Although much of this area is under urban development, some of the acreage is used for parks or is idle land. The wildlife species are mainly those that can adapt to urban conditions. Examples are gray squirrels, fox squirrels, mice, cardinals, song sparrows, robins, pigeons, and blue jays. A few open areas attract pheasant, quail, rabbits, and songbirds.

Planting food-bearing ornamental trees and shrubs provides habitat diversity and cover valuable to wildlife, especially to songbirds. Examples of landscape plants suitable for wildlife are oak, maple, cherry, silky dogwood, flowering dogwood, crabapple, amur honeysuckle, viburnum, arrowwood, elderberry, and sumac.

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, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. 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 10 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 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, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 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. 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, and the available water capacity in the upper 40 inches 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 11 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 11 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, and flooding affect absorption of the effluent. Large stones 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 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 11 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 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 11 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 12 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, 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 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 12, 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 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

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

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

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

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

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

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

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to 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 large stones, slope, and the hazard of cutbanks caving. 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. The performance of a system is affected by the depth of the root zone 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, and large stones 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, and slope affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, 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 17.

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 classifications, 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 14 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 17.

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 15 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 clay loams 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 15, 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 of 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 16 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 intake 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 16, 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 16 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; November-May, for example, means that flooding can occur during the period November through May.

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 16 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 16.

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 17 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 (*12*). 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 18 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 Mollisol.

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 Aquoll (*Aqu*, meaning water, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of 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 Haplaquolls (*Hapl*, meaning minimal horizonation, plus *aquoll*, the suborder of the Mollisols that has an aquic 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 Haplaquolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly 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 Haplaquolls.

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. The soil is compared with similar soils and with nearby soils of other 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* (*10*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*12*). 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."

Allison Series

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

Allison soils commonly are adjacent to Lawson, Sawmill, and Tice soils. Lawson and Tice soils are somewhat poorly drained and slightly lower on the landscape. Sawmill soils are poorly drained and on the lowest parts of the flood plain and in sloughs.

Typical pedon from an area of Allison silt loam, 1,580 feet west and 1,940 feet north of the southeast corner of sec. 22, T. 16 N., R. 1 W.

Ap—0 to 9 inches; mixed black (10YR 2/1) and very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and very fine granular structure, moderate fine and medium angular blocky in the lower part; friable; medium acid; clear smooth boundary.

A—9 to 16 inches; mixed dark brown (10YR 3/3) and very dark gray (10YR 3/1) silt loam, brown (10YR 5/3) dry; weak fine and medium subangular blocky structure parting to moderate fine and medium granular; friable; slightly acid; clear smooth boundary.

AB—16 to 24 inches; mixed dark brown (10YR 3/3) and very dark gray (10YR 3/1) silt loam, brown (10YR 5/3) dry; weak fine prismatic structure parting to moderate fine subangular blocky; friable; slightly acid; clear smooth boundary.

Bw1—24 to 33 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 5/3) dry; common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate fine prismatic structure parting to moderate fine and medium angular blocky and subangular blocky; friable; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; common fine irregular accumulations (iron and manganese oxides); few pebbles; neutral; clear smooth boundary.

Bw2—33 to 44 inches; dark brown (10YR 4/3) silty clay loam; common fine faint dark yellowish brown (10YR 4/4) mottles; moderate fine and very fine prismatic structure; friable; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; common fine irregular accumulations (iron and manganese oxides); few pebbles; neutral; gradual smooth boundary.

Bw3—44 to 60 inches; dark brown (10YR 4/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; strong fine prismatic structure parting to moderate fine prismatic; friable; few faint very dark gray (10YR 3/1) organic coatings on faces of peds; common fine irregular accumulations (iron and manganese oxides); few pebbles; mildly alkaline.

The solum ranges from 45 to more than 60 inches in thickness. The mollic epipedon is 24 to 35 inches thick. The clay content averages from 27 to 30 percent in the control section.

The A horizon dominantly is silt loam, but is silty clay loam in some pedons. The Bw horizon dominantly is silty clay loam, but some pedons have sandier textures in the lower subhorizons. Some pedons have a C horizon that has strata of silt loam, silty clay loam, sandy loam, and loam.

Birkbeck Series

The Birkbeck series consists of moderately well drained soils on till plains. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. These soils formed in loess and the underlying loamy glacial till. Slopes range from 1 to 5 percent.

Birkbeck soils are similar to Camden, Elco, Rozetta, Russell, and Xenia soils and commonly are adjacent to Miami, Russell, and Sabina soils. Camden soils are well drained and formed in a thinner layer of loess and the underlying glacial outwash. Elco soils formed in a thinner layer of loess and the underlying paleosol formed in Illinoian drift. Rozetta soils formed entirely in loess. Russell soils are well drained, formed in a thinner layer of loess and in the underlying glacial till, and are on side slopes below Birkbeck soils. Xenia soils are in the aquic subgroup and formed in a thinner layer of loess and in the underlying glacial till. Miami soils are well drained, formed dominantly in glacial till, and are on side slopes below Birkbeck soils. Sabina soils are somewhat poorly drained, have more clay in the subsoil than Birkbeck soils, and are lower on the landscape.

Typical pedon of Birkbeck silt loam, 1 to 5 percent slopes, 1,600 feet east and 750 feet south of the northwest corner of sec. 25, T. 17 N., R. 3 E.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak thin platy structure parting to moderate very fine granular; friable; slightly acid; abrupt smooth boundary.

E—4 to 9 inches; dark brown (10YR 4/3) silt loam; moderate very fine platy structure; friable; few distinct light gray (10YR 6/1) silt coatings and dark brown (10YR 3/3) organic coatings on faces of peds; medium acid; clear smooth boundary.

BE—9 to 13 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine subangular blocky structure parting to moderate very fine granular; friable; common distinct dark brown (10YR 3/3) clay films and light gray (10YR 7/1) silt coatings on faces of peds; few fine irregular accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Bt1—13 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and very fine subangular blocky structure; friable; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; common fine irregular accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt2—24 to 29 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; common fine irregular accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Bt3—29 to 42 inches; dark yellowish brown (10YR 4/4) silty clay loam; common fine prominent light yellowish brown (2.5Y 6/4) and few fine faint light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; friable; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; common medium irregular accumulations (iron and manganese oxides); slightly acid; gradual smooth boundary.

Bt4—42 to 54 inches; dark yellowish brown (10YR 4/4) silty clay loam; common fine prominent light yellowish brown (2.5Y 6/4), few fine faint light brownish gray (2.5Y 6/2), and few medium distinct strong brown (7.5YR 5/6) mottles; moderate medium and coarse subangular blocky structure; friable; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; common medium irregular accumulations (iron and manganese oxides); neutral; clear smooth boundary.

2Bt5—54 to 60 inches; dark yellowish brown (10YR 4/4) loam; common medium prominent light yellowish brown (2.5Y 6/4), common fine distinct light brownish gray (2.5Y 6/2), and strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; friable; few distinct dark brown (7.5YR 4/4) clay films on faces of peds and few distinct very dark grayish brown (10YR 3/2) clay films lining pores; few fine irregular accumulations (iron and manganese oxides); neutral; gradual smooth boundary.

2C—60 to 67 inches; light olive brown (2.5Y 5/4) loam; common fine distinct light brownish gray (2.5Y 6/2), light yellowish brown (2.5Y 6/4), and yellowish brown (10YR 5/6) mottles; massive; firm; few distinct very dark grayish brown (10YR 3/2) organic coatings lining pores; few fine irregular accumulations (iron and manganese oxides); strong effervescence; mildly alkaline.

The solum ranges from 44 to 70 inches in thickness. The loess ranges from 40 to 60 inches in thickness. The clay content averages from 27 to 35 percent in the control section.

The A or Ap horizon has value of 3 or 4 and chroma of 1 to 3. The E horizon has value of 4 or 5 and chroma of 2 to 4. Some pedons in cultivated areas do not have an E horizon. Also, some pedons do not have a BE horizon. The Bt horizon has value of 4 or 5 and chroma of 3 or 4. It is typically strongly acid to neutral, but ranges from very strongly acid to neutral. The 2Bt horizon has hue of 10YR, 7.5YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 6. It has distinct or prominent mottles. It is loam or clay loam. The 2C horizon is loam or clay loam.

Broadwell Series

The Broadwell series consists of well drained soils on till plains and outwash plains. Permeability is moderate in the upper part of the profile and rapid in the lower part. These soils formed in loess and the underlying, wind-blown sands. Slopes range from 1 to 7 percent.

Broadwell soils are similar to Dana, Catlin, Plano, Proctor, and Tama soils and commonly are adjacent to Drummer, Elburn, and Proctor soils. Dana, Catlin, Plano, and Tama soils are moderately well drained. Catlin and Dana soils formed in loess and the underlying glacial till. Plano soils formed in loess and the underlying, stratified outwash. Proctor soils formed in thinner loess and the underlying glacial outwash, and are on side slopes below Broadwell soils. Tama soils formed entirely in loess. Drummer soils are poorly drained and in drainageways and broad, flat areas below Broadwell soils. Elburn soils are somewhat poorly drained and on broader ridges.

Typical pedon of Broadwell silt loam, 1 to 7 percent slopes, 650 feet south and 1,410 feet west of the northeast corner of sec. 24, T. 16 N., R. 1 W.

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate fine granular structure; friable; strongly acid; abrupt smooth boundary.

A—8 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate very fine subangular blocky structure with moderate medium angular blocky structure in the traffic pan in the upper part; friable; strongly acid; clear smooth boundary.

BA—11 to 15 inches; dark yellowish brown (10YR 4/4) silty clay loam; strong very fine and fine subangular blocky structure; friable; continuous distinct very dark gray (10YR 3/1) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt1—15 to 21 inches; dark yellowish brown (10YR 4/6) silty clay loam; strong fine and medium subangular blocky structure; friable; many distinct very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—21 to 33 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; continuous distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt3—33 to 43 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; many distinct dark yellowish brown (10YR 4/4) and brown (10YR 4/3) clay films on faces of peds; neutral; gradual wavy boundary.

Bt4—43 to 50 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure; friable; few distinct dark yellowish brown (10YR 4/4) clay films on vertical faces of prisms; about 15 percent sand; neutral; abrupt wavy boundary.

2BC—50 to 60 inches; yellowish brown (10YR 5/6) loamy fine sand; weak coarse subangular blocky structure; very friable; common distinct strong brown (7.5YR 4/6) clay bridges between sand grains in a few lamella; neutral.

The solum ranges from 45 to 65 inches in thickness. The loess is 40 to 60 inches in thickness. The mollic epipedon ranges from 10 to 18 inches in thickness. The clay content averages between 27 and 35 percent in the control section.

The A horizon has value of 2 or 3 and chroma of 1 to 3. Some pedons have an AB horizon. The Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. Reaction ranges from medium acid to neutral. Some pedons have a 2Bt horizon that is silty clay loam, silt loam, loam, or sandy loam. The 2BC horizon and, in some pedons, the 2C horizon are fine sandy loam, loamy fine sand, or fine sand.

Brooklyn Series

The Brooklyn series consists of poorly drained soils on outwash plains and till plains. Permeability is slow in the upper part of the profile and moderately slow in the lower part. These soils formed in loess and the underlying loamy outwash. Slopes are less than 1 percent.

Brooklyn soils are similar to Denny and Thorp soils and commonly are adjacent to Drummer, Elburn, and Flanagan soils in the landscape. Denny soils formed in thicker loess and do not have a 2Bt or 2BC horizon. Thorp soils have a mollic epipedon and have less clay in the subsoil than Brooklyn soils. Drummer soils are in slightly lower positions in the landscape. Elburn and Flanagan soils are somewhat poorly drained and on low ridges above Brooklyn soils.

Typical pedon of Brooklyn silt loam, 1,200 feet south and 1,600 feet east of the northwest corner of sec. 4, T. 16 N., R. 4 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and very fine granular structure; friable; medium acid; abrupt smooth boundary.

E—8 to 15 inches; grayish brown (10YR 5/2) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure, weak thin platy in upper part; friable; common thin very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Btg1—15 to 20 inches; grayish brown (10YR 5/2) silty clay; common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; few distinct very dark gray (10YR 3/1) organic coatings and many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Btg2—20 to 34 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium angular blocky structure; firm; few distinct very dark gray (10YR 3/1) coatings and many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine irregular accumulations (iron and manganese oxides); slightly acid; gradual smooth boundary.

Btg3—34 to 49 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse subangular blocky structure; firm; few distinct very dark gray (10YR 3/1) and common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine irregular accumulations (iron and manganese oxides); neutral; gradual smooth boundary.

2BCg—49 to 56 inches; grayish brown (2.5YR 5/2) silt loam; many medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; massive; friable; few distinct very dark gray (10YR 3/1) clay films lining pores; few fine irregular accumulations (iron and manganese oxides); neutral; abrupt smooth boundary.

2Cg—56 to 60 inches; grayish brown (10YR 5/2) stratified clay loam, loam, and sandy loam; individual strata are gravelly; many medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; massive; friable; few distinct very dark gray (10YR 3/1) clay films lining pores; neutral.

The solum ranges from 45 to more than 60 inches in thickness. The loess ranges from 40 to 60 inches in thickness.

The Ap horizon is 7 to 9 inches thick. It has a chroma of 1 or 2. The E horizon has value of 4 or 5 and chroma of 1 or 2, and has mottles of higher chroma.

The Bt horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. It typically is medium acid to neutral, but ranges from strongly acid to neutral. The clay content averages from 35 to 40 percent in the control section.

Camden Series

The Camden series consists of well drained soils on outwash plains and stream terraces. Permeability is moderate in the upper part of the profile and moderately rapid in the lower part. These soils formed in loess and the underlying, stratified, loamy glacial outwash. Slopes range from 1 to 5 percent.

Camden soils are similar to Birkbeck, Elco, Rozetta, and Xenia soils and commonly are adjacent to Lawson and Starks soils. Birkbeck, Elco, Rozetta, and Xenia soils are moderately well drained. Birkbeck, Russell, and Xenia soils formed in loess and the underlying glacial till. Elco soils formed in loess and the underlying paleosol formed in Illinoian drift. Rozetta soils formed entirely in loess. Lawson and Starks soils are somewhat poorly drained and are lower on the landscape than the Camden soils. Also, Lawson soils are subject to frequent flooding.

Typical pedon of Camden silt loam, 1 to 5 percent slopes, 1,040 feet west and 970 feet north of the center of sec. 16, T. 17 N., R. 4 E.

Ap—0 to 5 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; moderate fine and medium granular structure; friable; neutral; abrupt smooth boundary.

E—5 to 8 inches; mixed brown (10YR 4/3) and pale brown (10YR 6/3) silt loam; weak moderate and coarse platy structure parting to weak fine angular blocky and subangular blocky; friable; slightly acid; clear smooth boundary.

BE—8 to 14 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium and fine subangular blocky structure; friable; many distinct pale brown (10YR 6/3) silt coatings and few distinct brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt1—14 to 19 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; common distinct brown (10YR 4/3) clay films and pale brown (10YR 6/3) silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt2—19 to 25 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very fine prismatic structure parting to moderate fine and medium subangular blocky; firm; many distinct brown (10YR 4/3) clay films on faces of peds and few distinct black (10YR 2/1) clay films lining pores; strongly acid; clear smooth boundary.

2Bt3—25 to 32 inches; dark yellowish brown (10YR 4/4) and pale brown (10YR 6/3) stratified clay loam and sandy loam; common fine distinct strong brown (7.5YR 5/6 and 5/8) mottles; moderate medium prismatic structure; firm; common distinct brown (10YR 4/3) clay films on faces of peds and few distinct black (10YR 2/1) clay films lining pores; strongly acid; gradual smooth boundary.

2BC—32 to 49 inches; dark yellowish brown (10YR 4/4) and pale brown (10YR 6/3) stratified loam, sandy loam, and loamy sand; common fine distinct strong brown (7.5YR 5/6 and 5/8) mottles; weak coarse prismatic structure; friable; few distinct brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

2C—49 to 60 inches; dark yellowish brown (10YR 4/4) and pale brown (10YR 6/3) stratified loam, sandy loam, and loamy sand; common fine distinct strong brown (7.5YR 5/6 and 5/8) mottles; massive; friable; few distinct very dark grayish brown (10YR 3/2) clay bridges in sandy strata; common fine and medium irregular accumulations (iron and manganese oxides); medium acid.

The solum ranges from 40 to 55 inches in thickness. The loess ranges from 24 to 40 inches in thickness.

The Ap horizon has value of 3 to 5 and chroma of 2 or 3. The E horizon has chroma of 2 to 4. Some cultivated pedons do not have an E horizon. The Bt horizon has value of 4 or 5 and chroma of 3 to 6. The clay content averages 27 to 35 percent in the control section. The Bt horizon ranges from strongly acid to neutral. The 2Bt horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 3 to 6. The 2C horizon is medium acid to moderately alkaline.

Catlin Series

The Catlin series consists of moderately well drained, moderately permeable soils on till plains and moraines. These soils formed in loess and in the underlying, loamy glacial till. Slopes range from 1 to 7 percent.

Catlin soils are similar to Broadwell, Dana, Plano, Proctor, and Tama soils and commonly are adjacent to Dana, Drummer, and Flanagan soils. Broadwell and Proctor soils are well drained. Broadwell soils formed in loess and the underlying eolian sands. Plano and Proctor soils formed in loess and the underlying glacial outwash. Tama soils formed entirely in loess. Dana soils formed in thinner loess than Catlin soils, and are in similar positions on the landscape or on more sloping convex ridges than Catlin soils. Drummer soils are poorly drained and in drainageways and broad, flat areas below Catlin soils. Flanagan soils are somewhat poorly drained and on low ridges below Catlin soils.

Typical pedon of Catlin silt loam, 1 to 5 percent slopes, 260 feet west and 1,140 feet south of the northeast corner of sec. 2, T. 17 N., R. 1 E.

Ap—0 to 9 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; slightly acid; clear smooth boundary.

A—9 to 14 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many distinct very dark brown (10YR 2/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

BA—14 to 19 inches; dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure parting to strong fine subangular blocky; friable; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt1—19 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine distinct strong brown (7.5YR 5/6) mottles; weak fine prismatic structure parting to moderate fine and medium subangular blocky; friable; many distinct dark brown (7.5YR 3/4) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—24 to 31 inches; yellowish brown (10YR 5/4) silty clay loam; few medium distinct strong brown (7.5YR 5/6) and brown (10YR 5/3) mottles; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt3—31 to 53 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct dark brown (7.5YR 4/4), strong brown (7.5YR 5/6), pale brown (10YR 6/3), and few fine distinct grayish brown (10YR 5/2) mottles; moderate medium prismatic structure; friable; common distinct brown (10YR 4/3) clay films on vertical faces of peds; slightly acid; abrupt smooth boundary.

2Bt4—53 to 60 inches; dark brown (7.5YR 4/4) clay loam; few medium prominent yellowish red (5YR 5/8) and common medium distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; firm; common distinct brown (7.5YR 4/2) and very dark gray (10YR 3/1) clay films on vertical faces of peds; neutral; gradual smooth boundary.

The solum ranges from 45 to more than 60 inches in thickness. The mollic epipedon is 10 to 16 inches thick. The loess ranges from 40 to 60 inches in thickness.

The A horizon has value of 2 or 3 and chroma of 1 to 3. Some pedons do not have a BA horizon. The Bt horizon has chroma of 3 or 4. The clay content averages from 27 to 35 percent in the control section. Reaction of the Bt horizon typically is medium acid to neutral, but ranges from strongly acid to neutral. The 2Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is loam or clay loam. Reaction is slightly acid to moderately alkaline.

Some pedons have a 2C horizon that is loam or clay loam. Reaction ranges from neutral to moderately alkaline.

Clarksdale Series

The Clarksdale series consists of somewhat poorly drained, moderately slowly permeable soils on loess-covered till plains and outwash plains. These soils formed in loess. Slopes range from 0 to 2 percent.

These soils have grayer colors in the Bt horizon than is definitive for the Clarksdale series. This difference, however, does not significantly affect the usefulness or behavior of the soils.

Clarksdale soils are similar to Sabina soils and commonly are adjacent to Denny, Downs, and Sable soils. Sabina soils have a lighter colored surface layer than Clarksdale soils and formed in loess and the underlying glacial till. Denny soils are poorly drained and are in level or depressional areas lower on the landscape than Clarksdale soils. Downs soils are moderately well drained and on convex ridges above Clarksdale soils. Sable soils are poorly drained and in drainageways below Clarksdale soils.

Typical pedon of Clarksdale silt loam, 43 feet north and 2,290 feet west of the center of sec. 19, T. 15 N., R. 1 E.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate fine granular structure; friable; medium acid; abrupt smooth boundary.

E1—7 to 10 inches; dark gray (10YR 4/1) silt loam; common mixing of darker material from surface layer and lighter patches of clean silt grains; few fine distinct yellowish brown (10YR 5/4) mottles; weak medium platy structure parting to weak fine granular; friable; brittle when dry; medium acid; clear smooth boundary.

E2—10 to 17 inches; grayish brown (10YR 5/2) silt loam; common fine distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure parting to moderate fine granular; friable; medium acid; abrupt smooth boundary.

BE—17 to 24 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct yellowish brown (10YR 5/4) and very dark gray (10YR 3/1) mottles; weak fine and medium subangular blocky structure; friable; few distinct light gray (10YR 6/1) dry silt coatings on faces of peds; medium acid; clear smooth boundary.

Bt1—24 to 31 inches; grayish brown (10YR 5/2) silty clay loam; common medium prominent strong brown (7.5YR 5/8) and common medium distinct yellowish brown (10YR 5/4) mottles; moderate fine and medium angular blocky structure; firm; many distinct very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) and few distinct very dark gray (10YR 3/1) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—31 to 42 inches; mottled grayish brown (2.5Y 5/2), strong brown (7.5YR 4/6), and yellowish brown (10YR 5/6) silty clay loam; moderate medium prismatic structure; firm; many distinct very dark gray (10YR 3/1), dark gray (10YR 4/1), and dark grayish brown (10YR 4/2) clay films on faces of peds; few fine round accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt3—42 to 52 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium and coarse prominent strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure; firm; many distinct black (10YR 2/1) and dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; gradual smooth boundary.

BC—52 to 60 inches; mottled yellowish brown (10YR 5/6) and gray (5Y 6/1) silty clay loam; weak coarse prismatic structure; friable; common distinct very dark gray (10YR 3/1) clay films lining pores; slightly acid.

The solum ranges from 50 to more than 60 inches in thickness.

The Ap horizon has a value of 2 or 3 and chroma of 1 or 2. The E horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. The Bt horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 4. It has distinct or prominent mottles throughout. The clay content in the control section averages from 35 to 40 percent.

Dana Series

The Dana series consists of moderately well drained soils on till plains and moraines. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. These soils formed in loess and in the underlying, loamy glacial till. Slopes range from 1 to 6 percent.

Dana soils are similar to Broadwell, Catlin, Plano, Proctor, and Tama soils and commonly are adjacent to Catlin, Drummer, Flanagan, and Raub soils. Broadwell and Proctor soils are well drained. Broadwell soils formed in loess and the underlying eolian sands. Plano and Proctor soils formed in loess and the underlying glacial outwash. Tama soils formed entirely in loess. Catlin, Drummer, and Flanagan soils formed in thicker loess. Catlin soils are on adjacent or nearby ridgetops above Dana soils. Drummer soils are poorly drained and Flanagan and Raub soils are somewhat poorly drained; these soils are on lower parts of the landscape than Dana soils.

Typical pedon of Dana silt loam, 1 to 5 percent slopes, 1,130 feet north and 75 feet west of the southeast corner of sec. 17, T. 15 N., R. 3 E.

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

Bt1—10 to 15 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine and very fine subangular blocky structure; friable; many distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; neutral; clear smooth boundary.

Bt2—15 to 22 inches; yellowish brown (10YR 5/4) silty clay loam; strong fine and medium subangular blocky structure; friable; many distinct dark brown (10YR 3/3) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt3—22 to 28 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct yellowish brown (10YR 5/4 and 5/6) mottles; moderate medium subangular blocky structure; friable; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine rounded accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

2Bt4—28 to 42 inches; yellowish brown (10YR 5/4) clay loam; common fine prominent strong brown (7.5YR 5/6) and few fine distinct dark yellowish brown (10YR 3/4) mottles; moderate fine prismatic structure; friable; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few medium irregular accumulations (iron and manganese oxides); about 10 percent gravel; slightly acid; clear smooth boundary.

2Bt5—42 to 49 inches; brown (10YR 5/3) clay loam; few fine faint gray (10YR 5/1) and common fine and medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; weak medium prismatic structure; friable; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common distinct very dark gray (10YR 3/1) clay films lining pores; about 10 percent gravel; slight effervescence; mildly alkaline; gradual smooth boundary.

2C—49 to 60 inches; brown (10YR 5/3) loam; common fine prominent strong brown (7.5YR 5/8) and grayish brown (2.5Y 5/2) and common fine distinct yellow (10YR 7/8) mottles; massive; firm; few fine and medium irregular lime concretions; about 10 to 15 percent gravel; slight effervescence; mildly alkaline.

The solum ranges from 48 to 55 inches in thickness. The mollic epipedon is 10 to 16 inches thick. The loess ranges from 22 to 40 inches in thickness.

The A horizon has value of 2 or 3 and chroma of 1 or 2. Some pedons have a BA horizon. The Bt horizon has value of 4 or 5 and chroma of 3 or 4. The 2Bt horizon has value of 4 or 5 and chroma of 3 to 6. It is loam or clay loam. The clay content averages from 27 to 35 percent in the control section. Reaction of the Bt and 2Bt horizons ranges from strongly acid to mildly alkaline. The 2C horizon is neutral to moderately alkaline.

Dana silt loam, 4 to 6 percent slopes, eroded, has a thinner, dark surface layer than is definitive for the Dana series. This difference, however, does not significantly affect the usefulness or behavior of the soil.

Denny Series

The Denny series consists of poorly drained soils on loess-covered till plains and outwash plains. Permeability is slow in the upper part of the profile and moderately slow in the lower part. These soils formed in loess. Slopes range from 0 to 2 percent.

Denny soils are similar to Brooklyn soils and commonly are adjacent to Ipava, Sable, and Tama soils. Brooklyn soils formed in loess and in the underlying glacial outwash. The adjacent Ipava, Sable, and Tama soils have a mollic epipedon and do not have an E horizon and abrupt textural changes. Ipava soils are somewhat poorly drained and Tama soils are moderately well drained; these soils are on ridges higher on the landscape. Sable soils are poorly drained, have a silty clay loam surface layer, and do not have an argillic horizon. Sable soils are in similar landscape positions as Denny soils or in lower, broad, flat landscape positions.

Typical pedon of Denny silt loam, 450 feet north and 1,390 feet west of the southeast corner of sec. 28, T. 15 N., R. 1 E.

A—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; medium acid; abrupt smooth boundary.

Eg1—8 to 12 inches; gray (10YR 5/1) silt loam; common medium prominent dark yellowish brown (10YR 4/6) mottles; weak thin and thick platy structure; friable; many distinct light gray (10YR 7/1) silt coatings on horizontal cleavage planes; medium acid; clear smooth boundary.

Eg2—12 to 18 inches; dark gray (10YR 4/1) silt loam; common medium and coarse distinct dark yellowish brown (10YR 4/6) mottles; weak medium subangular blocky structure; friable; common distinct light gray (10YR 7/1) silt coatings on faces of peds; medium acid; abrupt smooth boundary.

Btg1—18 to 24 inches; dark gray (10YR 4/1) silty clay; many medium and coarse prominent strong brown (7.5YR 5/8) mottles; moderate medium angular blocky structure; firm; many distinct dark gray (10YR 4/1) clay films on faces of peds; medium acid; clear smooth boundary.

Btg2—24 to 34 inches; gray (5Y 5/1) silty clay; many medium and coarse prominent strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure; many prominent dark gray (10YR 4/1) clay films on faces of peds; medium acid; clear smooth boundary.

Btg3—34 to 40 inches; gray (5Y 5/1) silty clay loam; many medium prominent strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure; friable; many distinct dark gray (10YR 4/1) clay films on faces of peds; medium acid; clear smooth boundary.

Btg4—40 to 48 inches; gray (10YR 6/1) silty clay loam; many coarse prominent strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; friable; common distinct dark gray (10YR 4/1) clay films on vertical faces of prisms; medium acid; gradual smooth boundary.

BCg—48 to 60 inches; gray (10YR 6/1) silty clay loam; many medium and coarse prominent yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; friable; common distinct dark gray (10YR 4/1) and very dark gray (10YR 3/1) clay films lining pores; medium acid.

The solum ranges from 40 to 65 inches in thickness.

The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The Eg horizon has value of 4 or 5 and chroma of 1 or 2. 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 or silty clay loam. Reaction of the Btg horizon is medium acid or slightly acid. Some pedons have a Cg horizon. The BCg and Cg horizons have hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. They are silt loam or silty clay loam. Reaction of the BCg and Cg horizons ranges from medium acid to mildly alkaline.

Downs Series

The Downs series consists of moderately well drained, moderately permeable soils on the loess-covered Illinoian till plain. These soils formed in loess. Slopes range from 1 to 5 percent.

Downs soils are similar to Tama and Wingate soils and commonly are adjacent to Ipava, Rozetta, and Tama soils. Tama soils have a mollic epipedon and are on nearby ridges. Wingate soils formed in loess and the underlying glacial till. Ipava soils are somewhat poorly drained and on low, broad ridges below Downs soils. Rozetta soils have a lighter colored surface layer than Downs soils and are on similar landscapes closer to streams.

Typical pedon of Downs silt loam, 1 to 5 percent slopes, 2,140 feet south and 520 feet east of the northwest corner of sec. 19, T. 15 N., R. 1 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common faint very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; abrupt smooth boundary.

BE—9 to 13 inches; brown (10YR 4/3) silt loam; moderate very fine subangular blocky structure; friable; common distinct very dark grayish brown (10YR 3/2) peds from Ap horizon and as organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bt1—13 to 20 inches; dark yellowish brown (10YR 4/4) silty clay loam; strong fine and medium subangular blocky structure; friable; many distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—20 to 29 inches; dark yellowish brown (10YR 4/4) silty clay loam; strong fine and medium subangular blocky structure; friable; many distinct dark brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt3—29 to 37 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct grayish brown (10YR 5/2) and common medium distinct pale brown (10YR 6/3) mottles; moderate medium prismatic structure; friable; common distinct brown (10YR 5/3) and dark yellowish brown (10YR 4/4) clay films on faces of peds; common medium irregular dark stains (iron and manganese oxides) on faces of some peds; strongly acid; gradual smooth boundary.

BC—37 to 55 inches; yellowish brown (10YR 5/4) silt loam; common fine distinct grayish brown (10YR 5/2) and few fine distinct strong brown (7.5YR 5/6) mottles; weak medium prismatic structure; friable; common distinct very dark grayish brown (10YR 3/2) and brown (10YR 4/3) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); medium acid; diffuse smooth boundary.

C—55 to 60 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct grayish brown (10YR 5/2) and common medium and coarse distinct strong brown (7.5YR 5/6) mottles; massive; friable; few fine rounded accumulations (iron and manganese oxides); medium acid.

The solum ranges from 50 to more than 60 inches in thickness. The clay content averages from 27 to 35 percent in the control section. Reaction ranges from strongly acid in the most acid part of the subsoil to neutral in the lower part.

The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The Bt horizon has value of 4 or 5 and chroma of 3 to 6. The C horizon is medium acid to neutral.

Drummer Series

The Drummer series consists of poorly drained, moderately permeable soils on outwash plains and till plains. These soils formed in loess or other silty material and the underlying loamy sediments. Slopes range from 0 to 2 percent.

Drummer soils are similar to Hartsburg, Pella, and Sable soils and commonly are adjacent to Elburn, Flanagan, Harpster, and Pella soils. Hartsburg and Sable soils formed entirely in loess. Hartsburg, Harpster, and Pella soils contain carbonates at a depth of less than 35 inches. Pella soils commonly are slightly lower on the landscape than Drummer soils. Elburn and Flanagan soils are somewhat poorly drained and are higher on the landscape than Drummer soils. Harpster soils commonly are slightly lower on the landscape than Drummer soils.

Typical pedon of Drummer silty clay loam, 100 feet east and 1,070 feet north of the southwest corner of sec. 12, T. 14 N., R. 3 E.

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine subangular blocky structure; friable; slightly acid; clear smooth boundary.

A—7 to 12 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate very fine subangular blocky structure; friable; many distinct black (10YR 2/1) organic coatings on faces of peds; neutral; clear smooth boundary.

AB—12 to 18 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; few fine distinct dark grayish brown (2.5Y 4/2) mottles; strong fine angular blocky structure; friable; common fine rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Btg1—18 to 24 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few fine prominent yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure parting to strong fine and medium angular blocky; firm; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Btg2—24 to 30 inches; grayish brown (2.5Y 5/2) silty clay loam; few fine prominent yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/6) mottles; moderate medium prismatic structure; firm; many distinct dark gray (10YR 4/1) clay films on faces of peds; few medium rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Bg1—30 to 45 inches; mottled grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/4 and 5/8) silty clay loam; moderate medium prismatic structure; friable; few faint gray (5Y 5/1) clay films on faces of peds; common krotovinas; neutral; gradual smooth boundary.

2Bg2—45 to 56 inches; gray (5Y 5/1) stratified silt loam, loam, and clay loam; medium coarse prominent strong brown (7.5YR 5/8) and yellowish brown (10YR 5/8) mottles; weak coarse prismatic structure; friable; few faint dark gray (5Y 4/1) clay films lining pores; neutral; gradual smooth boundary.

2Cg—56 to 65 inches; gray (5Y 5/1) stratified clay loam, loam, and sandy loam; many coarse prominent yellowish brown (10YR 5/8) mottles; massive; friable; slight effervescence; mildly alkaline.

The solum ranges from 45 to 60 inches in thickness. The overlying silty material ranges from 40 to 60 inches in thickness. The depth to free carbonates ranges from 40 to 60 inches. The mollic epipedon ranges from 10 to

24 inches in thickness. The clay content averages 27 to 35 percent in the control section.

The A horizon has hue of 10YR to 5Y, or is neutral, value of 2 or 3, and chroma of 0 to 2. The Btg and Bg horizons have hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 to 4. They range from medium acid to mildly alkaline. The 2Bg horizon has hue of 10YR, 2.5Y, 5Y, or is neutral, value of 4 to 6, and chroma of 0 to 8. It is loam or silt loam and in some pedons has strata of silty clay loam, clay loam, sandy clay loam, and sandy loam. It ranges from neutral to moderately alkaline. The 2Cg horizon is stratified loam, sandy loam, loamy sand, sandy clay loam, clay loam, and silty clay loam. It ranges from neutral to moderately alkaline.

Elburn Series

The Elburn series consists of somewhat poorly drained, moderately permeable soils on outwash plains. These soils formed in loess and the underlying loamy outwash. Slopes range from 0 to 3 percent.

Elburn soils are similar to Flanagan and Ipava soils and commonly are adjacent to Drummer, Ipava, and Plano soils. Flanagan and Ipava soils have more clay in the subsoil. Flanagan soils formed in loess and the underlying glacial till. Ipava soils formed entirely in loess and are in similar and slightly lower positions on the landscape. Drummer soils are poorly drained and in drainageways and broad, flat areas below Elburn soils. Plano soils are moderately well drained and higher on the landscape than Elburn soils.

Typical pedon of Elburn silt loam, 0 to 3 percent slopes, 220 feet east and 1,380 feet south of the northwest corner of sec. 10, T. 17 N., R. 1 E.

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

AB—9 to 13 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; friable; many distinct black (10YR 2/1) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt1—13 to 19 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine prominent strong brown (7.5YR 5/8) mottles; strong fine and medium subangular blocky structure; friable; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—19 to 28 inches; brown (10YR 4/3) silty clay loam; common fine and medium distinct yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) mottles; weak medium prismatic structure parting to strong medium angular and subangular blocky; friable; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common medium irregular accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt3—28 to 35 inches; grayish brown (10YR 5/2) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/8), reddish yellow (7.5YR 6/8), and distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; firm; many distinct grayish brown (10YR 5/2) clay films on faces of peds; few medium rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Bt4—35 to 50 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; firm; common distinct very dark grayish brown (10YR 3/2) organic clay films lining pores; few fine irregular accumulations (iron and manganese oxides); neutral; abrupt smooth boundary.

2Bt5—50 to 54 inches; strong brown (7.5YR 5/8) sandy loam; common medium prominent grayish brown (10YR 5/2) mottles; weak coarse prismatic structure; friable; common distinct black (10YR 2/1) clay films lining pores; neutral; abrupt smooth boundary.

2C—54 to 60 inches; strong brown (7.5YR 5/8) sandy loam; common coarse prominent gray (10YR 5/1) mottles; massive; loose; mildly alkaline.

The solum ranges from 45 to 65 inches in thickness. The overlying silty material ranges from 40 to 60 inches in thickness. The mollic epipedon is 10 to 20 inches thick. The clay content averages from 27 to 35 percent in the control section.

The A horizon has value of 2 or 3 and chroma of 1 or 2. Some pedons do not have an AB or BA horizon. The Bt horizon has value of 4 or 5 and chroma of 2 to 4. It is dominantly silty clay loam, but some pedons have subhorizons that are silt loam. Reaction of the Bt horizon is medium acid to mildly alkaline. Some pedons have a 2BC horizon. The 2Bt, 2BC, and 2C horizons commonly are stratified sandy loam to silty clay loam; strata of sandier textures are common in the 2C horizon. Reaction of the 2Bt, 2BC, and 2C horizons ranges from slightly acid to moderately alkaline.

Elco Series

The Elco series consists of moderately well drained soils on uplands. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. These soils formed in loess and the underlying Sangamon paleosol. Slopes range from 4 to 12 percent.

Elco soils are similar to Birkbeck, Camden, Rozetta, Russell, and Xenia soils and commonly are adjacent to Lawson and Rozetta soils. These soils did not develop in a paleosol. Birkbeck, Russell, and Xenia soils formed in loess and the underlying till. Camden and Russell soils are well drained. Camden soils formed in loess and the underlying glacial outwash. Rozetta soils formed entirely in loess and are on ridges above Elco soils. Lawson soils are somewhat poorly drained on the alluvial bottom land below Elco soils.

Typical pedon of Elco silt loam, 4 to 12 percent slopes, eroded, 1,410 feet north and 540 feet east of the southwest corner of sec. 18, T. 15 N., R. 1 E.

Ap—0 to 5 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; weak medium granular structure; friable; strongly acid; abrupt smooth boundary.

Bt1—5 to 9 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; many distinct brown (10YR 4/3) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—9 to 17 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; medium acid; clear smooth boundary.

Bt3—17 to 23 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct gray (10YR 5/1) and common fine distinct yellowish brown (10YR 5/8) mottles; moderate medium angular blocky structure; friable; many distinct brown (10YR 4/3) clay films on faces of peds; strongly acid; clear smooth boundary.

2Bt4—23 to 35 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct strong brown (7.5YR 5/8) and grayish brown (10YR 5/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; many distinct light gray (10YR 7/2) dry silt coatings on vertical faces of prisms and many distinct brown (10YR 4/3) clay films on faces of peds; 15 percent sand, estimated; strongly acid; gradual smooth boundary.

2Bt5—35 to 60 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) and few fine prominent gray (10YR 5/1) mottles; moderate medium prismatic structure; firm; many distinct dark brown (10YR 3/3 and 4/3) clay films on faces of peds; 15 to 20 percent sand, estimated; strongly acid.

The thickness of the solum ranges from 50 to more than 70 inches. The clay content averages 27 to 35 percent in the control section.

The Ap horizon has value of 3 to 5 and chroma of 2 to 4. It is silt loam or silty clay loam. Uneroded pedons have an E horizon. The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. In the upper part it is silt loam in some pedons. It ranges from strongly acid to mildly alkaline. The 2Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 4. It is silty clay loam or clay loam. It is strongly acid to mildly alkaline.

Flanagan Series

The Flanagan series consists of somewhat poorly drained soils on till plains and moraines. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. These soils formed in loess and the underlying, loamy glacial till. Slopes range from 0 to 3 percent.

Flanagan soils are similar to Elburn, Ipava, Raub, and Sunbury soils and commonly are adjacent to Catlin, Dana, and Drummer soils. Elburn soils contain less clay in the subsoil and formed in loess and the underlying glacial outwash. Ipava soils formed in thicker loess and do not have a 2Bt or 2BC horizon. Raub soils formed in thinner loess and contain less clay in the control section. Sunbury soils have a thinner, dark colored surface layer than Flanagan soils. Catlin and Dana soils are moderately well drained and in more sloping areas higher on the landscape than Flanagan soils. Drummer soils are poorly drained and in drainageways and broad, flat areas below Flanagan soils.

Typical pedon of Flanagan silt loam, 0 to 3 percent slopes, 135 feet west and 2,575 feet north of the southeast corner of sec. 18, T. 16 N., R. 1 E.

Ap—0 to 9 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; many faint black (10YR 2/1) organic coatings on faces of peds; strongly acid; clear smooth boundary.

A—9 to 14 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate coarse granular structure; friable; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt1—14 to 19 inches; dark grayish brown (10YR 4/2) silty clay loam; few medium distinct yellowish brown (10YR 5/6) mottles; strong fine angular blocky structure; friable; many distinct very dark gray (10YR 3/1) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—19 to 26 inches; yellowish brown (10YR 5/4) silty clay loam; few medium distinct strong brown (7.5YR 5/6) mottles; moderate fine prismatic structure parting to strong fine angular blocky; friable; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; medium acid; clear smooth boundary.

Bt3—26 to 34 inches; yellowish brown (10YR 5/4) silty clay loam; few medium distinct grayish brown (10YR 5/2) and common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure; friable; many distinct dark grayish brown (10YR 4/2) and few distinct very dark gray (10YR

3/1) clay films on faces of peds and lining pores; medium acid; clear smooth boundary.

Bt4—34 to 48 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure; friable; many distinct dark gray (10YR 4/1) and very dark gray (10YR 3/1) clay films on faces of peds and many distinct black (10YR 2/1) clay films lining pores; slightly acid; clear smooth boundary.

Bt5—48 to 52 inches; mottled yellowish brown (10YR 5/4), grayish brown (10YR 5/2), and strong brown (7.5YR 5/6) silty clay loam; weak coarse prismatic structure; friable; many distinct very dark gray (10YR 3/1) clay films lining pores; neutral; clear smooth boundary.

2Bt6—52 to 58 inches; brown (7.5YR 5/4) clay loam; common medium distinct grayish brown (10YR 5/2) mottles; weak coarse prismatic structure; friable; common distinct very dark gray (10YR 3/1) clay films lining pores; neutral; gradual smooth boundary.

2C—58 to 70 inches; brown (7.5YR 5/4) loam; common medium distinct strong brown (7.5YR 5/8) and grayish brown (10YR 5/2) mottles; massive; firm; slight effervescence; mildly alkaline.

The solum ranges from 44 to 60 inches in thickness. The loess ranges from 40 to 60 inches in thickness. The depth to carbonates ranges from 44 to 58 inches. The mollic epipedon is 11 to 18 inches thick.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is dominantly silt loam but in some pedons it is silty clay loam. The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 6. The clay content averages from 35 to 42 percent in the control section. The 2Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 1 to 6. It is silt loam, loam, clay loam, or silty clay loam. It ranges from slightly acid to mildly alkaline. The 2C horizon is loam, clay loam, silt loam, or silty clay loam. It is mildly alkaline or moderately alkaline.

Harpster Series

The Harpster series consists of poorly drained, moderately permeable soils on till plains and outwash plains. These soils formed in loess or other silty material. Slopes range from 0 to 2 percent.

Harpster soils are similar to Hartsburg and Pella soils and commonly are adjacent to Hartsburg, Drummer, and Sable soils. These soils all have carbonates at greater depths in the profile than Harpster soils. Hartsburg and Pella soils are slightly lower on the landscape. Drummer and Sable soils are slightly higher or slightly lower on the landscape.

Typical pedon of Harpster silty clay loam, 2,180 feet west and 680 feet north of the southeast corner of sec. 3, T. 17 N., R. 3 E.

Apk—0 to 7 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and very fine granular structure; friable; few snail shells; few pebbles; strong effervescence; moderately alkaline; abrupt smooth boundary.

Ak—7 to 12 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak medium angular blocky and weak very fine subangular blocky structure parting to moderate fine and very fine granular; friable; few snail shells; few pebbles; strong effervescence; moderately alkaline; clear smooth boundary.

AB—12 to 18 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak very fine subangular blocky structure parting to moderate fine and very fine granular; friable; many faint black (10YR 2/1) organic coatings on faces of peds; few snail shells; few fine rounded concretions (iron and manganese oxides); few pebbles; slight effervescence; mildly alkaline; clear smooth boundary.

Bg1—18 to 25 inches; dark gray (10YR 4/1) silty clay loam; few fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak fine prismatic structure parting to moderate very fine subangular blocky; friable; many faint very dark gray (10YR 3/1) organic coatings on faces of peds; few snail shells; few fine irregular lime concretions (calcium carbonates); few fine rounded concretions (iron and manganese oxides); few pebbles; very weak effervescence; mildly alkaline; gradual smooth boundary.

Bg2—25 to 32 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak medium prismatic structure parting to moderate fine subangular blocky; friable; many faint dark grayish brown (2.5Y 4/2) silty clay loam coatings on faces of peds; common very dark gray (10YR 3/1) krotovinas; few snail shells; few fine irregular lime concretions (calcium carbonates); few fine rounded concretions (iron and manganese oxides); few pebbles; very weak effervescence; mildly alkaline; gradual smooth boundary.

Bg3—32 to 39 inches; light olive gray (5Y 6/2) silty clay loam; many fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak medium subangular blocky structure; friable; common faint gray (5Y 5/1) clay films on faces of peds; common very dark gray (10YR 3/1) krotovinas; few snail shells; few fine irregular lime concretions (calcium carbonates); few fine irregular accumulations (iron and manganese oxides); few pebbles; slight effervescence; mildly alkaline; diffuse smooth boundary.

Cg1—39 to 54 inches; light gray (5Y 6/1) silt loam; moderate fine and medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; massive; friable; common prominent gray (5Y 5/1) clay films lining pores; common very dark gray (10YR 3/1) krotovinas; few snail shells; few fine irregular lime concretions (calcium carbonates); few fine irregular accumulations (iron and manganese oxides); few pebbles; violent effervescence; moderately alkaline; abrupt smooth boundary.

2Cg2—54 to 60 inches; mottled yellowish brown (10YR 5/6) and pale olive (5Y 6/3) stratified silt loam, sandy loam, and loamy sand; moderate medium distinct light gray (5Y 6/1) mottles; massive; friable; few fine irregular lime concretions (calcium carbonates); few fine irregular accumulations (iron and manganese oxides); few pebbles; violent effervescence; moderately alkaline.

The solum ranges from 30 to 46 inches in thickness. The mollic epipedon ranges from 10 to 24 inches in thickness. The clay content averages 27 to 35 percent in the control section.

The A horizon has hue of 10YR to 5Y or is neutral, value of 2 or 3, and chroma of 0 or 1. It is silty clay loam or silt loam. The Bg horizon has value of 3 to 6 and chroma of 0 to 2. It is dominantly silty clay loam, but is silt loam in the lower part. Reaction throughout is mildly alkaline or moderately alkaline. Some pedons do not have a 2Cg horizon.

Hartsburg Series

The Hartsburg series consists of poorly drained, moderately permeable soils on uplands. These soils formed in loess. Slopes range from 0 to 2 percent.

Hartsburg soils are similar to Drummer, Harpster, Pella, and Sable soils and commonly are adjacent to Harpster, Ipava, and Sable soils. Drummer and Pella soils have loamy glacial outwash or glacial till within a depth of 60 inches. Also, Drummer soils do not have carbonates above a depth of 35 inches. Harpster soils have carbonates above a depth of 16 inches and are slightly higher on the landscape than Hartsburg soils. Ipava soils are somewhat poorly drained and on low ridges above Hartsburg soils. Sable soils are slightly higher on the landscape and do not have carbonates above a depth of 35 inches.

Typical pedon of Hartsburg silty clay loam, 1,050 feet south and 57 feet west of the northeast corner of sec. 3, T. 17 N., R. 3 E.

Ap—0 to 9 inches; black (N 2/0) silty clay loam, dark gray (10YR 4/1) dry; moderate very fine subangular blocky structure parting to moderate fine and medium granular; friable; common roots; neutral; abrupt smooth boundary.

A—9 to 12 inches; black (N 2/0) silty clay loam, dark gray (10YR 4/1) dry; common fine distinct dark grayish brown (2.5Y 4/2) mottles; weak fine and medium subangular blocky structure; friable; neutral; clear smooth boundary.

BA—12 to 16 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; common fine distinct dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure parting to moderate fine subangular blocky; friable; many faint very dark gray (N 3/0) organic coatings on faces of peds; few fine rounded accumulations (iron and manganese oxides); few pebbles; neutral; clear smooth boundary.

Btg1—16 to 22 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable; common distinct very dark gray (N 3/0) and dark gray (N 4/0) clay films on faces of peds; many distinct black (N 2/0) clay films lining pores; common fine round accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Btg2—22 to 27 inches; dark grayish brown (2.5Y 4/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and prominent strong brown (7.5YR 5/6) mottles; moderate very fine prismatic structure parting to moderate fine subangular blocky; friable; many distinct very dark gray (10YR 3/1) clay films lining pores; common distinct dark gray (N 4/0) clay films on faces of peds; few fine irregular lime concretions (calcium carbonates); slight effervescence; mildly alkaline; clear smooth boundary.

Btg3—27 to 31 inches; gray (10YR 5/1) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure; friable; many distinct dark gray (N 4/0) clay films on faces of peds; few distinct very dark gray (10YR 3/1) clay films lining pores; few fine irregular lime concretions (calcium carbonates); common fine rounded accumulations (iron and manganese oxides); few pebbles; slight effervescence; mildly alkaline; clear smooth boundary.

BCkg—31 to 36 inches; gray (10YR 5/1) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) mottles; weak very fine prismatic structure; friable; few distinct very dark gray (10YR 3/1) clay films on faces of peds and lining pores; common black (N 2/0) krotovinas; common fine irregular lime concretions (calcium carbonates); common few rounded accumulations (iron and manganese oxides); few pebbles; strong effervescence; moderately alkaline; clear smooth boundary.

Cg1—36 to 52 inches; gray (10YR 5/1) silt loam; common fine and medium prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) mottles; massive; friable; common distinct very dark grayish brown (10YR 3/2) clay films lining pores; common black (N 2/0) and dark gray (N 4/0) krotovinas; common fine irregular lime concretions (calcium carbonates); few pebbles; violent effervescence; moderately alkaline; gradual smooth boundary.

Cg2—52 to 60 inches; gray (10YR 6/1) silt loam; common medium and coarse prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) mottles; massive; friable; common dark gray (N 4/0) krotovinas; common fine and medium irregular lime concretions (calcium carbonates); few pebbles; violent effervescence; moderately alkaline.

The solum ranges from 30 to 42 inches in thickness. The mollic epipedon ranges from 10 to 20 inches in thickness. The depth to carbonates ranges from 20 to 35 inches. The loess is more than 60 inches thick. The clay content averages from 27 to 35 percent in the control section.

The A horizon has hue of 10YR or is neutral, value of 2 or 3, and chroma of 0 or 1. Some pedons do not have a BA horizon. The Btg horizon has hue of 10YR, 2.5Y, 5Y, or is neutral, and chroma of 0 to 2. It is dominantly silty clay loam but is silt loam in the lower part of some pedons.

Ipava Series

The Ipava series consists of somewhat poorly drained, moderately slowly permeable soils on till plains. These soils formed in loess. Slopes range from 0 to 3 percent.

Ipava soils are similar to Elburn and Flanagan soils and commonly are adjacent to Elburn, Sable, and Tama soils. Elburn soils formed in loess and the underlying glacial outwash, have less clay in the subsoil, and are on slightly higher ridges above Ipava soils. Flanagan soils formed in loess and the underlying glacial till. Sable soils are poorly drained and in broad, flat areas below Ipava soils. Tama soils are moderately well drained and on more sloping, prominent ridges above Ipava soils.

Typical pedon of Ipava silt loam, 0 to 3 percent slopes, 1,240 feet north and 250 feet west of the southeast corner of sec. 31, T. 18 N., R. 1 E.

Ap—0 to 9 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; medium acid; clear smooth boundary.

A—9 to 13 inches; very dark grayish brown (10YR 3/2) rubbed, silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many faint black (10YR 2/1) organic coatings on faces of peds; medium acid; clear smooth boundary.

AB—13 to 16 inches; dark brown (10YR 3/3) rubbed, silt loam, brown (10YR 5/3) dry; moderate very fine subangular blocky structure; friable; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; medium acid; abrupt smooth boundary.

Bt1—16 to 21 inches; dark brown (10YR 4/3) silty clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate fine subangular blocky structure; friable; many distinct dark grayish brown (10YR 4/2) and few distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—21 to 28 inches; yellowish brown (10YR 5/4) silty clay loam; few medium prominent strong brown (7.5YR 5/6) and common fine prominent grayish brown (2.5Y 5/2) mottles; moderate medium angular blocky structure; firm; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few medium round dark accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt3—28 to 36 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium and coarse prominent strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure; friable; common distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine round dark accumulations (iron and manganese oxides); neutral; clear smooth boundary.

BC—36 to 43 inches; light brownish gray (2.5Y 6/2) silt loam; common coarse prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure; friable; few distinct very dark gray (10YR 3/1) clay films lining pores; few fine irregular dark accumulations (iron and manganese oxides); mildly alkaline; gradual smooth boundary.

C—43 to 60 inches; mottled light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/6) silt loam; massive; friable; few distinct grayish brown (2.5Y 5/2) and dark gray (10YR 4/1) clay films lining pores; few fine irregular dark accumulations (iron and manganese oxides); slight effervescence; moderately alkaline.

The solum ranges from 40 to more than 60 inches in thickness. The mollic epipedon is 12 to 20 inches thick. The clay content averages 35 to 40 percent in the control section. Some pedons do not have an AB or BA horizon.

Jasper Series

The Jasper series consists of well drained, moderately permeable soils on upland till plains and outwash plains, and on stream terraces. These soils formed in loamy, wind- or water-laid materials. Slopes range from 4 to 12 percent.

These soils have a dark surface soil that is thinner than is definitive for the Jasper series. This difference, however, does not significantly affect the usefulness or behavior of the soils.

Jasper soils commonly are adjacent to Plano, Proctor, Sable, and Sawmill soils. Plano and Proctor soils are moderately well drained and on ridges above Jasper soils. Sable and Sawmill soils are poorly drained and lower on the landscape.

Typical pedon of Jasper silt loam, 4 to 12 percent slopes, eroded, 350 feet south and 2,020 feet east of the northwest corner of sec. 5, T. 15 N., R. 1 E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; medium acid; abrupt smooth boundary.

Bt1—7 to 10 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; friable; many faint very dark grayish brown (10YR 3/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—10 to 15 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine and medium subangular blocky structure; friable; many distinct dark brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

2Bt3—15 to 24 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; many distinct dark brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

2Bt4—24 to 38 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; common distinct dark brown (7.5YR 4/4) clay films on faces of peds; medium acid; diffuse smooth boundary.

2Bt5—38 to 55 inches; yellowish brown (10YR 5/6) fine sandy loam with strata of loamy fine sand; weak coarse subangular blocky structure; very friable; common distinct dark yellowish brown (10YR 4/6) clay films on faces of peds; medium acid; diffuse smooth boundary.

2C—55 to 60 inches; yellowish brown (10YR 5/4) fine sandy loam; predominantly single grained with few strata of very weak coarse subangular blocky structure; loose and very friable; neutral.

The solum ranges from 40 to 60 inches in thickness. The mollic epipedon is 7 to 10 inches thick.

The Ap horizon has value of 2 or 3 and chroma of 1 to 3. The Ap horizon and the upper part of the Bt horizon have textures that are high in silt of loessal origin. The Bt horizon is silt loam, loam, or fine sandy loam. It has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. It typically ranges from slightly acid to strongly acid, but ranges to mildly alkaline in the lower part. The 2C horizon is neutral to moderately alkaline.

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.

Lawson soils are similar to Tice soils and commonly are adjacent to Allison, Sawmill, and Tice soils on the landscape. Tice soils are in similar landscape positions, have a mollic epipedon less than 24 inches thick, and have a higher content of clay in the control section. Allison soils are moderately well drained and on natural levees slightly higher on the landscape. Sawmill soils are poorly drained and on lower parts of the flood plain.

Typical pedon of Lawson silty clay loam, 1,760 feet east and 950 feet south of the northwest corner of sec. 17, T. 16 N., R. 2 E.

Ap1—0 to 4 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and medium granular structure; friable; many roots; mildly alkaline; clear smooth boundary.

Ap2—4 to 10 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and medium subangular blocky structure; friable; common roots; mildly alkaline; clear smooth boundary.

A1—10 to 16 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine and medium subangular blocky structure parting to moderate fine granular; friable; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common roots; mildly alkaline; clear smooth boundary.

A2—16 to 22 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine prismatic structure parting to moderate medium subangular blocky; friable; few faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common roots; mildly alkaline; clear smooth boundary.

A3—22 to 37 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine prismatic structure parting to moderate medium subangular blocky; friable; few faint dark brown (10YR 3/3) organic coatings on faces of peds; few roots; mildly alkaline; gradual smooth boundary.

C1—37 to 43 inches; dark grayish brown (10YR 4/2) loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak fine prismatic structure parting to weak medium subangular blocky; friable; few distinct very dark gray (10YR 3/1) organic coatings on faces of prisms; mildly alkaline; clear smooth boundary.

C2—43 to 60 inches; dark grayish brown (10YR 4/2) loam; common medium distinct yellowish brown

(10YR 5/6) and prominent dark brown (7.5YR 4/4) mottles; massive; friable; neutral.

The solum ranges from 24 to 40 inches in thickness. The silty clay loam overwash is as much as 20 inches thick in some places.

The A horizon has value of 2 or 3 and chroma of 1 or 2. Some pedons do not have the silty clay loam overwash. Reaction to a depth of 60 inches ranges from slightly acid to mildly alkaline. The C horizon commonly is stratified loam, silt loam, and silty clay loam.

Miami Series

The Miami series consists of well drained soils on till plains. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. These soils formed in glacial till. Some areas have a thin mantle of loess. Slopes range from 5 to 60 percent.

Miami soils are similar to Parr and Russell soils and commonly are adjacent to Birkbeck, Lawson, Russell, and Sabina soils. Parr soils have a mollic epipedon. Russell soils formed in loess and the underlying glacial till, and are on side slopes above Miami soils. Birkbeck soils are moderately well drained and Sabina soils are somewhat poorly drained; these soils formed in loess and the underlying glacial till. Birkbeck and Sabina soils are on ridges above Miami soils. Somewhat poorly drained Lawson soils have a mollic epipedon and formed in silty alluvium on bottom land below Miami soils.

Typical pedon of Miami loam, 18 to 30 percent slopes, 260 feet south and 220 feet east of the center of sec. 3, T. 15 N., R. 3 E.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; neutral; abrupt smooth boundary.

E—6 to 8 inches; brown (10YR 4/3) loam; moderate fine granular structure; friable; slightly acid; clear smooth boundary.

Bt1—8 to 11 inches; yellowish brown (10YR 5/4) loam; moderate fine and medium subangular blocky structure; friable; many distinct brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—11 to 18 inches; yellowish brown (10YR 5/4) clay loam; weak fine prismatic structure parting to moderate medium subangular blocky; friable; many distinct brown (10YR 4/3) clay films on faces of peds; 5 percent gravel; slightly acid; clear smooth boundary.

Bt3—18 to 28 inches; yellowish brown (10YR 5/4) clay loam; few fine distinct strong brown (7.5YR 5/6) and grayish brown (10YR 5/2) mottles; moderate medium prismatic structure; friable; many distinct brown (10YR 4/3) clay films on faces of peds; 5 percent gravel; neutral; clear smooth boundary.

Bt4—28 to 36 inches; light olive brown (2.5Y 5/4) loam; few medium distinct strong brown (7.5YR 5/6) and grayish brown (10YR 5/2) mottles; weak medium prismatic structure parting to moderate fine angular blocky; friable; many distinct brown (10YR 4/3) clay films on faces of peds; 5 to 10 percent gravel; slight effervescence; mildly alkaline; clear smooth boundary.

C1—36 to 47 inches; light olive brown (2.5Y 5/4) loam; common medium prominent strong brown (7.5YR 5/6) and grayish brown (10YR 5/2) mottles; massive; firm; 5 to 10 percent gravel; strong effervescence; moderately alkaline; abrupt smooth boundary.

C2—47 to 60 inches; dark brown (7.5YR 4/4) gravelly sandy loam; massive; friable; about 20 to 30 percent gravel; strong effervescence; moderately alkaline.

The solum ranges from 24 to 42 inches in thickness. The loess cap is less than 18 inches thick.

The A or Ap horizon has value of 3 or 4 and chroma of 1 to 3. It is loam, silty clay loam, clay loam, or silt loam. Pedons in cultivated areas commonly do not have an E horizon.

The Bt horizon has hue of 10YR, 7.5YR, or 2.5Y, value of 4 or 5, and chroma of 3 to 6. It dominantly is clay loam, but some pedons have subhorizons that are silt loam, loam, or silty clay loam. The C horizon dominantly is loam, but in some pedons it is clay loam or gravelly sandy loam.

Palms Series

The Palms series consists of very poorly drained, moderately permeable soils in a slightly depressional area on a flood plain. These soils formed in silty clay loam overwash material and the underlying sapric material. Slopes range from 0 to 2 percent.

Palms soils commonly are adjacent to Lawson and Sawmill soils. These adjacent soils are in nondepressional areas of the flood plain, are better drained, and are mineral.

Typical pedon of Palms silty clay loam, overwash, 240 feet north and 460 feet east of the southwest corner of sec. 11, T. 18 N., R. 1 E.

A—0 to 8 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; few medium prominent strong brown (7.5YR 4/6) mottles; moderate coarse granular structure; friable; neutral; abrupt smooth boundary.

Oa1—8 to 16 inches; black (N 2/0) sapric material; about 5 percent fiber, trace rubbed; weak medium prismatic structure; very friable; fibers are herbaceous; some mixing of mineral overwash material in the upper part; neutral; clear smooth boundary.

Oa2—16 to 46 inches; black (N 2/0) sapric material; about 5 percent fiber, trace rubbed; massive; very friable; fibers are herbaceous; neutral; clear smooth boundary.

2Cg—46 to 60 inches; gray (5Y 5/1) fine sandy loam; massive; friable; slight effervescence; mildly alkaline.

The A horizon ranges from 5 to 15 inches in thickness. The sapric material ranges from 20 to 40 inches in thickness.

The Oa horizon has value of 2 or 3 and chroma of 2 or less. It is dominantly sapric material, but in some pedons the content of hemic material is as much as 25 percent.

The 2Cg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is sandy loam, fine sandy loam, loam, or clay loam. In some pedons it is gravelly.

Parr Series

The Parr series consists of well drained soils on moraines and till plains. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. These soils formed in loamy glacial till. Slopes range from 2 to 10 percent.

These soils have a thinner, dark colored surface soil and a higher reaction in the subsoil than is definitive for the Parr series. These differences, however, do not significantly affect the use or behavior of the soil.

Parr soils are similar to Miami soils and commonly are adjacent to Dana and Flanagan soils. Miami soils have a lighter colored surface soil than Parr soils. Dana soils are moderately well drained and Flanagan soils are somewhat poorly drained; these soils are on ridges above or below Parr soils.

Typical pedon of Parr loam, 5 to 10 percent slopes, eroded, 160 feet west and 940 feet south of the center of sec. 1, T. 17 N., R. 1 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; slightly acid; abrupt smooth boundary.

Bt1—8 to 12 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine and medium subangular blocky structure; friable; many distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—12 to 19 inches; dark yellowish brown (10YR 4/6) clay loam; moderate fine and medium subangular blocky structure; friable; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; neutral; clear smooth boundary.

Bt3—19 to 26 inches; brown (7.5YR 5/4) clay loam; strong medium subangular blocky structure; friable; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; neutral; clear smooth boundary.

Bt4—26 to 33 inches; brown (7.5YR 5/4) clay loam; moderate medium subangular blocky structure; firm; common distinct dark brown (7.5YR 4/4 and 3/4) clay films on faces of peds; neutral; clear smooth boundary.

Bt5—33 to 39 inches; yellowish brown (10YR 5/4) loam; few medium faint grayish brown (10YR 5/2) and pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; firm; common distinct dark brown (7.5YR 3/4) and very dark brown (7.5YR 2/2) clay films on faces of peds; very weak effervescence; mildly alkaline; clear smooth boundary.

C—39 to 60 inches; yellowish brown (10YR 5/4) loam; common medium faint brown (10YR 4/3) and pale brown (10YR 6/3) mottles; massive; very firm; few faint dark brown (7.5YR 4/4) and very dark brown (7.5YR 2/2) coatings and stains (iron and manganese oxides) on cleavage surfaces and in some pores; strong effervescence; moderately alkaline.

The solum ranges from 24 to 40 inches in thickness. The loess cap is less than 18 inches thick.

The Ap horizon has value of 2 or 3 and chroma of 1 to 3. It is silt loam, loam, or clay loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6. It is dominantly clay loam or loam, but is silty clay loam in the upper part of some pedons. The clay content averages 20 to 30 percent in the control section. Reaction of the Bt horizon is medium acid to mildly alkaline.

Pella Series

The Pella series consists of poorly drained, moderately permeable soils on till plains. These soils formed in less than 60 inches of loess. Slopes range from 0 to 2 percent.

Pella soils are similar to Drummer, Harpster, Hartsburg, and Sable soils and commonly are adjacent to Drummer, Flanagan, and Harpster soils. Drummer and Harpster soils are in similar or slightly higher positions than Pella soils on the landscape. Drummer and Sable soils do not have carbonates above 35 inches. Harpster soils have a calcic horizon. Hartsburg and Sable soils formed in loess in areas where the loess thickness is more than 60 inches. Flanagan soils are somewhat poorly drained and on low ridges above Pella soils.

Typical pedon of Pella silty clay loam, 200 feet north and 960 feet west of the southeast corner of sec. 26, T. 15 N., R. 2 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate medium granular structure; friable; slightly acid; abrupt smooth boundary.

A—8 to 11 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak medium angular blocky structure caused by compaction and parting to moderate medium granular; friable; slightly acid; clear smooth boundary.

BA—11 to 15 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few medium distinct yellowish brown (10YR 5/4) mottles; moderate fine angular blocky structure; friable; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Btg1—15 to 24 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine prominent yellowish brown (10YR 5/4) mottles; moderate fine and medium prismatic structure parting to moderate fine and medium angular blocky; friable; many distinct dark gray (10YR 4/1) clay films on faces of peds; neutral; clear smooth boundary.

Btg2—24 to 31 inches; olive gray (5Y 5/2) silty clay loam; common medium prominent strong brown (7.5YR 5/8) and few medium prominent yellowish brown (10YR 5/4) mottles; weak medium prismatic structure; friable; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; very weak effervescence; mildly alkaline; clear smooth boundary.

Btg3—31 to 45 inches; gray (5Y 6/1) silty clay loam; common medium and coarse prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; friable; common distinct gray (5Y 5/1) clay films on faces of peds; common fine and medium rounded accumulations (iron and manganese oxides); weak effervescence; moderately alkaline; clear smooth boundary.

2BCg—45 to 50 inches; gray (5Y 5/1) silt loam (about 20 percent sand estimate); common medium and coarse prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; friable; few distinct dark gray (10YR 4/1) clay films lining pores; strong effervescence; moderately alkaline; clear smooth boundary.

2Cg—50 to 60 inches; gray (5Y 5/1) loam; many coarse prominent yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/6) mottles; massive; firm; strong effervescence; moderately alkaline.

The solum ranges from 30 to 50 inches in thickness. The mollic epipedon ranges from 10 to 20 inches in thickness. The depth to carbonates ranges from 20 to 35 inches. The loess ranges from 30 to 60 inches in thickness. The clay content averages 27 to 35 percent in the control section.

The A horizon has hue of 10YR, or is neutral, value of 2 or 3, and chroma of 0 or 1. The Btg horizon has hue of 10YR, 2.5Y, or 5Y, or is neutral, value of 4 to 6, and chroma of 0 to 2. It is dominantly silty clay loam, but in some pedons it is silt loam in the lower part. The 2BCg horizon is loam, silt loam, or clay loam. The 2Cg horizon is loam or clay loam, and in some pedons it is stratified.

Peotone Series

The Peotone series consists of very poorly drained, moderately slowly permeable soils in depressions on outwash plains and till plains. These soils formed in local sediments of silty clay loam. Slopes range from 0 to 2 percent.

Peotone soils are similar to Shiloh soils and commonly are adjacent to Drummer, Elburn, and Flanagan soils. Shiloh soils are on broad flats normally in areas of thicker loess. Adjacent soils are better drained, have a mollic epipedon less than 24 inches thick, and are higher on the landscape than Peotone soils. Drummer soils are in broad, flat areas, and Elburn and Flanagan soils are on low ridges.

Typical pedon of Peotone silty clay loam, 310 feet north and 2,435 feet west of the center of sec. 13, T. 14 N., R. 3 E.

Ap—0 to 6 inches; black (5Y 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate very fine subangular blocky structure; firm; neutral; clear smooth boundary.

A—6 to 14 inches; black (5Y 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate very fine subangular blocky structure; moderate medium angular blocky compaction zone in upper 2 inches; firm; neutral; clear smooth boundary.

AB—14 to 22 inches; very dark gray (5Y 3/1) silty clay loam, gray (5Y 5/1) dry; moderate fine angular blocky structure; firm; many faint black (5Y 2/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bg1—22 to 28 inches; very dark gray (5Y 3/1) silty clay loam, gray (5Y 5/1) dry; moderate fine prismatic structure; firm; few medium rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Bg2—28 to 36 inches; dark gray (5Y 4/1) silty clay loam; few fine faint gray (5Y 5/1) mottles; weak medium prismatic structure; firm; few medium rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Bg3—36 to 44 inches; gray (5Y 5/1) silty clay loam; common fine prominent light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; firm; few fine and medium rounded accumulations (iron and manganese oxides); neutral; gradual smooth boundary.

Bg4—44 to 60 inches; gray (5Y 5/1) silty clay loam; common medium prominent strong brown (7.5YR

5/6) and light yellowish brown (2.5Y 6/4) mottles; weak medium prismatic structure; firm; common krotovinas with dark coatings on vertical faces of prisms below; violent effervescence; mildly alkaline.

The solum ranges from 40 to 60 inches in thickness. The mollic epipedon ranges from 24 to 36 inches in thickness. The clay content averages 35 to 42 percent in the control section.

The A horizon has hue of 10YR to 5Y or is neutral, value of 2 or 3, and chroma of 0 or 1. The Bg horizon has hue of 10YR, 2.5Y, 5Y, or is neutral, value of 3 to 6, and chroma of 0 to 2. It ranges from slightly acid to mildly alkaline. Some pedons have a Cg horizon that is silty clay loam and that ranges from neutral to moderately alkaline.

Plano Series

The Plano series consists of moderately well drained, moderately permeable soils on outwash plains. These soils formed in loess and the underlying loamy outwash. Slopes range from 0 to 10 percent.

Plano soils are similar to Broadwell, Catlin, Dana, Proctor, and Tama soils and commonly are adjacent to Drummer and Elburn soils. Broadwell and Proctor soils are well drained. Broadwell soils formed in loess and the underlying eolian sands. Proctor soils formed in thinner loess and the underlying outwash. Catlin and Dana soils formed in loess and the underlying glacial till. Tama soils formed entirely in loess. Drummer soils are poorly drained and in broad, flat areas and drainageways below Plano soils. Elburn soils are somewhat poorly drained and on broad ridges lower on the landscape.

Typical pedon of Plano silt loam, 2 to 5 percent slopes, 30 feet east and 600 feet north of the southwest corner of sec. 18, T. 16 N., R. 4 E.

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

A—10 to 14 inches; very dark grayish brown (10YR 3/2) silt loam, dark brown (10YR 3/3) rubbed, brown (10YR 5/3) dry; moderate medium granular structure; friable; slightly acid; clear smooth boundary.

AB—14 to 17 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bt1—17 to 26 inches; brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; friable; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—26 to 35 inches; yellowish brown (10YR 5/4) silty clay loam; few medium distinct grayish brown (10YR 5/2) and common fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; many distinct dark brown (10YR 4/3) clay films on faces of peds; medium acid; gradual smooth boundary.

Bt3—35 to 43 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; many distinct brown (10YR 5/3) clay films on vertical faces of prisms; common fine rounded accumulations (iron and manganese oxides); slightly acid; gradual smooth boundary.

Bt4—43 to 50 inches; brown (10YR 5/3) silty clay loam; common medium distinct strong brown (7.5YR 5/6) and many medium distinct grayish brown (10YR 5/2) mottles; weak medium prismatic structure; friable; common distinct brown (10YR 5/3) clay films on vertical faces of prisms; common fine and medium rounded accumulations (iron and manganese oxides); neutral; abrupt smooth boundary.

2Bt5—50 to 60 inches; brown (10YR 5/3) stratified sandy loam and sandy clay loam; many medium and coarse strong brown (7.5YR 5/6) and common fine distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; friable; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common medium and coarse irregular stains (iron and manganese oxides) on faces of peds; neutral.

The solum ranges from 44 to 70 inches in thickness. The loess ranges from 40 to 60 inches in thickness. The mollic epipedon is 10 to 20 inches thick. The clay content averages 27 to 35 percent in the control section.

The A horizon has value of 2 or 3 and chroma of 1 to 3. The Bt horizon has value of 4 or 5 and chroma of 3 or 4. It ranges from medium acid to neutral. Some pedons have 2BC and 2C horizons. The 2Bt horizon and the 2BC and 2C horizons are stratified silt loam, loam, sandy clay loam, or sandy loam. They range from slightly acid to moderately alkaline.

Plano silt loam, 5 to 10 percent slopes, eroded, has a thinner, dark surface soil than is definitive for the Plano series. This difference, however, does not significantly affect the usefulness or behavior of the soil.

Proctor Series

The Proctor series consists of well drained soils on outwash plains and high terraces. Permeability is moderate in the upper part of the profile and moderately rapid in the lower part. These soils formed in loess and the underlying loamy outwash. Slopes range from 1 to 10 percent.

Proctor soils are similar to Broadwell, Catlin, Dana, Plano, and Tama soils and commonly are adjacent to Drummer, Elburn, and Plano soils. Broadwell soils formed in loess and the underlying eolian sands. Catlin, Dana, Plano, and Tama soils are moderately well drained. Catlin and Dana soils formed in loess and the underlying glacial till. Plano soils formed in thicker loess than Proctor soils and are in positions on the landscape similar to those of the Proctor soils. Tama soils formed entirely in loess. Drummer soils are poorly drained and in drainageways and in broad, flat areas below Proctor soils. Elburn soils are somewhat poorly drained and lower on the landscape than Proctor soils.

Typical pedon of Proctor silt loam, 1 to 5 percent slopes, 1,780 feet south and 175 feet west of the northeast corner of sec. 15, T. 14 N., R. 2 E.

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

A—9 to 11 inches; dark brown (10YR 3/3) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many faint very dark gray (10YR 3/1) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt1—11 to 16 inches; dark brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; friable; many distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—16 to 25 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; friable; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; medium acid; clear smooth boundary.

2Bt3—25 to 31 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; friable; many distinct dark brown (7.5YR 3/4) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt4—31 to 44 inches; dark yellowish brown (10YR 4/4) stratified sandy loam, loam, and clay loam; moderate medium prismatic structure; friable; common distinct dark brown (7.5YR 4/4) clay films on vertical faces of prisms and bridging sand grains; slightly acid; gradual smooth boundary.

2Bt5—44 to 60 inches; dark brown (7.5YR 4/4) stratified sandy loam, clay loam, and gravelly clay loam; weak medium prismatic structure; friable; common distinct dark brown (7.5YR 4/4) clay films bridging sand grains and on some vertical faces of prisms; neutral.

The solum ranges from 40 to more than 60 inches in thickness. The loess ranges from 20 to 40 inches in thickness. The mollic epipedon is 10 to 14 inches thick. The clay content averages 27 to 35 percent in the control section.

The A horizon has value of 2 or 3 and chroma of 1 to 3. The Bt horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. The 2Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It commonly is stratified silt loam, loam, clay loam, or sandy loam. The Bt and 2Bt horizons range from medium acid to neutral. Some pedons have 2BC and 2C horizons that have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 6. The 2BC and 2C horizons are stratified loam, sandy loam, clay loam, silt loam, or loamy sand.

Proctor silt loam, 5 to 10 percent slopes, eroded, has a thinner, dark surface soil than is definitive for the Proctor series. This difference, however, does not significantly affect the usefulness or behavior of the soil.

Raub Series

The Raub series consists of somewhat poorly drained, moderately slowly permeable soils on till plains and moraines. These soils formed in loess and the underlying loamy glacial till. Slopes range from 0 to 3 percent.

Raub soils are similar to Flanagan soils and commonly are adjacent to Dana, Drummer, and Parr soils. Flanagan soils have more clay in the argillic horizon and formed in thicker loess. Dana soils are moderately well drained. They are on ridges higher on the landscape and are next to the well drained Parr soils on side slopes lower on the landscape than Raub soils. Drummer soils are poorly drained and in drainageways and broad, flat areas below Raub soils.

Typical pedon of Raub silt loam, 0 to 3 percent slopes, 50 feet east and 300 feet north of the southwest corner of sec. 7, T. 14 N., R. 3 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; neutral; abrupt smooth boundary.

AB—8 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; strong very fine subangular blocky structure; friable; many faint very dark gray (10YR 3/1) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt1—12 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; few fine prominent strong brown (7.5YR 5/6) mottles; strong fine subangular blocky structure; friable; many distinct very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt2—16 to 20 inches; yellowish brown (10YR 5/4) silty clay loam; common fine prominent strong brown

(7.5YR 5/8) mottles; strong fine and medium subangular blocky structure; friable; many distinct very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), and dark brown (10YR 4/3) clay films on faces of peds; common fine rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Bt3—20 to 27 inches; brown (10YR 5/3) silty clay loam; few fine distinct grayish brown (2.5Y 5/2) and common medium prominent strong brown (7.5YR 5/8) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine rounded accumulations (iron and manganese oxides); neutral; gradual smooth boundary.

Bt4—27 to 35 inches; brown (10YR 5/3) silty clay loam; few fine distinct grayish brown (2.5Y 5/2) and common medium strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure; friable; many distinct dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) clay films on vertical faces of prisms; few fine and medium rounded accumulations (iron and manganese oxides); neutral; abrupt smooth boundary.

2Bt5—35 to 43 inches; yellowish brown (10YR 5/4) sandy clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; weak coarse subangular blocky structure; friable; common distinct dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2) clay films on faces of peds; common medium irregular accumulations (iron and manganese oxides); about 5 percent gravel; neutral; abrupt smooth boundary.

2BC—43 to 50 inches; yellowish brown (10YR 5/4) clay loam; few fine prominent gray (10YR 6/1) and common medium light brownish gray (10YR 6/2) mottles; weak medium prismatic structure; firm; few distinct grayish brown (10YR 5/2) clay films on vertical faces of prisms; about 5 percent gravel; mildly alkaline; gradual smooth boundary.

2C—50 to 60 inches; yellowish brown (10YR 5/4) loam; few fine prominent gray (10YR 6/1) and common medium light brownish gray (10YR 6/2) mottles; massive; firm; about 5 percent gravel; slight effervescence; moderately alkaline.

The thickness of the solum and depth to free carbonates range from 36 to 60 inches. The loess ranges from 22 to 40 inches in thickness. The mollic epipedon ranges from 10 to 16 inches in thickness. The clay content averages 27 to 35 percent in the control section.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The Bt and 2Bt horizons have hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 3 to 6. The Bt horizon is medium acid to neutral. The 2Bt horizon is neutral or mildly alkaline. It is loam, clay loam, or sandy clay loam. The 2C horizon is mildly alkaline or moderately alkaline.

Rozetta Series

The Rozetta series consists of moderately well drained, moderately permeable soils on the Illinoian till plain. These soils formed in loess. Slopes range from 1 to 5 percent.

Rozetta soils are similar to Birkbeck, Camden, Elco, Russell, and Xenia soils and commonly are adjacent to Clarksdale, Elco, and Sable soils. Birkbeck, Russell, and Xenia soils formed in loess and the underlying glacial till. Camden soils are well drained and formed in loess and the underlying outwash. Elco soils are on side slopes and formed in loess and the Sangamon paleosol. Clarksdale soils are somewhat poorly drained and on less sloping parts of the landscape than Rozetta soils. Sable soils are poorly drained and in shallow drainageways below Rozetta soils. Clarksdale and Sable soils have a darker surface layer.

Typical pedon of Rozetta silt loam, 1 to 5 percent slopes, 875 feet east and 2,300 feet south of the northwest corner of sec. 19, T. 15 N., R. 1 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; slightly acid; abrupt smooth boundary.

BE—8 to 12 inches; dark yellowish brown (10YR 4/4) silt loam mixed with some dark grayish brown (10YR 4/2) Ap material; weak very fine and fine subangular blocky structure; friable; medium acid; clear smooth boundary.

Bt1—12 to 20 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—20 to 33 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine distinct pale brown (10YR 6/3) mottles in the lower part; moderate fine and medium subangular blocky structure; friable; many distinct dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3—33 to 41 inches; yellowish brown (10YR 5/4) silty clay loam; few fine and medium distinct pale brown (10YR 6/3) and few medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; few faint light gray (10YR 7/1) dry silt coatings and common distinct dark brown (7.5YR 4/4) clay films on faces of peds; few very fine to medium irregular accumulations and stains (iron and manganese oxides); strongly acid; gradual smooth boundary.

Bt4—41 to 55 inches; yellowish brown (10YR 5/4) silt loam; few medium distinct strong brown (7.5YR

5/6), few medium distinct pale brown (10YR 6/3), and few medium distinct grayish brown (10YR 5/2) mottles; weak medium prismatic structure; friable; common distinct dark brown (7.5YR 4/4) clay films on faces of peds and lining pores; few very fine irregular accumulations (iron and manganese oxides); medium acid; diffuse smooth boundary.

BC—55 to 60 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct strong brown (7.5YR 5/6) and few medium distinct grayish brown (10YR 5/2) mottles; weak coarse prismatic structure; friable; few distinct dark brown (10YR 4/3) clay films lining pores; medium acid.

The solum ranges from 50 to 70 inches in thickness. The clay content averages 27 to 35 percent in the control section.

The A1 or Ap horizon has value of 3 or 4 and chroma of 1 to 3. Pedons in uncultivated areas have an E horizon. The Bt horizon has value of 4 or 5 and chroma of 3 or 4. It is strongly acid or medium acid. The BC horizon is medium acid to mildly alkaline.

Russell Series

The Russell series consists of well drained soils on till plains. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. These soils formed in loess and the underlying loamy glacial till. Slopes range from 4 to 10 percent.

Russell soils are similar to Birkbeck, Camden, Elco, Rozetta, and Xenia soils and commonly are adjacent to Birkbeck, Miami, Sabina, and Xenia soils. Birkbeck, Elco, Rozetta, and Xenia soils are moderately well drained. Birkbeck and Xenia soils are on less sloping ridges higher on the landscape than Russell soils. In addition, Birkbeck soils formed in a thicker mantle of loess. Camden soils formed in loess and the underlying glacial outwash. Elco soils formed in loess and the underlying paleosol. Rozetta soils formed entirely in loess. Miami soils formed dominantly in glacial till and are on side slopes below Russell soils. Sabina soils are somewhat poorly drained and in nearly level areas lower on the landscape than Russell soils.

Typical pedon of Russell silt loam, 4 to 10 percent slopes, eroded, 2,360 feet north and 820 feet east of southwest corner of sec. 33, T. 17 N., R. 3 E.

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate very fine subangular blocky and moderate fine granular structure; friable; many distinct dark brown (10YR 3/3) organic coatings on faces of peds; slightly acid; abrupt smooth boundary.

Bt1—7 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very fine subangular blocky structure; friable; common distinct brown (7.5YR 4/4) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—16 to 25 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very fine and fine subangular blocky structure; friable; common distinct brown (7.5YR 4/3) clay films on faces of peds; few fine rounded and irregular accumulations (iron and manganese oxides); about 1 percent gravel; medium acid; clear smooth boundary.

2Bt3—25 to 36 inches; dark yellowish brown (10YR 4/4) clay loam; few fine prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; common distinct brown (10YR 4/3) and dark brown (10YR 3/3) clay films on faces of peds and few distinct very dark grayish brown (10YR 3/2) clay films lining pores; few fine rounded and irregular accumulations (iron and manganese oxides); about 5 percent gravel; medium acid; gradual smooth boundary.

2Bt4—36 to 47 inches; yellowish brown (10YR 5/4) loam; few fine prominent strong brown (7.5YR 5/8) mottles; moderate coarse subangular blocky structure; friable; common distinct dark brown (10YR 4/3) clay films on faces of peds and few distinct very dark grayish brown (10YR 3/2) clay films lining pores; few fine and medium rounded and irregular accumulations (iron and manganese oxides); 5 percent gravel; slight effervescence; mildly alkaline; gradual smooth boundary.

2C—47 to 60 inches; yellowish brown (10YR 5/4) loam; few fine prominent strong brown (7.5YR 5/8) and medium light brownish gray (2.5Y 6/2) mottles; massive; firm; few distinct dark brown (10YR 4/3) clay films lining pores; few fine and medium rounded and irregular accumulations (iron and manganese oxides); 10 percent gravel; strong effervescence; mildly alkaline.

The thickness of the solum and depth to carbonates range from 40 to 60 inches. The loess ranges from 22 to 40 inches in thickness. The clay content averages 27 to 33 percent in the control section.

The A horizon has value of 4 or 5 and chroma of 2 to 4. Some pedons in uncultivated areas have an E horizon. The Bt and 2Bt horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. They range from strongly acid to mildly alkaline. The Bt horizon is silt loam or silty clay loam. The 2Bt horizon is clay loam or loam. The 2C horizon is mildly alkaline or moderately alkaline.

Sabina Series

The Sabina series consists of somewhat poorly drained, moderately slowly permeable soils on till plains. These soils formed in loess and the underlying, loamy glacial till. Slopes range from 0 to 3 percent.

Sabina soils are similar to Clarksdale and Starks soils and commonly are adjacent to Birkbeck, Flanagan, Miami, and Xenia soils. Clarksdale soils formed entirely in loess and have a darker colored surface layer than Sabina soils. Starks soils have a lower content of clay in the subsoil and formed in thinner loess and the underlying glacial outwash. Birkbeck and Xenia soils are moderately well drained, are higher on the landscape, and contain less clay in the control section. Also, Xenia soils formed in a thinner mantle of loess than Sabina soils. Flanagan soils are in similar landscape positions and have a mollic epipedon. Miami soils are well drained, are on side slopes below Sabina soils, and formed dominantly in glacial till.

Typical pedon of Sabina silt loam, 0 to 3 percent slopes, 880 feet east and 1,760 feet south of the northwest corner of sec. 25, T. 17 N., R. 3 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; grayish brown (10YR 5/2) E horizon material and dark brown (10YR 4/3) subsoil material mixed by tillage; moderate medium granular structure; friable; neutral; clear smooth boundary.

E—9 to 11 inches; brown (10YR 5/3) silt loam; common fine distinct grayish brown (10YR 5/2) and few yellowish brown (10YR 5/6) mottles; moderate very fine subangular blocky structure; friable; few fine and medium rounded accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Bt1—11 to 16 inches; dark brown (10YR 4/3) silty clay loam; common fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate very fine subangular blocky structure; friable; many distinct grayish brown (10YR 5/2) and brown (10YR 5/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—16 to 26 inches; dark brown (10YR 4/3) silty clay loam; many fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; many distinct dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) clay films on faces of peds; few fine rounded concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt3—26 to 39 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common distinct very dark gray (10YR 3/1) clay films lining pores and common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine rounded concretions (iron and manganese oxides); neutral; gradual smooth boundary.

Bt4—39 to 54 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; few distinct very dark gray (10YR 3/1) clay films lining pores and few distinct grayish brown (10YR 5/2) clay films on faces of peds; few fine irregular accumulations (iron and manganese oxides); neutral; abrupt smooth boundary.

2BC—54 to 58 inches; yellowish brown (10YR 5/4) loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; few faint very dark gray (10YR 3/1) clay films lining pores; few pebbles and stones; neutral; gradual smooth boundary.

2C—58 to 60 inches; yellowish brown (10YR 5/4) loam; many medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; massive; firm; few faint very dark gray (10YR 3/1) coatings lining pores; few pebbles; strong effervescence; mildly alkaline.

The thickness of the solum and depth to carbonates range from 45 to 60 inches. The loess ranges from 40 to 60 inches in thickness. The clay content averages 35 to 42 percent in the control section.

The Ap horizon has value of 4 or 5. Some pedons have an A horizon that is less than 5 inches thick and that has value of 3. Some pedons in cultivated areas do not have an E horizon. The Bt horizon has hue of 10YR or 2.5Y and chroma of 2 to 4. Some pedons have a 2Bt horizon. The 2Bt and 2BC horizons are silty clay loam, clay loam, or loam. The 2C horizon is loam, silt loam, or clay loam. Reaction of the C horizon is neutral to moderately alkaline.

Sable Series

The Sable series consists of poorly drained, moderately permeable soils on loess-covered outwash plains and till plains. These soils formed in loess. Slopes range from 0 to 2 percent.

Sable soils are similar to Drummer, Hartsburg, and Pella soils and commonly are adjacent to Elburn, Flanagan, Hartsburg, and Ipava soils. Drummer soils formed in a thinner mantle of loess and the underlying loamy sediments. Elburn, Flanagan, and Ipava soils are somewhat poorly drained and on low ridges above Sable soils. Hartsburg and Pella soils contain carbonates within a depth of 35 inches and commonly are slightly lower on the landscape than Sable soils.

Typical pedon of Sable silty clay loam, 1,240 feet north and 120 feet west of the southeast corner of sec. 28, T. 15 N., R. 1 E.

Ap—0 to 9 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate very fine granular structure; friable; neutral; abrupt smooth boundary.

A—9 to 17 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate very fine subangular blocky structure parting to moderate very fine granular; friable; many faint black (10YR 2/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bg—17 to 24 inches; dark grayish brown (2.5Y 4/2) silty clay loam; common fine distinct light olive brown (2.5Y 5/4) mottles; moderate very fine subangular blocky structure; friable; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; many medium and coarse rounded nodules (iron and manganese oxides); neutral; clear smooth boundary.

Btg1—24 to 31 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6) and many coarse distinct light olive brown (2.5Y 5/4) mottles; moderate fine subangular blocky structure; friable; many distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds and few distinct very dark gray (10YR 3/1) clay films lining pores in peds; many medium and coarse rounded nodules (iron and manganese oxides); neutral; clear smooth boundary.

Btg2—31 to 38 inches; mottled gray (2.5Y 5/1), light olive brown (2.5Y 5/4), and yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; many distinct grayish brown (2.5Y 5/2) clay films on faces of peds and few distinct very dark gray (10YR 3/1) clay films lining pores in peds; common medium rounded nodules (iron and manganese oxides); neutral; gradual smooth boundary.

BCg—38 to 52 inches; mottled gray (2.5Y 5/1), light olive brown (2.5Y 5/4), and yellowish brown (10YR 5/6) silt loam; weak coarse subangular blocky structure; friable; few faint grayish brown (2.5Y 5/2) clay films on faces of peds and very dark gray (10YR 3/1) clay films lining pores in peds; common medium rounded nodules (iron and manganese oxides); neutral; diffuse smooth boundary.

Cg—52 to 60 inches; mottled gray (5Y 6/1), light olive brown (2.5Y 5/4), and yellowish brown (10YR 5/4) silt loam; massive; friable; few faint dark gray (10YR 4/1) coatings lining pores; very slight effervescence; mildly alkaline.

The solum ranges from 36 to 60 inches in thickness. The loess is more than 60 inches thick. The depth to free carbonates ranges from 40 to 60 inches. The mollic epipedon ranges from 12 to 24 inches in thickness. The clay content averages 24 to 35 percent in the control section.

The A horizon has hue of 10YR, 2.5Y, or is neutral, value of 2 or 3, and chroma of 0 or 1. The Bg and Btg horizons have hue of 10YR, 2.5Y, 5Y, or are neutral, value of 4 to 6, and chroma of 0 to 4. They range from medium acid to mildly alkaline. The Cg horizon is silt loam or silty clay loam, and is neutral to moderately alkaline.

Sawmill Series

The Sawmill series consists of poorly drained, moderately permeable soils on broad flood plains of major streams and in broad drainageways on till plains and outwash plains. These soils formed in silty alluvium. Slopes range from 0 to 2 percent.

Sawmill soils commonly are adjacent to Drummer, Lawson, Miami, and Tice soils. Drummer soils are higher on the upland landscape and have a thinner mollic epipedon than Sawmill soils. Lawson and Tice soils are somewhat poorly drained and in nearly level areas above Sawmill soils on bottom land. Also, Tice soils have a mollic epipedon less than 24 inches thick. Miami soils are well drained and on upland side slopes above Sawmill soils.

Typical pedon of Sawmill silty clay loam, 760 feet north and 210 feet east of the southwest corner of sec. 3, T. 16 N., R. 1 W.

Ap—0 to 9 inches; black (10YR 2/1) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; friable; neutral; clear smooth boundary.

A1—9 to 16 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; common fine faint very dark grayish brown (10YR 3/2) mottles; strong medium angular blocky structure parting to moderate fine angular blocky; firm; neutral; clear smooth boundary.

A2—16 to 21 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; common fine faint very dark grayish brown (10YR 3/2) mottles; weak fine prismatic structure parting to moderate fine subangular blocky; firm; common faint black (10YR 2/1) organic coatings on faces of peds; few pebbles; neutral; clear smooth boundary.

Bg—21 to 33 inches; very dark gray (5Y 3/1) silty clay loam, gray (5Y 5/1) dry; common fine distinct dark grayish brown (10YR 4/2) mottles; moderate fine and very fine prismatic structure parting to moderate fine angular and subangular blocky; firm; many faint black (10YR 2/1) organic coatings on faces of peds; common fine irregular accumulations (iron and manganese oxides); few pebbles; neutral; gradual smooth boundary.

Btg1—33 to 42 inches; dark gray (5Y 4/1) silty clay loam; few fine and medium prominent strong brown (7.5YR 5/6) mottles; moderate fine and very fine prismatic structure; firm; many distinct very dark gray (10YR 3/1) clay films on faces of peds; common black (N 2/0) krotovinas; common fine and medium irregular accumulations (iron and manganese oxides); few pebbles; neutral; clear smooth boundary.

Btg2—42 to 48 inches; gray (5Y 5/1) silty clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate fine and very fine prismatic; firm; common distinct dark gray (5Y 4/1) clay films on faces of peds; common black (N 2/0) krotovinas; common fine and medium irregular accumulations (iron and manganese oxides); few pebbles; neutral; gradual smooth boundary.

BCg—48 to 60 inches; mottled gray (5Y 5/1), dark gray (5Y 4/1), and strong brown (7.5YR 4/6) clay loam; weak moderate prismatic structure; firm; common black (N 2/0) krotovinas; many fine and medium irregular accumulations (iron and manganese oxides); few pebbles; neutral.

The solum ranges from 36 to 60 inches in thickness. The mollic epipedon ranges from 24 to 36 inches in thickness. The clay content averages 27 to 35 percent in the control section.

The A horizon commonly has hue of 10YR to 5Y, or is neutral, value of 2 or 3, and chroma of 0 to 2. The Bg and Btg horizons have hue of 10YR, 2.5Y, or 5Y, value of 2 to 6, and chroma of 2 or less. These horizons are dominantly silty clay loam, but in the lower part they range to loam. Some pedons have a C horizon that is stratified silty clay loam, silt loam, clay loam, or loam.

Shiloh Series

The Shiloh series consists of very poorly drained, moderately slowly permeable soils on loess-covered outwash plains and till plains. These soils formed in loess. Slopes range from 0 to 2 percent.

Shiloh soils are similar to Peotone soils and commonly are adjacent to Elburn, Ipava, and Sable soils. Peotone soils are in shallow depressions in areas where the loess is generally thinner. Elburn and Ipava soils are somewhat poorly drained and on low ridges above Shiloh soils. Sable soils are poorly drained and slightly higher on the landscape than Shiloh soils. Elburn, Ipava, and Sable soils have a mollic epipedon less than 24 inches thick.

Typical pedon in an area of Shiloh silty clay loam, 1,295 feet south and 1,305 feet east of the northwest corner of sec. 11, T. 17 N., R. 1 E.

Ap—0 to 9 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and very fine angular blocky structure parting to moderate fine granular; friable; few pebbles; common roots; neutral; abrupt smooth boundary.

AB—9 to 12 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and very fine subangular blocky structure; friable; few pebbles; mildly alkaline; clear smooth boundary.

Btg1—12 to 18 inches; very dark gray (5Y 3/1) silty clay loam, gray (10YR 5/1) dry; moderate very fine prismatic structure parting to moderate fine and very fine angular blocky; friable; many faint very dark gray (N 3/0) clay films on faces of peds; few pebbles; mildly alkaline; clear smooth boundary.

Btg2—18 to 26 inches; very dark gray (5Y 3/1) silty clay loam, gray (10YR 5/1) dry; common fine distinct dark grayish brown (2.5Y 4/2) mottles; moderate fine prismatic structure parting to moderate fine and very fine angular blocky; friable; many faint very dark gray (N 3/0) clay films on faces of peds; mildly alkaline; clear smooth boundary.

Btg3—26 to 37 inches; very dark gray (5Y 3/1) silty clay loam, gray (10YR 5/1) dry; common fine distinct dark grayish brown (2.5YR 4/2) and prominent strong brown (7.5YR 5/6) mottles; moderate fine and very fine prismatic structure; friable; many faint very dark gray (N 3/0) clay films on faces of peds; few fine irregular accumulations (iron and manganese oxides); mildly alkaline; clear smooth boundary.

Btg4—37 to 44 inches; gray (5Y 5/1) silty clay loam; common fine prominent strong brown (7.5YR 5/6 and 5/8) mottles; moderate fine prismatic structure; friable; common faint dark gray (5Y 4/1) clay films on vertical faces of prisms; common krotovinas; few fine irregular accumulations (iron and manganese oxides); mildly alkaline; gradual smooth boundary.

Cg—44 to 60 inches; light gray (5Y 7/2) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; massive; friable; common faint dark brown (10YR 3/3) and dark olive gray (5Y 3/2) clay films lining pores; few fine irregular accumulations (iron and manganese oxides); mildly alkaline.

The solum ranges from 42 to 55 inches in thickness. The mollic epipedon is 24 to 40 inches thick. The clay content averages 35 to 40 percent in the control section.

The A horizon has value of 2 or 3 and chroma of 2 or less. The Btg horizon has hue of 10YR to 5Y, or is neutral, value of 3 to 6, and chroma of 0 to 2. It ranges from slightly acid to mildly alkaline. The Cg horizon is silt loam or silty clay loam and, in some pedons, is stratified with sandier textures.

Sparta Series

The Sparta series consists of excessively drained, rapidly permeable soils on uplands adjacent to the Sangamon River in the western part of the county. These soils formed in sandy eolian material. Slopes range from 4 to 12 percent.

Sparta soils commonly are adjacent to Broadwell, Drummer, Elburn, and Plano soils. These soils have an argillic horizon and formed in 40 to 60 inches of loess. Broadwell soils are well drained and Plano soils are moderately well drained; these soils are on ridges above Sparta soils. Drummer soils are poorly drained and in drainageways and on flats below Sparta soils. Elburn soils are somewhat poorly drained and on less sloping side slopes and on low, broad ridges above Sparta soils.

Typical pedon of Sparta loamy sand, 4 to 12 percent slopes, 640 feet south and 1,540 feet east of the northwest corner of sec. 30, T. 16 N., R. 1 E.

Ap—0 to 12 inches; very dark grayish brown (10YR 3/2) loamy sand, grayish brown (10YR 5/2) dry; weak medium granular structure; very friable; medium acid; clear smooth boundary.

BA—12 to 17 inches; dark brown (10YR 4/3) loamy sand; weak medium subangular blocky structure; very friable; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds and on sand grains; medium acid; clear smooth boundary.

Bw—17 to 31 inches; yellowish brown (10YR 5/4) loamy sand; weak medium subangular blocky structure; very friable; few faint dark brown (10YR 3/3) clay films bridging sand grains; slightly acid; clear smooth boundary.

BC—31 to 40 inches; yellowish brown (10YR 5/6) fine sand; single grain; loose; slightly acid; clear smooth boundary.

C—40 to 60 inches; light yellowish brown (10YR 6/4) fine sand; single grain; loose; slightly acid.

The solum ranges from 30 to 40 inches in thickness. The mollic epipedon ranges from 10 to 20 inches in thickness.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The Bw horizon has value of 3 to 5 and chroma of 4 to 6. It is loamy fine sand, loamy sand, fine sand, or sand. Reaction ranges from strongly acid to slightly acid. The C horizon is loamy fine sand, fine sand, or sand. Some pedons have lamellae.

Starks Series

The Starks series consists of somewhat poorly drained, moderately permeable soils on uplands and terraces. These soils formed in loess or silty material and the underlying, stratified loamy outwash. Slopes range from 0 to 2 percent.

These soils have browner colors in the upper part of the subsoil than is definitive for the Starks series. This difference, however, does not significantly affect the usefulness or behavior of the soils.

Starks soils are similar to Sabina soils and commonly are adjacent to Camden, Lawson, and Miami soils. Sabina soils formed in loess and the underlying glacial till and have a higher content of clay in the subsoil than Starks soils. Camden and Miami soils are well drained. Camden soils are on more sloping ridges, and Miami soils are on side slopes below Starks soils. Lawson soils are on bottom land below Starks soils.

Typical pedon of Starks silt loam, 460 feet east and 915 feet north of the center of sec. 16, T. 17 N., R. 4 E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; few fine rounded accumulations (iron and manganese oxides); medium acid; abrupt smooth boundary.

E—5 to 11 inches; grayish brown (10YR 5/2) silt loam; few fine faint yellowish brown (10YR 5/4) mottles; weak thick platy structure parting to weak fine granular; friable; many very fine irregular accumulations (iron and manganese oxides); slightly acid; abrupt smooth boundary.

Bt1—11 to 17 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; common faint grayish brown (10YR 5/2) silt coatings and many distinct brown (10YR 4/3) clay films on faces of peds; strongly acid; clear boundary.

Bt2—17 to 22 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint grayish brown (10YR 5/2) mottles; moderate fine and medium prismatic structure parting to weak medium angular blocky; firm; many distinct brown (10YR 5/3) clay films and many faint gray (10YR 6/1) silt coatings on faces of peds; medium acid; clear smooth boundary.

Bt3—22 to 31 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct strong brown (7.5YR 5/6) and grayish brown (10YR 5/2) mottles; moderate medium prismatic structure; firm; many distinct brown (10YR 5/3) clay films on faces of peds; few medium irregular accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

2Bt4—31 to 44 inches; yellowish brown (10YR 5/6) clay loam; common fine and medium distinct grayish brown (10YR 5/2) mottles; weak coarse prismatic structure; firm; many distinct grayish brown (10YR 5/2) clay films on faces of prisms; few medium irregular accumulations (iron and manganese oxides); slightly acid; abrupt smooth boundary.

2BC—44 to 60 inches; dark grayish brown (10YR 4/2) and dark gray (10YR 4/1) sandy loam; many coarse prominent dark brown (7.5YR 3/4), strong brown (7.5YR 4/6), and gray (N 5/0) mottles; massive; friable; few faint dark grayish brown (10YR 4/2) clay films as bridges between sand grains; neutral.

The solum ranges from 45 to more than 60 inches in thickness. The loess is 25 to 40 inches thick. The clay content averages 27 to 35 percent in the control section.

The A horizon has value of 4 or 5 and chroma of 2 or 3. Some pedons in cultivated areas do not have an E horizon. The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 6. Reaction is strongly acid to slightly acid. The 2Bt and 2BC horizons are loam, silt loam, clay loam, or sandy loam. Some pedons have a 2C horizon that is stratified loam, sandy loam, and loamy sand.

Sunbury Series

The Sunbury series consists of somewhat poorly drained, moderately permeable soils on till plains. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. These soils formed in loess and the underlying glacial drift. Slopes range from 0 to 2 percent.

Sunbury soils are similar to Flanagan and Ipava soils and commonly are adjacent to Birkbeck, Flanagan, and Sabina soils. Flanagan and Ipava soils have a mollic epipedon. Ipava soils formed entirely in loess. Sabina soils have a lighter colored surface layer than Sunbury soils. Flanagan and Sabina soils are in positions on the landscape similar to those of Sunbury soils and are in a biosequence with Sunbury soils. Birkbeck soils are moderately well drained and higher on the landscape than Sunbury soils.

Typical pedon of Sunbury silt loam, 1,020 feet west and 1,280 feet south of the center of sec. 3, T. 15 N., R. 3 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; neutral; clear smooth boundary.

E—8 to 12 inches; brown (10YR 5/3) silt loam; some mixing with the Ap material was caused by animals; weak medium subangular blocky structure; friable; few faint light gray (10YR 7/2) dry silt coatings; few fine rounded strong brown (7.5YR 4/6) accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt1—12 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable; many distinct dark grayish brown (10YR 4/2) clay films and common faint light gray (10YR 7/1) dry silt coatings on faces of peds; few fine rounded strong brown (7.5YR 4/6) accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt2—16 to 26 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; fine medium prismatic structure parting to strong fine and medium subangular blocky and angular blocky; firm; common faint light gray (10YR 7/1) dry silt coatings and many distinct dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2) clay films on faces of peds; neutral; clear smooth boundary.

Bt3—26 to 37 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure; firm; common distinct brown (10YR 4/3) and very dark grayish brown (10YR 3/2) clay films on faces of peds and many distinct black (10YR 2/1) clay films lining pores; few medium rounded accumulations (iron and manganese oxides); neutral; gradual smooth boundary.

Bt4—37 to 49 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium and coarse distinct strong brown (7.5YR 5/8) and few medium prominent gray (10YR 5/1) mottles; weak medium and coarse prismatic structure; friable; common distinct brown (10YR 4/3) and very dark grayish brown (10YR 3/2) clay films on faces of peds and many distinct black (10YR 2/1) clay films lining pores; few pebbles; neutral; abrupt smooth boundary.

2BC—49 to 54 inches; light olive brown (2.5Y 5/4) loam; many medium prominent strong brown (7.5YR 5/6) and common medium prominent grayish brown (2.5Y 5/2) mottles; weak coarse subangular blocky structure; friable; common faint very dark gray (10YR 3/1) clay films lining pores; very slight effervescence; neutral; clear smooth boundary.

2C1—54 to 60 inches; grayish brown (2.5Y 5/2) sandy loam; common medium prominent yellowish brown (10YR 5/4) mottles; massive; friable; very slight effervescence; mildly alkaline; clear smooth boundary.

3C2—60 to 72 inches; light olive brown (2.5Y 5/4) loam; few fine distinct grayish brown (2.5Y 5/2) mottles; massive; firm; strong effervescence; moderately alkaline.

The thickness of the solum and depth to carbonates range from 45 to 60 inches. The loess ranges from 40 to 60 inches in thickness. The clay content averages from 35 to 40 percent in the control section.

The Ap horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. The E horizon has value of 3 to 5 and chroma of 2 or 3. In cultivated areas some pedons do not have an E horizon. The Bt horizon has value of 4 or 5 and chroma of 2 to 4. It is dominantly silty clay loam, but some subhorizons are silty clay. Some pedons have a 2Bt horizon. The 2Bt and 2BC horizons have hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. They are loam, clay loam, or silt loam. Reaction of the 2Bt and 2BC horizons is neutral or mildly alkaline. The 2C horizon commonly is loam, but the range includes sandy loam, clay loam, silt loam, and silty clay loam. In some pedons it is firm, loam till. Some pedons do not have a 3C horizon.

Tama Series

The Tama series consists of moderately well drained, moderately permeable soils on uplands. These soils formed in loess. Slopes range from 1 to 5 percent.

Tama soils are similar to Broadwell, Catlin, Dana, Downs, Plano, and Proctor soils and commonly are adjacent to Ipava and Sable soils. Broadwell and Proctor soils are well drained. Broadwell soils formed in loess and the underlying eolian sands. Catlin and Dana soils formed in loess and the underlying glacial till. Downs soils have a thinner dark surface soil than Tama soils. Plano and Proctor soils formed in loess and the underlying glacial outwash. Ipava soils are somewhat poorly drained and on broad ridges below Tama soils. Sable soils are poorly drained and on low, broad flats below Tama soils.

Typical pedon of Tama silt loam, 1 to 5 percent slopes, 920 feet east and 1,420 feet north of the southwest corner of sec. 19, T. 18 N., R. 1 E.

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

A—10 to 13 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate very fine subangular blocky structure; friable; many faint very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

BA—13 to 17 inches; brown (10YR 4/3) silty clay loam; strong very fine and fine subangular blocky structure; friable; many faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bt1—17 to 23 inches; brown (10YR 4/3) silty clay loam; common fine faint yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure parting to strong fine subangular blocky; friable; many distinct dark brown (10YR 3/3) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Bt2—23 to 31 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct yellowish brown (10YR 5/8) and pale brown (10YR 6/3) mottles; weak fine prismatic structure parting to moderate fine and medium subangular blocky; friable; many distinct brown (10YR 4/3) clay films on faces of peds; few very fine rounded accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt3—31 to 38 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct pale brown (10YR 6/3) and strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common distinct brown (10YR 4/3) clay films on faces of peds; common very fine rounded accumulations (iron and manganese oxides); neutral; gradual smooth boundary.

Bt4—38 to 55 inches; yellowish brown (10YR 5/4) silt loam; common fine distinct light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; friable; common distinct dark yellowish brown (10YR 3/4) clay films on vertical faces of prisms and very dark grayish brown (10YR 3/2) clay films lining pores; common medium dark brown (7.5YR 3/2) stains (iron and manganese oxides) on faces of peds; neutral; gradual smooth boundary.

C—55 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; many medium prominent yellowish brown (10YR 5/6) and common medium distinct gray (10YR 6/1) mottles; massive; friable; slight effervescence; mildly alkaline.

The solum ranges from 45 to more than 60 inches in thickness. The mollic epipedon is 10 to 18 inches thick. The clay content averages 27 to 35 percent in the control section.

The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The Bt horizon ranges from medium acid in the most acid part to mildly alkaline in the lower part.

Thorp Series

The Thorp series consists of poorly drained, slowly permeable soils on till plains and outwash plains. These soils formed in silty material and the underlying loamy outwash or till. Slopes range from 0 to 2 percent.

Thorp soils are similar to Brooklyn soils and commonly are adjacent to Catlin, Drummer, and Flanagan soils. Brooklyn soils have a thinner, dark surface layer and have more clay in the subsoil. Catlin soils are moderately well drained. Flanagan soils are somewhat poorly drained and above Thorp soils. Drummer soils are poorly drained and in drainageways and broad, flat areas below Thorp soils.

Typical pedon of Thorp silt loam, approximately 70 feet north and 1,200 feet west of the southeast corner of sec. 31, T. 18 N., R. 1 E.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; few very fine irregular accumulations (iron and manganese oxides); neutral; abrupt smooth boundary.

E—10 to 15 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/4) and dark grayish brown (10YR 4/2) mottles; weak thin platy structure parting to weak fine granular; friable; common medium rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

BE—15 to 19 inches; brown (10YR 5/3) silt loam; common medium faint grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; common fine and medium rounded accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Btg1—19 to 25 inches; grayish brown (10YR 5/2) silty clay loam; many medium prominent strong brown (7.5YR 5/8) and common fine distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; friable; common distinct grayish brown (10YR 5/2) clay films on faces of peds; few fine rounded accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Btg2—25 to 31 inches; gray (10YR 5/1) silty clay loam; many medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; many faint light gray (10YR 7/1) dry, silt coatings on faces of peds and many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Btg3—31 to 40 inches; light brownish gray (2.5Y 6/2) silty clay loam; many coarse prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure; firm; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few medium rounded accumulations (iron and manganese oxides); neutral; gradual smooth boundary.

Btg4—40 to 53 inches; mottled strong brown (7.5YR 5/8), gray (10YR 6/1), and grayish brown (10YR 5/2) silty clay loam; weak coarse prismatic structure; firm; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds and lining pores; few medium rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

2Btg5—53 to 61 inches; mottled strong brown (7.5YR 5/8) and gray (10YR 6/1) silt loam; weak coarse prismatic structure; friable; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds and lining pores; noticeable sand increase; neutral; abrupt smooth boundary.

2C—61 to 66 inches; dark grayish brown (10YR 4/2) sandy loam; few fine faint dark yellowish brown (10YR 4/4) and many medium prominent strong brown (7.5YR 4/6) mottles; massive; friable; neutral.

The solum ranges from 45 to more than 60 inches in thickness. The mollic epipedon is 10 to 12 inches thick. The clay content averages 27 to 35 percent in the control section.

The Ap or A1 horizon has value of 2 or 3 and chroma of 1 or 2. The E horizon has value of 4 or 5 and chroma of 1 or 2. The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. The 2Btg horizon is silt loam, loam, or clay loam. The 2C horizon is loam, sandy loam, or loamy sand, and commonly is stratified.

Tice Series

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

Tice soils are similar to Lawson soils and commonly are adjacent to Allison, Lawson, and Sawmill soils. Lawson soils are in similar landscape positions and have a mollic epipedon more than 24 inches thick. Allison soils are moderately well drained and on natural levees above Tice soils. Sawmill soils are poorly drained and below Tice soils on the flood plain.

Typical pedon of Tice silty clay loam, 960 feet east and 325 feet south of the center of sec. 22, T. 16 N., R. 1 W.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine granular and moderate medium angular blocky structure; friable; slightly acid; abrupt smooth boundary.

A—6 to 21 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate fine subangular blocky structure; friable; neutral; clear smooth boundary.

Bw1—21 to 34 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine prominent strong brown (7.5YR 5/8) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; neutral; clear smooth boundary.

Bw2—34 to 46 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate fine prominent strong brown (7.5YR 5/8 and 4/6) mottles; moderate fine and medium prismatic structure parting to moderate medium subangular blocky; firm; ped surfaces are dark gray (10YR 4/1) and, when dry, have clean sand and silt grains evident with magnification; neutral; clear smooth boundary.

Bw3—46 to 58 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate medium prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; firm; ped surfaces are dark gray (10YR 4/1) and, when dry, have clean sand and silt grains evident with magnification; common fine rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

Bg—58 to 66 inches; grayish brown (10YR 5/2) silty clay loam; moderate medium prominent yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; firm; ped surfaces are gray (10YR 5/1) and, when dry, have clean sand and silt grains evident with magnification; common fine rounded accumulations (iron and manganese oxides); neutral.

The solum ranges from 40 to more than 60 inches in thickness. The mollic epipedon ranges from 10 to 24 inches in thickness. The clay content averages 27 to 35 percent in the control section.

The A horizon has value of 2 or 3 and chroma of 1 to 3. The Bw horizon dominantly is silty clay loam, but it has strata of silt loam, loam, and very fine sandy loam in the lower part of some pedons. Reaction is slightly acid or neutral.

Wabash Series

The Wabash series consists of very poorly drained, very slowly permeable soils on flood plains. These soils formed in silty and clayey alluvium. Slope is less than 1 percent.

Wabash soils commonly are adjacent to Lawson, Sawmill, and Tice soils. Lawson and Tice soils are somewhat poorly drained and Sawmill soils are poorly drained and contain less clay in the profile than Wabash soils. These soils are in nearly level areas slightly higher on the landscape.

Typical pedon of Wabash silty clay loam, wet, 75 feet east and 120 feet south of the northwest corner of sec. 23, T. 16 N., R. 1 W.

Ap—0 to 4 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and very fine granular structure; friable; neutral; clear smooth boundary.

A1—4 to 10 inches; black (10YR 2/1) silty clay, dark gray (10YR 4/1) dry; few fine faint dark gray (10YR 4/1) mottles; moderate medium angular blocky structure; firm; few faint very dark brown (10YR 2/2) organic coatings lining pores; neutral; clear smooth boundary.

A2—10 to 16 inches; black (N 2/0) silty clay, dark gray (10YR 4/1) dry; few fine faint dark gray (10YR 4/1) mottles; moderate very fine prismatic structure parting to moderate fine and very fine subangular blocky and angular blocky; firm; few faint black (10YR 2/2) organic coatings on faces of peds; few pebbles; neutral; clear smooth boundary.

Bg1—16 to 33 inches; black (5Y 2.5/1) silty clay, dark gray (10YR 4/1) dry; few fine distinct dark grayish brown (10YR 4/2) mottles; moderate fine prismatic structure parting to moderate fine and medium subangular blocky and angular blocky; firm; common faint very dark gray (N 3/0) organic coatings on faces of peds; few pebbles; mildly alkaline; clear smooth boundary.

Bg2—33 to 54 inches; black (5Y 2.5/1) silty clay, gray (10YR 6/1) dry; common fine prominent dark yellowish brown (10YR 4/4) and few fine prominent strong brown (7.5YR 5/6) mottles; moderate fine and medium prismatic structure; very firm; common fine irregular concretions (iron and manganese oxides); common pebbles; mildly alkaline; clear smooth boundary.

Cg—54 to 60 inches; dark gray (5Y 4/1) silty clay; common fine distinct grayish brown (2.5Y 5/2) and common fine prominent strong brown (7.5YR 4/6) mottles; massive; very firm; common fine irregular accumulations (iron and manganese oxides); common pebbles; mildly alkaline.

The solum ranges from 40 to more than 60 inches in thickness. The mollic epipedon ranges from 24 to more than 40 inches in thickness. The clay content averages 46 to 60 percent in the control section.

The A horizon has hue of 10YR, 2.5Y, or 5Y, or is neutral, value of 2 or 3, and chroma of 2 or less. It is silty clay loam or silty clay. The Bg horizon has hue of 10YR, 2.5Y, or 5Y, or is neutral, and value of 2 to 5. It is medium acid to mildly alkaline.

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.

Wakeland soils commonly are adjacent to Lawson, Miami, and Sawmill soils on the landscape. Lawson soils are somewhat poorly drained and Sawmill soils are poorly drained. These soils have a mollic epipedon and are in lower positions than Wakeland soils on the flood plain. Miami soils are well drained and on upland side slopes adjacent to the flood plain.

Typical pedon of Wakeland silt loam, 520 feet south and 975 feet east of the northwest corner of sec. 27, T. 17 N., R. 3 E.

A1—0 to 1 inch; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine granular structure; friable; neutral; abrupt smooth boundary.

A2—1 to 10 inches; dark grayish brown (10YR 4/2) silt loam; weak thin platy structure and weak very fine subangular blocky; friable; many distinct very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) organic coatings on faces of peds; common fine worm casts; neutral; clear smooth boundary.

C1—10 to 23 inches; dark grayish brown (10YR 4/2) silt loam with thin strata of loam and sandy loam; common fine faint brown (10YR 4/3 and 5/3) mottles; weak very fine subangular blocky structure; friable; common faint dark grayish brown (10YR 4/2) coatings on faces of peds; common fine worm casts; neutral; diffuse smooth boundary.

C2—23 to 42 inches; dark grayish brown (10YR 4/2) silt loam; common very thin strata of loam, sandy loam, and loamy sand; common fine distinct brown (10YR 5/3 and 4/3) mottles throughout and common fine distinct grayish brown (10YR 5/2) mottles in the lower part; massive; friable; few faint dark grayish brown (10YR 4/2) coatings on cleavage planes and lining pores; neutral; abrupt smooth boundary.

Cg—42 to 60 inches; dark gray (10YR 4/1) silt loam with thin strata of loam, sandy loam, and loamy sand; common fine faint brown (10YR 4/3) mottles; massive; friable; common irregular strong brown (7.5YR 4/6) stains (iron and manganese oxides); mildly alkaline.

The solum and the A horizon coincide in thickness. The clay content averages 10 to 17 percent in the control section. The A horizon has a value of 3 to 5 and chroma of 1 to 3. The C or Cg horizon has value of 4 or 5, chroma of 1 to 4, and is mottled. Some pedons have a dark colored buried soil below a depth of 40 inches.

Wingate Series

The Wingate series consists of moderately well drained, moderately slowly permeable soils on till plains and moraines. These soils formed in loess and the underlying loamy glacial till. Slopes range from 1 to 5 percent.

Wingate soils are similar to Dana and Downs soils and commonly are adjacent to Birkbeck, Drummer, Flanagan, and Sunbury soils. Dana soils have a mollic epipedon. Downs soils formed entirely in loess. Birkbeck soils have a lighter colored surface soil and are in positions similar to those of Wingate soils, but are closer to major streams. Drummer soils are poorly drained and in drainageways and broad, flat areas. Flanagan and Sunbury soils are somewhat poorly drained and on broad ridges lower on the landscape.

Typical pedon of Wingate silt loam, 1 to 5 percent slopes, 800 feet west and 1,720 feet south of the northeast corner of sec. 1, T. 15 N., R. 2 E.

Ap—0 to 7 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak fine and very fine granular structure; friable; slightly acid; abrupt smooth boundary.

BE—7 to 11 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and very fine subangular blocky structure; friable; many distinct dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2) coatings on faces of peds; common fine rounded accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Bt1—11 to 17 inches; dark yellowish brown (10YR 4/4) silty clay loam; common fine faint yellowish brown (10YR 5/6) mottles; moderate very fine prismatic structure parting to moderate very fine subangular blocky; friable; many distinct dark brown (10YR 3/3) clay films on faces of peds; common fine rounded accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

Bt2—17 to 26 inches; dark yellowish brown (10YR 4/4) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; moderate fine prismatic structure parting to moderate fine angular blocky; friable; many distinct brown (10YR 4/3) and dark brown (10YR 3/3) clay films on faces of peds; many fine rounded accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

Bt3—26 to 33 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct pale brown (10YR 6/3) and faint yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to weak fine angular blocky; friable; common distinct dark brown (10YR 4/3) clay films on faces of peds; many fine rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

2Bt4—33 to 41 inches; yellowish brown (10YR 5/4) clay loam; common fine prominent light brownish gray (2.5Y 6/2) mottles; weak medium prismatic structure; friable; common distinct brown (10YR 4/3) clay films on faces of peds; many fine rounded accumulations (iron and manganese oxides); neutral; abrupt smooth boundary.

2BC—41 to 49 inches; yellowish brown (10YR 5/4) clay loam; common fine prominent light brownish gray (2.5Y 6/2) mottles; weak medium prismatic structure; friable; few distinct brown (10YR 4/3) clay films on faces of peds and few distinct dark brown (7.5YR 3/2) clay films lining pores; common fine rounded accumulations (iron and manganese oxides); neutral; clear smooth boundary.

2C—49 to 60 inches; yellowish brown (10YR 5/4) loam; common fine prominent light brownish gray (2.5Y 6/2) mottles; massive; firm; strong effervescence; mildly alkaline.

The solum ranges from 36 to 65 inches in thickness. The loess ranges from 24 to 40 inches in thickness. The clay content averages 27 to 35 percent in the control section.

The Ap horizon has value of 2 or 3 and chroma of 2 or 3. Pedons in uncultivated areas have an E horizon. The Bt horizon has value of 4 or 5 and chroma of 3 or 4. The 2Bt and 2BC horizons typically are medium acid to neutral, but range to strongly acid.

Xenia Series

The Xenia series consists of moderately well drained, moderately slowly permeable soils on till plains. These soils formed in loess and the underlying loamy glacial till. Slopes range from 1 to 5 percent.

Xenia soils are similar to Birkbeck, Camden, Elco, and Russell soils and commonly are adjacent to Miami, Russell, and Sabina soils. Birkbeck soils formed in a thicker mantle of loess than Xenia soils. Camden soils are well drained and formed in loess and the underlying glacial outwash. Elco soils formed in loess and the underlying paleosol. Rozetta soils formed entirely in loess. Miami and Russell soils are well drained and on side slopes below Xenia soils. Sabina soils are somewhat poorly drained and in generally less sloping areas lower on the landscape than Xenia soils.

Typical pedon of Xenia silt loam, 1 to 5 percent slopes, 600 feet west and 2,060 feet north of the center of sec. 1, T. 15 N., R. 2 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; neutral; abrupt smooth boundary.

E—6 to 11 inches; yellowish brown (10YR 5/4) silt loam; weak thick platy structure parting to weak fine granular; friable; many fine faint brown (10YR 5/3) silt coatings on faces of peds; neutral; clear smooth boundary.

Bt1—11 to 15 inches; dark yellowish brown (10YR 4/6) silty clay loam; moderate fine subangular blocky structure; friable; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; neutral; clear smooth boundary.

Bt2—15 to 20 inches; yellowish brown (10YR 5/6) silty clay loam; moderate fine and medium subangular blocky structure; friable; many distinct yellowish brown (10YR 5/4) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt3—20 to 28 inches; yellowish brown (10YR 5/6) silty clay loam; few fine distinct grayish brown (10YR 5/2) and strong brown (7.5YR 4/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; many distinct dark yellowish brown (10YR 4/4) clay films and faint pale brown (10YR 6/3) silt coatings on faces of peds; few medium irregular accumulations (iron and manganese oxides); medium acid; gradual smooth boundary.

2Bt4—28 to 42 inches; yellowish brown (10YR 5/4) clay loam; common medium distinct strong brown (7.5YR 5/6) and common medium distinct grayish brown (10YR 5/2) mottles; moderate coarse prismatic structure parting to moderate coarse angular blocky; firm; many distinct dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2) clay films on faces of peds; common medium dark stains and accumulations (iron and manganese oxides); 2 percent gravel estimated; slightly acid; clear smooth boundary.

2BC—42 to 51 inches; yellowish brown (10YR 5/4) clay loam; many medium distinct grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; firm; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common medium dark stains (iron and manganese oxides); 10 percent gravel estimated; very weak effervescence below 45 inches; neutral; gradual smooth boundary.

2C—51 to 60 inches; yellowish brown (10YR 5/4) loam; many medium grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) mottles; weak medium and coarse angular blocky structure; firm; 10 percent gravel estimated; slight effervescence; moderately alkaline.

The solum ranges from 36 to 60 inches in thickness. The loess ranges from 22 to 40 inches in thickness. The clay content averages 27 to 35 percent in the control section.

The A horizon has value of 3 or 4 and chroma of 2 to 4. Pedons in cultivated areas commonly do not have an E horizon. The Bt and 2Bt horizons have value of 4 or 5 and chroma of 3 to 6. They typically are neutral to medium acid, but range to strongly acid. The 2Bt horizon is clay loam or loam.

Formation of the Soils

Soils are natural bodies that formed on the earth's surface, that contain living matter, and that support or are capable of supporting plants. The characteristics of soils at any given point are determined by (1) the physical and mineralogical composition of the parent material; (2) the climate, especially rainfall and temperature; (3) the topography; (4) the plant and animal life on and in the soil; and (5) the length of time that the processes of soil formation have acted on the soil material (*6, 7*). The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effects of any one factor unless conditions are specified for the other four.

Soils form a continuum over the landscape. Differences in soil properties of adjacent soil bodies primarily reflect changes in topography or slope. Changes in parent material and vegetation can also be locally significant influences. Each of the soil series in Macon County differs in one or more properties, the result of differing conditions under which the soils formed.

Parent Material

Bruce Putnam, soil scientist, Soil Conservation Service, helped with the statistical analysis.

Parent material is the unconsolidated geologic material in which a soil forms. It determines the chemical and mineralogical composition of the soil. In Macon County, four parent materials are important: (1) loess, (2) glacial till, (3) glacial outwash, and (4) alluvium. These materials were deposited either by wind, water, glaciers, or glacial meltwater. In some areas the materials were reworked and deposited by subsequent actions of water and wind.

Loess, or wind deposited silty material, is the most extensive parent material in Macon County. The loess was deposited during the Woodfordian glacial substage, 22,000 to 12,000 years ago (*15, 16*). Most soils in the county formed entirely in loess or in loess and the underlying glacial till or glacial outwash (*4*). The somewhat poorly drained Ipava soils formed entirely in loess. The somewhat poorly drained Flanagan soils formed in loess and the underlying glacial till.

The loess thickness on nearly level, uneroded uplands ranges from 42 inches on the Wisconsinan ground moraine in the southeastern part of the county to more than 96 inches on the Illinoian ground moraine in the western part of the county. On the Wisconsinan ground moraine in the county, those soils that formed in more than 60 inches of loess are north of the Sangamon River. Those soils that formed in 40 to 60 inches of loess are south of the river.

A statistical analysis was made of 87 observations of loess depth north of the river and 60 observations south of the river. This supports the use of the Sangamon River as a boundary between soil series grouped on the basis of loess thickness being more or less than 60 inches. North of the river, the mean loess thickness is 63.9 inches. The 95 percent Confidence Interval is 61.3 to 66.5 inches. South of the river the mean loess thickness is 55.5 inches. The 95 percent Confidence Interval is 52.9 to 58.1 inches.

Glacial till is material laid down directly by glaciers with a minimum of water action. It is a mixture of different sized soil particles. In this county, the till is calcareous, firm loam or clay loam. Glacial till from both the Illinoian and Wisconsinan glacial stages is in the county. Deposits from the more recent Wisconsinan glacial stage cover about the eastern three-fourths of the county. The Shelbyville moraine marks the furthest advance of Wisconsinan glaciers. It is located in the western part of the county. West of this moraine loess directly overlies Illinoian age glacial till. Illinoian glacial till outcrops intermittently on steep slopes adjacent to the Sangamon River west of the Shelbyville moraine. Wisconsinan glacial till is commonly at the surface on side slopes along the Sangamon River and its tributary streams east of the moraine. Common in these areas are the well drained Miami and Parr soils.

Outwash material was deposited by running water from melting glaciers. The size of the particles varies depending on the velocity of the water that carried the material. Individual strata generally have uniform textured materials, such as sandy loam, sand, gravel, or other medium to coarse textured materials. Large loess-covered outwash plains lie in front of the Shelbyville and Cerro Gordo moraines. The outwash materials are 2 to more than 10 feet thick, and in some areas of the county are a source of sand and gravel. Elburn and Plano soils are common on the outwash plain. On the Wisconsinan ground moraine a thin layer of outwash materials is common between the loess and the till. This layer is typically 6 to 12 inches thick.

Alluvium is material recently deposited by floodwater from streams. Soils that formed in alluvium are generally stratified by color and texture. Stratification was caused by additions of material during separate flooding events. Variation in soil texture indicates differences in the speed of the floodwaters. Coarse particles of sand settle out in fast-moving water, but fine particles can settle out only in very slowly moving or stagnant water. The largest area of alluvial soils is on the Sangamon River flood plain. Sawmill and Tice soils are common in these areas.

Climate

Macon County has a temperate, humid, continental climate. The climate is essentially uniform throughout the county, and has not caused any obvious differences among the soils within the survey area. However, it has differentiated those soils from the soils in other broad regions.

Climate affects soil formation through its effect on weathering, plant and animal life, and erosion. When water from rains and melting snow seeps slowly downward through the soils, it causes physical and chemical changes. In many of the soils in the county, percolating water has moved clay from the surface layer to the subsoil and has dissolved minerals and moved them downward through the profile. Free carbonates have been leached from the upper layers of most of the soils. As a result, these layers are slightly acid or medium acid.

Climate also affects soil formation by stimulating the growth of living organisms, particularly plants. The climate of the survey area has favored the growth of prairie grasses and hardwood trees.

Topography

Variations in the slope of the land surface greatly affect the rate of surface runoff, the infiltration rate, the extent of erosion, and the natural drainage of the soil.

A comparison of soils that formed in similar kinds of parent material but under different drainage conditions indicates the effect of slope on soil formation. Tama and Sable soils, for example, formed in loess. Tama soils are gently sloping and moderately well drained, and have a brownish subsoil. Sable soils are nearly level and poorly drained, and have a grayish subsoil. The difference in the color of the subsoil is the result of the degree of oxidation of certain mineral compounds, mainly iron. On nearly level or level soils, such as Sable soils, in most years the seasonal high water table is close to the surface. The water in the soil pores restricts the circulation of air. Under these conditions, the iron is poorly oxidized and Sable soils are dominantly gray. On the more sloping Tama soils, the seasonal high water table is lower and some of the rainfall runs off the surface. As a result, these soils are drier and more air is in the pores. Under these conditions, the iron in the subsoil of Tama soils is oxidized and the subsoil is dominantly brown.

Topography also affects the susceptibility to and intensity of erosion. Soils on steeper slopes and in areas with long slope lengths are more susceptible to erosion than soils that formed in nearly level or level areas and where slope lengths are short. Vegetation or plant residues that cover much or all of the soil surface can significantly control erosion caused by topography. For example, Miami soils that have slopes of between 18 and 30 percent are generally in trees, herbaceous plants, and grasses. Because of a vegetative cover, these soils have little or no erosion. Other areas of Miami soils, where slopes are between 5 and 20 percent, are commonly cultivated. Failure to maintain adequate vegetative cover on these soils has resulted in moderate or severe erosion. Because of the erosion hazard, soils on slopes of more than about 2 or 3 percent need to be protected by some type of erosion control practice.

Plant and Animal Life

Living organisms, such as plants, burrowing animals, bacteria, and fungi, affect soil formation. Human activities, such as farming, also alter the nature of the existing plant community.

Plant and animal life chiefly adds and incorporates organic matter and nitrogen into the soil. The remains of these plants accumulate in the surface layer, decay, and eventually become soil organic matter. As the roots of the plants die and decay they add organic matter to the soil and provide channels for the movement of water through the soil. Burrowing animals, such as earthworms, cicadas, mice, and gophers, help to incorporate the organic matter into the soil. Bacteria and fungi help to break down the organic matter into forms that can be used by growing plants. The kind of organic material on and in the soil depends on the kind of plants present.

On about 85 percent of the acreage in Macon County the soils formed under native prairie grasses. These soils have a thicker and generally a darker colored surface layer than soils that formed under forest vegetation. The wooded areas were mainly along the Sangamon River and its major tributaries. The darker color of the prairie soil reflects the higher organic matter content. Catlin and Birkbeck soils are moderately well drained and form a biosequence. Catlin soils formed under prairie vegetation and are dark colored. Birkbeck soils formed under forest vegetation and are light colored.

Time

Time greatly affects the degree of profile development in a soil. In Macon County, erosion and deposition of alluvial material have modified the influence of time on some soils. Soils on flood plains receive alluvial material during each flood. This repeated deposition slows soil formation. Lawson soils are an example.

In very steep areas, erosion generally removes the surface soil at the same rate as soil formation. The soils in these areas are immature, or young, even though the slopes have been exposed to weathering for thousands of years. In Macon County, these areas are not common and are included with other soils.

References

(1) American Association of State Highway and Transportation Officials. 1982. Standard specifications for highway materials and methods of sampling and testing. Ed. 13, 2 vols., illus.

(2) American Society for Testing and Materials. 1985. Standard test method for classification of soils for engineering purposes. ASTM Stand. D 2487.

(3) Bergstrom, R.E., K. Piskin, and L.R. Follmer. 1976. Geology for planning in the Springfield-Decatur Region, Illinois. Ill. State Geol. Surv. Circ. 497, 76 pp., illus.

(4) Fehrenbacher, J.B., and others. 1984. Soils of Illinois. Univ. of Ill. Agric. Exper. Sta. Bull. 778, 85 pp., illus.

(5) Fehrenbacher, J.B., and others. 1978. Soil productivity in Illinois. Univ. of Ill. Agric. Exper. Sta. Circ. 1156, 21 pp., illus.

(6) Jenny, Hans. 1941. Factors of soil formation. McGraw-Hill Book Company, Inc., 281 pp., illus.

(7) Jenny, Hans. 1980. The soil resource—origin and behavior. Springer-Verlag, 377 pp., illus.

(8) Smith, John W., Esq. 1876. History of Macon County, Illinois, from its organization to 1876. Rokkers Printing House, Springfield, Ill., 304 pp., illus.

(9) Smith, R.S., and others. 1929. Macon County soils. Univ. of Ill. Agric. Exper. Sta. Soil Report No. 45, 67 pp., illus.

(10) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus.

(11) United States Department of Agriculture. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210, 21 pp.

(12) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

(13) United States Department of Commerce, Bureau of the Census. 1983. 1982 census of agriculture—preliminary report, Macon County, Illinois. 4 pp., illus.

(14) Wascher, H.L., and R.T. Odell. 1954. Macon County soils, a revision of soil report 45. Univ. of Ill. Agric. Exper. Sta., 31 pp., illus.

(15) Willman, H.B., and John C. Frye. 1970. Pleistocene stratigraphy. Ill. State Geol. Surv. Bull 94, 204 pp., illus.

(16) Willman, H.B., and others. 1975. Handbook of Illinois stratigraphy. Ill. State Geol. Surv. Bull. 95, 261 pp., illus.

Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

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.

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—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Basal till. Compact glacial till deposited beneath the ice.

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.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

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.

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 or one or more soils and a miscellaneous area. They occur 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.

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.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

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.

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.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by 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 lime (in tables). Excess carbonates in the soil that restrict the growth of some 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.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

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.

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.

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.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

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.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (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.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

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.

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

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

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.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

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.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

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).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the 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.

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.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

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.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

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

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 degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

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.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

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 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.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

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.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns, and in swelling clayey soils, where there is marked change in moisture content.

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 refill (in tables). The slow filling of ponds, resulting from restricted permeability in 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 of separates recognized in the United States are as follows:

	Millimeters
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.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

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 grain* (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.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

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.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

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.

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.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer of a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

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 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 Decatur, Illinois)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	34.4	17.0	25.7	61	-12	1	2.03	0.90	3.05	4.7	6.7
February----	39.9	21.4	30.6	67	-6	4	2.02	.88	2.82	5.0	5.1
March-------	50.5	30.3	40.4	77	7	40	3.46	2.09	4.63	7.4	3.4
April-------	65.2	42.3	53.8	86	21	185	4.14	2.68	5.28	7.6	.3
May---------	75.8	52.0	63.9	93	31	435	4.09	1.88	5.38	7.0	.0
June--------	84.7	61.0	72.8	97	43	684	4.48	2.28	7.10	6.3	.0
July--------	88.0	65.1	76.5	98	48	821	4.17	2.26	5.86	6.1	.0
August------	85.9	63.1	74.5	96	47	759	3.68	1.88	5.51	5.6	.0
September---	80.8	55.9	68.3	96	37	549	3.22	1.23	5.36	5.3	.0
October-----	68.7	44.3	56.5	91	22	244	2.58	1.22	3.70	4.5	.0
November----	52.4	33.2	42.8	78	10	51	2.55	1.48	3.57	5.3	1.8
December----	39.9	23.3	31.6	66	-6	5	2.60	1.18	3.65	5.5	4.2
Yearly:											
Average---	64.0	42.5	53.2	---	---	3,778	---	---	---	---	---
Total-----	---	---	---	---	---	---	39.02	27.18	54.77	70.3	21.5

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

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-80 at Decatur, 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. 23	Apr. 24	May 13
2 years in 10 later than--	Apr. 7	Apr. 16	May 7
5 years in 10 later than--	Mar. 29	Apr. 9	Apr. 25
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 19	Oct. 6	Oct. 2
2 years in 10 earlier than--	Oct. 26	Oct. 13	Oct. 5
5 years in 10 earlier than--	Nov. 6	Oct. 26	Oct. 16

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-80 at Decatur, Illinois)

Probability	Length of growing season if daily minimum temperature is--		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	197	184	154
8 years in 10	209	190	159
5 years in 10	220	198	170
2 years in 10	234	210	191
1 year in 10	241	220	194

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
27C2	Miami silty clay loam, 5 to 10 percent slopes, eroded	3,330	0.9
27D2	Miami silt loam, 10 to 15 percent slopes, eroded	2,320	0.6
27E3	Miami clay loam, 15 to 20 percent slopes, severely eroded	1,280	0.3
27F	Miami loam, 18 to 30 percent slopes	3,450	0.9
27G	Miami loam, 30 to 60 percent slopes	420	0.1
36B	Tama silt loam, 1 to 5 percent slopes	6,650	1.8
43A	Ipava silt loam, 0 to 3 percent slopes	27,670	7.3
45	Denny silt loam	1,290	0.3
56B	Dana silt loam, 1 to 5 percent slopes	6,260	1.7
56C2	Dana silt loam, 4 to 6 percent slopes, eroded	2,220	0.6
67	Harpster silty clay loam	6,430	1.7
68	Sable silty clay loam	39,050	10.4
88C	Sparta loamy sand, 4 to 12 percent slopes	280	0.1
107	Sawmill silty clay loam	10,430	2.8
119C2	Elco silt loam, 4 to 12 percent slopes, eroded	230	0.1
132	Starks silt loam	200	0.1
134B	Camden silt loam, 1 to 5 percent slopes	770	0.2
136	Brooklyn silt loam	1,700	0.5
138	Shiloh silty clay loam	1,920	0.5
148B	Proctor silt loam, 1 to 5 percent slopes	890	0.2
148C2	Proctor silt loam, 5 to 10 percent slopes, eroded	460	0.1
152	Drummer silty clay loam	73,610	19.6
153	Pella silty clay loam	2,010	0.5
154A	Flanagan silt loam, 0 to 3 percent slopes	67,120	17.9
171B	Catlin silt loam, 1 to 5 percent slopes	23,020	6.1
198A	Elburn silt loam, 0 to 3 percent slopes	14,000	3.8
199A	Plano silt loam, 0 to 2 percent slopes	1,460	0.4
199B	Plano silt loam, 2 to 5 percent slopes	5,280	1.4
199C2	Plano silt loam, 5 to 10 percent slopes, eroded	320	0.1
206	Thorp silt loam	1,100	0.3
221B2	Parr silt loam, 2 to 5 percent slopes, eroded	1,060	0.3
221C2	Parr loam, 5 to 10 percent slopes, eroded	3,260	0.9
233B	Birkbeck silt loam, 1 to 5 percent slopes	6,010	1.6
234	Sunbury silt loam	1,600	0.4
236A	Sabina silt loam, 0 to 3 percent slopes	2,680	0.7
244	Hartsburg silty clay loam	7,160	1.9
257	Clarksdale silt loam	840	0.2
279B	Rozetta silt loam, 1 to 5 percent slopes	190	0.1
284	Tice silty clay loam	1,680	0.5
291B	Xenia silt loam, 1 to 5 percent slopes	1,910	0.5
306	Allison silt loam	770	0.2
322C2	Russell silt loam, 4 to 10 percent slopes, eroded	2,980	0.8
330	Peotone silty clay loam	1,480	0.4
333	Wakeland silt loam	220	0.1
348B	Wingate silt loam, 1 to 5 percent slopes	930	0.3
352	Palms silty clay loam, overwash	30	*
386B	Downs silt loam, 1 to 5 percent slopes	340	0.1
440C2	Jasper silt loam, 4 to 12 percent slopes, eroded	280	0.1
451	Lawson silty clay loam	6,820	1.8
481A	Raub silt loam, 0 to 3 percent slopes	1,230	0.3
533	Urban land	3,110	0.8
684B	Broadwell silt loam, 1 to 7 percent slopes	710	0.2
802B	Orthents, loamy, undulating	2,750	0.7
802D	Orthents, loamy, rolling	1,230	0.3
865	Pits, gravel	280	0.1
1083	Wabash silty clay loam, wet	520	0.1
2027C	Miami-Urban land complex, 5 to 10 percent slopes	300	0.1
2027D	Miami-Urban land complex, 10 to 18 percent slopes	400	0.1
2027F	Miami-Urban land complex, 18 to 35 percent slopes	320	0.1
2152	Drummer-Urban land complex	1,950	0.5
2154A	Flanagan-Urban land complex, 0 to 3 percent slopes	5,800	1.6
2171B	Catlin-Urban land complex, 1 to 7 percent slopes	1,970	0.5

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
2233B	Birkbeck-Urban land complex, 1 to 5 percent slopes	3,520	0.9
2236A	Sabina-Urban land complex, 0 to 3 percent slopes	820	0.2
2322C	Russell-Urban land complex, 5 to 10 percent slopes	1,410	0.4
	Water	3,170	0.9
	Total	374,900	100.0

* Less than 0.1 percent.

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
36B	Tama silt loam, 1 to 5 percent slopes
43A	Ipava silt loam, 0 to 3 percent slopes
45	Denny silt loam (where drained)
56B	Dana silt loam, 1 to 5 percent slopes
56C2	Dana silt loam, 4 to 6 percent slopes, eroded
67	Harpster silty clay loam (where drained)
68	Sable silty clay loam (where drained)
107	Sawmill silty clay loam (where drained and either protected from flooding or not frequently flooded during the growing season)
132	Starks silt loam (where drained)
134B	Camden silt loam, 1 to 5 percent slopes
136	Brooklyn silt loam (where drained)
138	Shiloh silty clay loam (where drained)
148B	Proctor silt loam, 1 to 5 percent slopes
152	Drummer silty clay loam (where drained)
153	Pella silty clay loam (where drained)
154A	Flanagan silt loam, 0 to 3 percent slopes
171B	Catlin silt loam, 1 to 5 percent slopes
198A	Elburn silt loam, 0 to 3 percent slopes
199A	Plano silt loam, 0 to 2 percent slopes
199B	Plano silt loam, 2 to 5 percent slopes
206	Thorp silt loam (where drained)
221B2	Parr silt loam, 2 to 5 percent slopes, eroded
233B	Birkbeck silt loam, 1 to 5 percent slopes
234	Sunbury silt loam
236A	Sabina silt loam, 0 to 3 percent slopes (where drained)
244	Hartsburg silty clay loam (where drained)
257	Clarksdale silt loam (where drained)
279B	Rozetta silt loam, 1 to 5 percent slopes
284	Tice silty clay loam (where protected from flooding or not frequently flooded during the growing season)
291B	Xenia silt loam, 1 to 5 percent slopes
306	Allison silt loam
330	Peotone silty clay loam (where drained)
333	Wakeland silt loam (where drained and either protected from flooding or not frequently flooded during the growing season)
348B	Wingate silt loam, 1 to 5 percent slopes
386B	Downs silt loam, 1 to 5 percent slopes
451	Lawson silty clay loam (where protected from flooding or not frequently flooded during the growing season)
481A	Raub silt loam, 0 to 3 percent slopes
684B	Broadwell silt loam, 1 to 7 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-ladino
		Bu	Bu	Bu	Tons	AUM*
27C2---------------------- Miami	IIIe	114	38	48	4.5	7.5
27D2---------------------- Miami	IVe	109	36	46	4.3	7.2
27E3---------------------- Miami	VIe	---	---	---	3.7	6.2
27F----------------------- Miami	VIe	---	---	---	---	6.0
27G----------------------- Miami	VIIe	---	---	---	---	---
36B----------------------- Tama	IIe	153	46	61	5.8	9.7
43A----------------------- Ipava	I	163	52	66	6.1	10.2
45------------------------ Denny	IIw	113	37	47	---	---
56B----------------------- Dana	IIe	142	45	59	5.5	9.1
56C2---------------------- Dana	IIe	136	43	57	5.2	8.7
67------------------------ Harpster	IIw	136	44	52	---	---
68------------------------ Sable	IIw	156	51	61	---	---
88C----------------------- Sparta	VIs	---	---	---	3.1	5.2
107----------------------- Sawmill	IIIw	132	42	---	---	---
119C2--------------------- Elco	IIIe	99	35	41	4.1	6.9
132----------------------- Starks	IIw	129	40	55	5.1	8.5
134B---------------------- Camden	IIe	124	39	54	5.0	8.2
136----------------------- Brooklyn	IIw	108	35	44	---	---
138----------------------- Shiloh	IIw	139	46	56	---	---

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-ladino
		Bu	Bu	Bu	Tons	AUM*
148B-----------------------Proctor	IIe	143	44	58	5.4	9.1
148C2----------------------Proctor	IIIe	135	41	55	5.2	8.6
152-----------------------Drummer	IIw	154	51	61	---	---
153-----------------------Pella	IIw	140	48	56	---	---
154A----------------------Flanagan	I	162	52	67	6.1	10.2
171B----------------------Catlin	IIe	149	46	60	5.7	9.6
198A----------------------Elburn	I	161	50	63	6.1	10.2
199A----------------------Plano	I	151	45	60	5.8	9.7
199B----------------------Plano	IIe	150	45	59	5.7	9.6
199C2---------------------Plano	IIIe	132	42	56	5.4	9.1
206-----------------------Thorp	IIw	126	42	51	---	---
221B2---------------------Parr	IIe	124	42	55	5.1	8.5
221C2---------------------Parr	IIIe	121	41	54	5.0	8.3
233B----------------------Birkbeck	IIe	122	41	54	4.9	8.2
234-----------------------Sunbury	I	149	45	62	5.6	8.1
236A----------------------Sabina	IIw	133	42	56	5.2	8.7
244-----------------------Hartsburg	IIw	145	47	56	---	---
257-----------------------Clarksdale	I	140	43	57	5.3	---
279B----------------------Rozetta	IIe	130	40	53	5.1	8.6
284-----------------------Tice	IIw	130	40	---	---	---

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-ladino
		Bu	Bu	Bu	Tons	AUM*
291B---------------------- Xenia	IIe	125	41	54	4.8	7.9
306---------------------- Allison	I	149	48	61	---	---
322C2---------------------- Russell	IIIe	117	38	52	4.5	7.5
330---------------------- Peotone	IIw	123	42	43	---	---
333---------------------- Wakeland	IIw	135	45	---	---	---
348B---------------------- Wingate	IIe	132	42	55	5.0	8.4
352---------------------- Palms	Vw	---	---	---	---	---
386B---------------------- Downs	IIe	147	43	58	5.5	9.2
440C2---------------------- Jasper	IIIe	130	40	54	5.0	8.3
451---------------------- Lawson	IIw	161	48	---	---	---
481A---------------------- Raub	IIw	155	51	63	6.1	10.2
533**. Urban land						
684B---------------------- Broadwell	IIe	144	44	58	5.5	9.2
802B, 802D. Orthents						
865**. Pits						
1083---------------------- Wabash	Vw	---	---	---	---	---
2027C**. Miami-Urban land						
2027D**. Miami-Urban land						
2027F**. Miami-Urban land						
2152**. Drummer-Urban land						

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	Wheat winter	Orchardgrass-alfalfa hay	Bromegrass-ladino
		Bu	Bu	Bu	Tons	AUM*
2154A**. Flanagan-Urban land						
2171B**. Catlin-Urban land						
2233B**. Birkbeck-Urban land						
2236A**. Sabina-Urban land						
2322C**. Russell-Urban land						

* 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.--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
27C2, 27D2, 27E3, 27F, 27G Miami	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
36B Tama	American cranberrybush, Amur honeysuckle, Amur privet, silky dogwood.	Blue spruce, northern white-cedar, Washington hawthorn, white fir.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
43A Ipava	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
45 Denny	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, northern white-cedar, Norway spruce, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
56B, 56C2 Dana	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
67 Harpster	Tatarian honeysuckle, nannyberry viburnum, Washington hawthorn.	White spruce, northern white-cedar, eastern redcedar, green ash, osageorange.	Black willow	---
68 Sable	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
88C Sparta	Amur honeysuckle, lilac, eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Tatarian honeysuckle.	Red pine, jack pine, Austrian pine.	Eastern white pine	---
107 Sawmill	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
119C2 Elco	Silky dogwood, honeysuckle, Amur privet, American cranberrybush.	Northern white-cedar, Washington hawthorn, blue spruce, white fir.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

TABLE 7.--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
132. Starks	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
134B. Camden	Amur honeysuckle, Amur privet, silky dogwood, American cranberrybush.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
136. Brooklyn	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	---
138. Shiloh	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
148B, 148C2. Proctor	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
152. Drummer	American cranberrybush, Amur honeysuckle, silky dogwood, Amur privet.	Norway spruce, Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine.	Eastern white pine	Pin oak.
153. Pella	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
154A. Flanagan	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
171B. Catlin	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
198A. Elburn	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Austrian pine, white fir, northern white-cedar, Washington hawthorn, blue spruce.	Norway spruce	Eastern white pine, pin oak.

TABLE 7.--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
199A, 199B, 199C2- Plano	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
206. Thorp	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
221B2, 221C2. Parr	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
233B. Birkbeck	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
234. Sunbury	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
236A. Sabina	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Pin oak, eastern white pine.
244. Hartsburg	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
257. Clarksdale	American cranberrybush, Amur honeysuckle, silky dogwood, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir, Austrian pine.	Norway spruce	Eastern white pine, pin oak.
279B. Rozetta	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
284. Tice	Silky dogwood, Amur privet, American cranberrybush, Amur honeysuckle.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
291B. Xenia	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

TABLE 7.--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
306. Allison	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
322C2. Russell	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
330. Peotone	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
333. Wakeland	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush, silky dogwood.	Northern white-cedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	---	Eastern white pine, pin oak.
348B. Wingate	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
352. Palms				
386B. Downs	American cranberrybush, Amur honeysuckle, autumn-olive, silky dogwood.	Blue spruce, northern white-cedar, Washington hawthorn, white fir.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
440C2. Jasper	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, northern white-cedar, blue spruce, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
451. Lawson	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
481A. Raub	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
533*. Urban land				
684B. Broadwell	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.

See footnote at end of table.

TABLE 7.--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
802B, 802D. Orthents				
865*. Pits				
1083. Wabash				
2027C*, 2027D*, 2027F*:				
Miami	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Urban land.				
2152*:				
Drummer	American cranberrybush, Amur honeysuckle, silky dogwood, Amur privet.	Norway spruce, Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine.	Eastern white pine	Pin oak.
Urban land.				
2154A*:				
Flanagan	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Urban land.				
2171B*:				
Catlin	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
Urban land.				
2233B*:				
Birkbeck	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
Urban land.				
2236A*:				
Sabina	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Pin oak, eastern white pine.
Urban land.				

See footnote at end of table.

TABLE 7.--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
2322C*:				
Russell	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Urban land.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--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
27C2 Miami	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight	Slight.
27D2 Miami	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
27E3, 27F Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
27G Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
36B Tama	Slight	Slight	Moderate: slope.	Slight	Slight.
43A Ipava	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
45 Denny	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
56B, 56C2 Dana	Slight	Slight	Moderate: slope.	Slight	Slight.
67 Harpster	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
68 Sable	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
88C Sparta	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
107 Sawmill	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
119C2 Elco	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
132 Starks	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
134B Camden	Slight	Slight	Moderate: slope.	Slight	Slight.
136 Brooklyn	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
138 Shiloh	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
148B Proctor	Slight	Slight	Moderate: slope.	Slight	Slight.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
148C2: Proctor	Slight	Slight	Severe: slope.	Slight	Slight.
152: Drummer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
153: Pella	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
154A: Flanagan	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
171B: Catlin	Slight	Slight	Moderate: slope.	Slight	Slight.
198A: Elburn	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
199A: Plano	Slight	Slight	Slight	Slight	Slight.
199B: Plano	Slight	Slight	Moderate: slope.	Slight	Slight.
199C2: Plano	Slight	Slight	Severe: slope.	Slight	Slight.
206: Thorp	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
221B2: Parr	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
221C2: Parr	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight	Slight.
233B: Birkbeck	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
234: Sunbury	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
236A: Sabina	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
244: Hartsburg	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
257: Clarksdale	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
279B: Rozetta	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
284: Tice	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
291B------------------ Xenia	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Slight.
306------------------- Allison	Severe: flooding.	Slight----------	Slight----------	Slight----------	Moderate: flooding.
322C2----------------- Russell	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
330------------------- Peotone	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
333------------------- Wakeland	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: flooding, wetness.	Severe: flooding.
348B------------------ Wingate	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
352------------------- Palms	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
386B------------------ Downs	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
440C2----------------- Jasper	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
451------------------- Lawson	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
481A------------------ Raub	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
533*. Urban land					
684B------------------ Broadwell	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
802B, 802D. Orthents					
865*. Pits					
1083------------------ Wabash	Severe: flooding, ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
2027C*:					
Miami-----------------	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight----------	Slight.
Urban land.					

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
2027D*:					
Miami	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Urban land.					
2027F*:					
Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land.					
2152*:					
Drummer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Urban land.					
2154A*:					
Flanagan	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Urban land.					
2171B*:					
Catlin	Slight	Slight	Moderate: slope.	Slight	Slight.
Urban land.					
2233B*:					
Birkbeck	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
Urban land.					
2236A*:					
Sabina	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Urban land.					
2322C*:					
Russell	Slight	Slight	Severe: slope.	Slight	Slight.
Urban land.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--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 herba-ceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
27C2---------------- Miami	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
27D2, 27E3, 27F---- Miami	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
27G---------------- Miami	Very poor	Poor	Good	Good	Very poor	Very poor	Poor	Good	Very poor.
36B---------------- Tama	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
43A---------------- Ipava	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
45----------------- Denny	Good	Good	Good	Fair	Good	Good	Good	Fair	Good.
56B, 56C2---------- Dana	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
67----------------- Harpster	Fair	Fair	Good	Fair	Good	Fair	Fair	Fair	Fair.
68----------------- Sable	Fair	Good	Good	Fair	Good	Good	Good	Fair	Good.
88C---------------- Sparta	Poor	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
107---------------- Sawmill	Good	Good	Good	Fair	Good	Fair	Good	Fair	Fair.
119C2-------------- Elco	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
132---------------- Starks	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
134B--------------- Camden	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
136---------------- Brooklyn	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
138---------------- Shiloh	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
148B, 148C2-------- Proctor	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
152---------------- Drummer	Fair	Good	Good	Fair	Good	Good	Good	Fair	Good.
153---------------- Pella	Good	Good	Good	Fair	Good	Good	Good	Fair	Good.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
154A Flanagan	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
171B Catlin	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
198A Elburn	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
199A, 199B Plano	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
199C2 Plano	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
206 Thorp	Good	Good	Good	Good	Good	Good	Good	Good	Good.
221B2 Parr	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
221C2 Parr	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
233B Birkbeck	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
234 Sunbury	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
236A Sabina	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
244 Hartsburg	Fair	Fair	Good	Fair	Good	Good	Fair	Fair	Good.
257 Clarksdale	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
279B Rozetta	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
284 Tice	Poor	Fair	Fair	Good	Fair	Fair	Fair	Good	Fair.
291B Xenia	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
306 Allison	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
322C2 Russell	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
330 Peotone	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
333 Wakeland	Poor	Fair	Fair	Good	Fair	Fair	Fair	Good	Fair.
348B Wingate	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.

TABLE 9.--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	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
352----------------- Palms	Good	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
386B---------------- Downs	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
440C2--------------- Jasper	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
451----------------- Lawson	Good	Good	Fair	Good	Fair	Fair	Good	Good	Fair.
481A---------------- Raub	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
533*. Urban land									
684B---------------- Broadwell	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
802B, 802D. Orthents									
865*. Pits									
1083---------------- Wabash	Very poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair.
2027C*: Miami---------------	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
Urban land.									
2027D*: Miami---------------	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
Urban land.									
2027F*: Miami---------------	Very poor	Poor	Good	Good	Very poor	Very poor	Poor	Good	Very poor.
Urban land.									
2152*: Drummer------------	Fair	Good	Good	Fair	Good	Good	Good	Fair	Good.
Urban land.									
2154A*: Flanagan-----------	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Urban land.									

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
2171B*:									
Catlin	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
Urban land.									
2233B*:									
Birkbeck	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Urban land.									
2236A*:									
Sabina	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Urban land.									
2322C*:									
Russell	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
Urban land.									

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--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
27C2 Miami	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
27D2 Miami	Moderate: slope, dense layer.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
27E3, 27F, 27G Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
36B Tama	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
43A Ipava	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
45 Denny	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, frost action.	Severe: ponding.
56B Dana	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
56C2 Dana	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
67 Harpster	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
68 Sable	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
88C Sparta	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
107 Sawmill	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
119C2 Elco	Moderate: too clayey, wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.

TABLE 10.--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
132---------------- Starks	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
134B--------------- Camden	Slight---------	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
136---------------- Brooklyn	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, frost action.	Severe: ponding.
138---------------- Shiloh	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
148B--------------- Proctor	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
148C2-------------- Proctor	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
152---------------- Drummer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
153---------------- Pella	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
154A--------------- Flanagan	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
171B--------------- Catlin	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
198A--------------- Elburn	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
199A, 199B--------- Plano	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
199C2-------------- Plano	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: frost action, low strength.	Slight.
206---------------- Thorp	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.

TABLE 10.--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
221B2 Parr	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Slight.
221C2 Parr	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Slight.
233B Birkbeck	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
234 Sunbury	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
236A Sabina	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
244 Hartsburg	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
257 Clarksdale	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, frost action, low strength.	Moderate: wetness.
279B Rozetta	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
284 Tice	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding, frost action.	Severe: flooding.
291B Xenia	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
306 Allison	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: flooding.
322C2 Russell	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
330 Peotone	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, frost action.	Severe: ponding.
333 Wakeland	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.

TABLE 10.--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
348B. Wingate	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
352. Palms	Severe: excess humus, ponding.	Severe: flooding, ponding, subsides.	Severe: flooding, ponding, subsides.	Severe: flooding, ponding, subsides.	Severe: ponding, flooding, subsides.	Severe: ponding, flooding.
386B. Downs	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
440C2. Jasper	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
451. Lawson	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
481A. Raub	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
533*. Urban land						
684B. Broadwell	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
802B, 802D. Orthents						
865*. Pits						
1083. Wabash	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
2027C*: Miami	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
Urban land.						
2027D*: Miami	Moderate: slope, dense layer.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Urban land.						
2027F*: Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.

See footnote at end of table.

TABLE 10.--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
2027F*: Urban land.						
2152*: Drummer----------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
Urban land.						
2154A*: Flanagan---------	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
Urban land.						
2171B*: Catlin-----------	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
Urban land.						
2233B*: Birkbeck---------	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
Urban land.						
2236A*: Sabina-----------	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
Urban land.						
2322C*: Russell----------	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
Urban land.						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--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
27C2: Miami	Severe: percs slowly.	Severe: slope.	Slight	Slight	Good.
27D2: Miami	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
27E3, 27F, 27G: Miami	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
36B: Tama	Moderate: wetness.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
43A: Ipava	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
45: Denny	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
56B, 56C2: Dana	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Slight	Fair: too clayey, wetness.
67: Harpster	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: hard to pack, ponding.
68: Sable	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: hard to pack, ponding.
88C: Sparta	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
107: Sawmill	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
119C2: Elco	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: too clayey, wetness, slope.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
132: Starks	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
134B: Camden	Slight	Moderate: seepage, slope.	Severe: seepage.	Slight	Fair: too clayey.

TABLE 11.--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
136----------------- Brooklyn	Severe: ponding, percs slowly.	Slight-----------	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
138----------------- Shiloh	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
148B---------------- Proctor	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight-----------	Fair: too clayey, thin layer.
148C2--------------- Proctor	Moderate: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Slight-----------	Fair: too clayey, thin layer.
152----------------- Drummer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
153----------------- Pella	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
154A---------------- Flanagan	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.
171B---------------- Catlin	Severe: wetness.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
198A---------------- Elburn	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
199A, 199B---------- Plano	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
199C2--------------- Plano	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
206----------------- Thorp	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: ponding.	Poor: ponding.
221B2--------------- Parr	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
221C2--------------- Parr	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
233B---------------- Birkbeck	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
234----------------- Sunbury	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.

TABLE 11.--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
236A: Sabina	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.
244: Hartsburg	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
257: Clarksdale	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey, hard to pack.
279B: Rozetta	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
284: Tice	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack.
291B: Xenia	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
306: Allison	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack.
322C2: Russell	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
330: Peotone	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
333: Wakeland	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
348B: Wingate	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.
352: Palms	Severe: flooding, ponding, subsides.	Severe: seepage, excess humus, flooding.	Severe: flooding, ponding, excess humus.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus.
386B: Downs	Moderate: wetness.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
440C2: Jasper	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope, thin layer.
451: Lawson	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.

TABLE 11.--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
481A Raub	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
533*. Urban land					
684B Broadwell	Slight	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey, thin layer.
802B, 802D. Orthents					
865*. Pits					
1083 Wabash	Severe: flooding, ponding, percs slowly.	Severe: flooding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
2027C*: Miami	Severe: percs slowly.	Severe: slope.	Slight	Slight	Good.
Urban land.					
2027D*: Miami	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Urban land.					
2027F*: Miami	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Urban land.					
2152*: Drummer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
Urban land.					
2154A*: Flanagan	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.
Urban land.					
2171B*: Catlin	Severe: wetness.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
Urban land.					

See footnote at end of table.

TABLE 11.--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
2233B*:					
Birkbeck	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
Urban land.					
2236A*:					
Sabina	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.
Urban land.					
2322C*:					
Russell	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Urban land.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--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
27C2: Miami	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
27D2: Miami	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, slope, too clayey.
27E3, 27F: Miami	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
27G: Miami	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
36B: Tama	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
43A: Ipava	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
45: Denny	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
56B, 56C2: Dana	Good.	Improbable: excess fines.	Improbable: excess fines.	Good.
67: Harpster	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
68: Sable	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
88C: Sparta	Good.	Probable.	Improbable: too sandy.	Poor: thin layer.
107: Sawmill	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
119C2: Elco	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, slope.
132: Starks	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
134B: Camden	Good.	Improbable: excess fines.	Improbable: excess fines.	Good.
136: Brooklyn	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
138----- Shiloh	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
148B, 148C2----- Proctor	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
152----- Drummer	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
153----- Pella	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
154A----- Flanagan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
171B----- Catlin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
198A----- Elburn	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
199A, 199B, 199C2----- Plano	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
206----- Thorp	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
221B2, 221C2----- Parr	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
233B----- Birkbeck	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
234----- Sunbury	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
236A----- Sabina	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
244----- Hartsburg	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
257----- Clarksdale	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
279B----- Rozetta	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
284----- Tice	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
291B----- Xenia	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
306----- Allison	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
322C2----------------- Russell	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Good.
330------------------- Peotone	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
333------------------- Wakeland	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
348B------------------ Wingate	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Good.
352------------------- Palms	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
386B------------------ Downs	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
440C2----------------- Jasper	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
451------------------- Lawson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
481A------------------ Raub	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
533*. Urban land				
684B------------------ Broadwell	Good-----------------	Probable-------------	Improbable: too sandy.	Good.
802B, 802D. Orthents				
865*. Pits				
1083------------------ Wabash	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
2027C*: Miami----------------	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
Urban land.				
2027D*: Miami----------------	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, slope, too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
2027D*:				
Urban land.				
2027F*:				
Miami	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Urban land.				
2152*:				
Drummer	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Urban land.				
2154A*:				
Flanagan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Urban land.				
2171B*:				
Catlin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Urban land.				
2233B*:				
Birkbeck	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Urban land.				
2236A*:				
Sabina	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Urban land.				
2322C*:				
Russell	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Urban land.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--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	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
27C2: Miami	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth.	Erodes easily	Erodes easily, rooting depth.
27D2, 27E3, 27F, 27G: Miami	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
36B: Tama	Moderate: seepage, slope.	Slight	Moderate: deep to water, slow refill.	Deep to water	Slope	Erodes easily	Erodes easily.
43A: Ipava	Slight	Severe: wetness.	Severe: slow refill.	Frost action	Wetness	Erodes easily, wetness.	Wetness, erodes easily.
45: Denny	Slight	Severe: ponding.	Severe: slow refill.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding.	Wetness, erodes easily, percs slowly.
56B, 56C2: Dana	Moderate: seepage, slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope	Erodes easily	Erodes easily.
67: Harpster	Moderate: seepage.	Severe: ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding	Ponding	Wetness.
68: Sable	Moderate: seepage.	Severe: ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding	Ponding	Wetness.
88C: Sparta	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
107: Sawmill	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness, flooding.	Wetness	Wetness.
119C2: Elco	Severe: slope.	Moderate: piping, wetness.	Severe: no water.	Frost action, slope.	Wetness, slope, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily.
132: Starks	Moderate: seepage.	Severe: thin layer, wetness.	Severe: cutbanks cave.	Frost action	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
134B-------------- Camden	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
136--------------- Brooklyn	Slight---------	Severe: thin layer, ponding.	Severe: slow refill.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
138--------------- Shiloh	Slight---------	Severe: ponding.	Severe: slow refill.	Ponding, frost action.	Ponding--------	Ponding--------	Wetness.
148B, 148C2------- Proctor	Severe: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope----------	Erodes easily	Erodes easily.
152--------------- Drummer	Moderate: seepage.	Severe: ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding--------	Ponding--------	Wetness.
153--------------- Pella	Moderate: seepage.	Severe: piping, ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding--------	Ponding--------	Wetness.
154A-------------- Flanagan	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Frost action---	Wetness--------	Erodes easily, wetness.	Erodes easily.
171B-------------- Catlin	Moderate: seepage, slope.	Moderate: wetness.	Moderate: deep to water, slow refill.	Deep to water	Slope----------	Erodes easily	Erodes easily.
198A-------------- Elburn	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Frost action---	Wetness--------	Erodes easily, wetness.	Wetness, erodes easily.
199A-------------- Plano	Moderate: seepage.	Moderate: thin layer, piping, wetness.	Moderate: deep to water, slow refill.	Deep to water	Favorable------	Erodes easily	Erodes easily.
199B, 199C2------- Plano	Moderate: seepage, slope.	Moderate: thin layer, piping, wetness.	Moderate: deep to water, slow refill.	Deep to water	Slope----------	Erodes easily	Erodes easily.
206--------------- Thorp	Severe: seepage.	Severe: ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
221B2, 221C2------ Parr	Moderate: seepage, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, rooting depth.	Favorable------	Rooting depth.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
233B----- Birkbeck	Moderate: seepage, slope.	Moderate: thin layer, piping, wetness.	Severe: slow refill.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
234----- Sunbury	Moderate: seepage.	Moderate: hard to pack, wetness.	Severe: no water.	Frost action---	Wetness--------	Erodes easily, wetness.	Erodes easily.
236A----- Sabina	Slight---------	Severe: wetness.	Severe: slow refill.	Frost action---	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
244----- Hartsburg	Moderate: seepage.	Severe: ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding--------	Ponding--------	Wetness.
257----- Clarksdale	Slight---------	Severe: wetness.	Severe: slow refill.	Frost action---	Wetness, erodes easily.	Wetness, erodes easily.	Wetness, erodes easily.
279B----- Rozetta	Moderate: seepage, slope.	Slight---------	Moderate: deep to water, slow refill.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
284----- Tice	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness--------	Wetness--------	Favorable.
291B----- Xenia	Moderate: seepage, slope.	Moderate: thin layer, wetness.	Severe: slow refill.	Frost action, slope.	Slope, wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
306----- Allison	Moderate: seepage.	Moderate: piping, hard to pack, wetness.	Moderate: deep to water, slow refill.	Deep to water	Flooding-------	Favorable------	Favorable.
322C2----- Russell	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
330----- Peotone	Slight---------	Severe: ponding.	Severe: slow refill.	Ponding, frost action.	Ponding--------	Ponding--------	Wetness.
333----- Wakeland	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
348B----- Wingate	Moderate: seepage, slope.	Moderate: thin layer, hard to pack, wetness.	Severe: slow refill.	Deep to water	Slope----------	Erodes easily	Erodes easily.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
352 Palms	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, flooding, subsides.	Ponding, flooding.	Ponding	Wetness.
386B Downs	Moderate: seepage, slope.	Slight	Moderate: deep to water, slow refill.	Deep to water	Slope	Erodes easily	Erodes easily.
440C2 Jasper	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
451 Lawson	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
481A Raub	Slight	Severe: wetness.	Severe: slow refill.	Frost action	Wetness	Erodes easily, wetness.	Wetness, erodes easily.
533*. Urban land							
684B Broadwell	Severe: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope	Erodes easily	Erodes easily.
802B, 802D. Orthents							
865*. Pits							
1083 Wabash	Slight	Severe: ponding.	Severe: slow refill.	Ponding, percs slowly, flooding.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
2027C*: Miami	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth.	Erodes easily	Erodes easily, rooting depth.
Urban land.							
2027D*, 2027F*: Miami	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
Urban land.							

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
2152*:							
Drummer	Moderate: seepage.	Severe: ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding	Ponding	Wetness.
Urban land.							
2154A*:							
Flanagan	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Frost action	Wetness	Erodes easily, wetness.	Erodes easily.
Urban land.							
2171B*:							
Catlin	Moderate: seepage, slope.	Moderate: wetness.	Moderate: deep to water, slow refill.	Deep to water	Slope	Erodes easily	Erodes easily.
Urban land.							
2233B*:							
Birkbeck	Moderate: seepage, slope.	Moderate: thin layer, piping, wetness.	Severe: slow refill.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
Urban land.							
2236A*:							
Sabina	Slight	Severe: wetness.	Severe: slow refill.	Frost action	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
Urban land.							
2322C*:							
Russell	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
Urban land.							

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--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: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
27C2------------- Miami	0-6	Silty clay loam	CL	A-6	0	100	90-100	75-95	65-95	30-40	15-20
	6-40	Clay loam, silty clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	40-95	30-40	15-25
	40-60	Loam-------------	CL, CL-ML, SC, SM-SC	A-4, A-6	0-3	85-100	85-100	70-90	45-70	20-40	5-20
27D2------------- Miami	0-6	Silt loam--------	CL, CL-ML, ML	A-4	0	100	95-100	80-100	50-90	15-30	3-10
	6-27	Clay loam, silty clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	40-95	30-40	15-25
	27-33	Loam-------------	CL, SC	A-4, A-6	0-3	85-100	85-100	70-90	40-90	25-35	8-15
	33-60	Loam-------------	CL, CL-ML, SC, SM-SC	A-4, A-6	0-3	85-100	85-100	70-90	45-70	20-40	5-20
27E3------------- Miami	0-7	Clay loam--------	CL	A-6	0	100	90-100	75-95	65-95	30-40	15-20
	7-26	Clay loam, silty clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	40-95	30-40	15-25
	26-29	Loam-------------	CL, SC	A-4, A-6	0-3	85-100	85-100	70-90	40-90	25-35	8-15
	29-60	Loam-------------	CL, CL-ML, SC, SM-SC	A-4, A-6	0-3	85-100	85-100	70-90	45-70	20-40	5-20
27F, 27G--------- Miami	0-11	Loam-------------	CL, CL-ML, ML	A-4	0	100	95-100	80-100	50-90	15-30	3-10
	11-28	Clay loam, silty clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	40-95	30-40	15-25
	28-36	Loam-------------	CL, SC	A-4, A-6	0-3	85-100	85-100	70-90	40-90	25-35	8-15
	36-60	Loam, gravelly sandy loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0-3	85-100	85-100	70-90	45-70	20-40	5-20
36B-------------- Tama	0-13	Silt loam--------	ML	A-6, A-7	0	100	100	100	95-100	35-50	10-20
	13-38	Silty clay loam	CL	A-7	0	100	100	100	95-100	40-50	15-25
	38-60	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
43A-------------- Ipava	0-16	Silt loam--------	ML, CL	A-6, A-7	0	100	100	95-100	90-100	30-45	10-20
	16-36	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	95-100	90-100	45-70	25-40
	36-60	Silt loam--------	CL	A-6	0	100	100	95-100	90-100	30-40	10-20
45--------------- Denny	0-8	Silt loam--------	CL	A-6, A-4	0	100	100	95-100	95-100	30-40	8-15
	8-18	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	25-40	5-15
	18-40	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0	100	100	95-100	95-100	35-60	15-35
	40-60	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	95-100	25-40	11-20
56B, 56C2-------- Dana	0-10	Silt loam--------	CL	A-6, A-4	0	100	100	95-100	85-95	30-35	8-12
	10-28	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-98	38-50	20-32
	28-49	Clay loam--------	CL	A-6, A-7	0	90-100	90-95	80-90	65-75	37-50	17-30
	49-60	Loam-------------	CL, ML, CL-ML	A-4, A-6	0-3	85-95	80-90	75-85	50-65	17-30	2-14
67--------------- Harpster	0-18	Silty clay loam	CL, CH	A-7	0	100	95-100	95-100	90-100	45-60	20-35
	18-32	Silty clay loam	CL, CH	A-7	0	100	95-100	95-100	85-100	40-60	20-35
	32-54	Silty clay loam, silt loam, loam.	CL, CH	A-6, A-7	0	100	95-100	95-100	70-100	35-55	20-35
	54-60	Stratified loamy sand to clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-7	0	100	95-100	95-100	45-95	20-50	5-25

TABLE 14.--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	
68 Sable	0-17	Silty clay loam	CL, CH, ML, MH	A-7	0	100	100	95-100	95-100	41-65	15-35
	17-52	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	95-100	40-55	20-35
	52-60	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	95-100	30-40	10-20
88C Sparta	0-17	Loamy sand	SM	A-2, A-4	0	85-100	85-100	50-95	15-50	---	NP
	17-40	Loamy sand, fine sand, sand.	SP-SM, SM	A-2, A-3, A-4	0	85-100	85-100	50-95	5-50	---	NP
	40-60	Sand, fine sand, loamy fine sand.	SP-SM, SM, SP	A-2, A-3	0	85-100	85-100	50-95	2-30	---	NP
107 Sawmill	0-21	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-100	30-50	15-30
	21-48	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-100	30-50	15-30
	48-60	Silty clay loam, clay loam, loam.	CL	A-6, A-7, A-4	0	100	100	85-100	70-95	25-50	8-25
119C2 Elco	0-5	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	5-23	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	85-100	25-45	10-30
	23-60	Silty clay loam, clay loam, silt loam.	CL	A-7, A-6	0	100	90-100	85-95	75-95	25-45	10-30
132 Starks	0-11	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	95-100	85-100	22-35	5-15
	11-31	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	35-45	15-24
	31-60	Loam, clay loam, sandy loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	95-100	90-100	80-95	40-80	25-40	6-17
134B Camden	0-8	Silt loam	CL, ML, CL-ML	A-4, A-6	0	100	100	95-100	90-100	20-35	3-15
	8-25	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	90-100	25-40	15-25
	25-49	Stratified clay loam to loamy sand.	ML, SC, SM, CL	A-2, A-4, A-6	0-5	90-100	85-100	60-100	30-70	20-40	3-15
	49-60	Stratified loam to sandy loam.	SM, SC, ML, CL	A-2, A-4	0-5	90-100	80-100	50-80	20-60	<25	3-10
136 Brooklyn	0-8	Silt loam	CL, CL-ML	A-6, A-4	0	100	100	95-100	90-100	25-35	5-15
	8-15	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	15-49	Silty clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	95-100	45-60	25-40
	49-60	Stratified sandy loam to gravelly clay loam.	CL, CL-ML, SM-SC, SC	A-4, A-2, A-6	0-5	75-100	65-90	60-90	30-70	15-38	5-20
138 Shiloh	0-12	Silty clay loam	CL	A-7	0	100	100	95-100	90-100	40-50	20-25
	12-44	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-100	40-65	15-40
	44-60	Silty clay loam, silty clay, silt loam.	CL	A-7, A-6	0	100	100	95-100	90-100	30-50	15-30
148B Proctor	0-11	Silt loam	CL	A-6	0	100	100	95-100	85-100	25-40	10-22
	11-25	Silty clay loam	CL	A-7, A-6	0	95-100	90-100	85-100	85-100	25-50	10-25
	25-31	Clay loam, loam, silty clay loam.	CL	A-6, A-7	0	90-100	85-100	75-100	65-80	25-45	10-25
	31-60	Stratified gravelly clay loam to sand.	SC, CL, SM-SC, CL-ML	A-2, A-4, A-6	0	85-100	80-100	50-100	25-80	20-40	5-20

TABLE 14.--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	
148C2------------ Proctor	0-6	Silt loam--------	CL	A-6	0	100	100	95-100	85-100	25-40	10-22
	6-27	Silty clay loam	CL	A-7, A-6	0	95-100	90-100	85-100	85-100	25-50	10-25
	27-55	Clay loam, loam, silty clay loam.	CL	A-6, A-7	0	90-100	85-100	75-100	65-80	25-45	10-25
	55-60	Stratified loam to sand.	SC, CL, SM-SC, CL-ML	A-2, A-4, A-6	0	85-100	80-100	50-100	25-80	20-40	5-20
152-------------- Drummer	0-18	Silty clay loam	CL	A-6, A-7	0	100	95-100	95-100	85-95	30-50	15-30
	18-45	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	95-100	95-100	85-95	30-50	15-30
	45-60	Stratified sandy loam to silty clay loam.	SC, CL	A-4, A-6	0-5	95-100	85-95	75-95	45-80	20-35	7-20
153-------------- Pella	0-11	Silty clay loam	CL	A-7	0	100	95-100	90-100	85-95	40-50	15-25
	11-45	Silty clay loam, silty clay, clay loam.	CL	A-6, A-7	0	100	95-100	90-100	85-95	30-50	15-30
	45-50	Silt loam, loam, clay loam.	CL	A-6, A-7	0-5	95-100	90-100	85-95	60-90	25-45	10-25
	50-60	Stratified sandy loam to clay loam.	SM-SC, SC, CL, CL-ML	A-2, A-4, A-6	0-5	90-100	80-100	50-100	30-85	20-35	7-20
154A------------- Flanagan	0-14	Silt loam--------	CL	A-7, A-6	0	100	100	95-100	85-100	35-50	15-30
	14-52	Silty clay loam	CL, CH	A-7	0	100	100	95-100	85-100	40-60	15-30
	52-70	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	85-100	80-100	70-95	50-85	20-45	5-30
171B------------- Catlin	0-19	Silt loam--------	ML, CL	A-6, A-7	0	100	100	95-100	85-100	30-50	11-20
	19-53	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	90-100	80-100	35-50	20-30
	53-60	Loam, clay loam, silty clay loam.	CL	A-6, A-7	0	90-100	90-100	85-100	60-100	25-45	11-20
198A------------- Elburn	0-13	Silt loam--------	CL	A-6	0	100	100	95-100	90-100	25-40	10-25
	13-50	Silty clay loam	CL	A-6, A-7	0	100	100	100	75-90	30-50	15-35
	50-60	Stratified sandy loam to silty clay loam.	CL, CL-ML, SC, SM-SC	A-6, A-4, A-2	0	90-100	80-100	60-90	25-80	20-40	5-20
199A, 199B------- Plano	0-17	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	95-100	95-100	20-30	5-15
	17-50	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	95-100	25-45	10-25
	50-60	Stratified sandy loam to silt loam.	ML, SM, CL, SC	A-4, A-2	0-5	90-100	85-95	60-90	30-70	<25	NP-10
199C2------------ Plano	0-9	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	100	100	95-100	95-100	20-30	5-15
	9-39	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	95-100	25-45	10-25
	39-60	Stratified sandy loam to silt loam.	ML, SM, CL, SC	A-4, A-2	0-5	90-100	85-95	60-90	30-70	<25	NP-10

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
206------------- Thorp	0-19	Silt loam--------	CL	A-6, A-4	0	95-100	95-100	90-100	75-95	20-40	8-19
	19-53	Silty clay loam	CL	A-7, A-6	0	95-100	95-100	90-100	75-95	35-50	13-27
	53-61	Silt loam, clay loam, loam.	CL	A-6, A-4, A-7	0	90-100	90-100	90-100	70-90	20-50	8-26
	61-66	Sandy loam, loamy sand, loam.	SM, ML, CL-ML, SM-SC	A-2, A-4	0	85-100	75-95	65-85	20-60	<20	NP-6
221B2----------- Parr	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	95-100	95-100	80-100	50-90	15-30	4-15
	8-33	Clay loam, loam, silty clay loam.	CL	A-6, A-4	0	90-100	90-100	75-100	50-95	25-35	9-15
	33-39	Loam-------------	CL	A-6, A-4	0	90-100	90-100	75-85	50-65	25-35	8-15
	39-60	Loam-------------	CL, ML, CL-ML	A-4	0-3	85-95	85-95	75-85	50-65	<25	3-8
221C2----------- Parr	0-8	Loam-------------	CL, CL-ML	A-4, A-6	0	95-100	95-100	80-100	50-90	15-30	4-15
	8-33	Clay loam, loam, silty clay loam.	CL	A-6, A-4	0	90-100	90-100	75-100	50-95	25-35	9-15
	33-39	Loam-------------	CL	A-6, A-4	0	90-100	90-100	75-85	50-65	25-35	8-15
	39-60	Loam-------------	CL, ML, CL-ML	A-4	0-3	85-95	85-95	75-85	50-65	<25	3-8
233B------------ Birkbeck	0-4	Silt loam--------	CL, ML	A-4, A-6 A-7	0	100	100	95-100	95-100	28-45	5-15
	4-9	Silt loam--------	CL, ML	A-4, A-6	0	100	100	100	95-100	30-40	7-15
	9-54	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	95-100	95-100	85-100	30-50	10-25
	54-60	Loam, silty clay loam, clay loam.	CL, CL-ML	A-4, A-6	0-5	95-100	85-100	70-100	55-80	25-40	5-20
	60-67	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0-5	95-100	85-100	70-100	55-80	20-40	5-20
234------------- Sunbury	0-12	Silt loam--------	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	8-15
	12-49	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0	100	100	95-100	85-100	35-60	20-35
	49-72	Loam, sandy loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	98-100	95-100	90-100	50-95	20-45	5-30
236A------------ Sabina	0-11	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	11-54	Silty clay loam	CL, CH	A-7	0	100	100	95-100	85-100	40-60	20-40
	54-60	Clay loam, silt loam, loam.	CL, CL-ML	A-4, A-6 A-7	0-5	95-100	90-100	70-100	55-75	20-50	5-30
244------------- Hartsburg	0-16	Silty clay loam	CL, ML	A-7, A-6	0	100	100	100	95-100	35-50	10-25
	16-36	Silty clay loam	CL, CH	A-7	0	100	100	95-100	95-100	40-55	20-30
	36-60	Silt loam--------	CL	A-6	0	95-100	90-100	90-100	70-100	25-40	11-20
257------------- Clarksdale	0-17	Silt loam--------	CL	A-6	0	100	100	95-100	90-100	25-40	10-20
	17-52	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	95-100	90-100	40-65	25-40
	52-60	Silt loam, silty clay loam.	CL	A-6	0	98-100	98-100	95-100	90-100	25-40	10-25
279B------------ Rozetta	0-8	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	95-100	24-35	8-15
	8-12	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	20-30	5-15
	12-41	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	95-100	35-50	15-30
	41-60	Silt loam--------	CL	A-6	0	100	100	95-100	95-100	25-40	10-20

TABLE 14.--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	
284----------------- Tice	0-21	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-95	30-45	10-20
	21-58	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-55	15-30
	58-66	Stratified silty clay loam to very fine sandy loam.	CL-ML, CL	A-4, A-6, A-7	0	100	100	60-95	55-80	25-45	5-20
291B---------------- Xenia	0-11	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-35	5-15
	11-28	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-95	35-50	15-30
	28-51	Clay loam--------	CL	A-6, A-7	0-5	92-100	90-95	75-95	65-75	35-50	15-30
	51-60	Loam-------------	CL, ML, SC, SM	A-4, A-6	0-5	85-95	80-90	75-90	40-65	15-30	NP-15
306----------------- Allison	0-24	Silt loam--------	CL, ML, CH, MH	A-6, A-7	0	100	100	95-100	80-100	30-55	10-30
	24-44	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	100	100	90-100	90-100	30-50	10-25
	44-60	Silty clay loam, silt loam, clay loam.	ML, CL, CH, MH	A-6, A-7	0	100	100	90-100	75-95	35-55	10-30
322C2--------------- Russell	0-7	Silt loam--------	CL-ML, CL, ML	A-4	0	100	100	90-100	70-90	<25	3-8
	7-25	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-40	10-20
	25-47	Clay loam, loam	CL	A-6	0	95-100	90-95	80-95	60-80	30-35	10-15
	47-60	Loam-------------	CL-ML, CL	A-4	0-3	85-95	80-90	65-90	50-75	<25	4-8
330----------------- Peotone	0-14	Silty clay loam	CH, CL	A-7	0	100	95-100	95-100	80-100	40-65	15-35
	14-44	Silty clay loam, silty clay.	CH, CL	A-7	0-5	100	95-100	90-100	85-100	41-70	17-39
	44-60	Silty clay loam, silt loam, silty clay.	CL, CH, ML, MH	A-7, A-6	0-5	95-100	95-100	90-100	75-98	30-60	14-29
333----------------- Wakeland	0-10	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	10-60	Stratified silt loam to loamy sand.	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
348B---------------- Wingate	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	7-33	Silty clay loam, silt loam.	CL, CH	A-6, A-7	0	100	100	95-100	85-95	35-55	20-30
	33-49	Clay loam, loam	CL	A-6, A-7	0	95-100	90-95	80-90	65-75	35-50	15-30
	49-60	Loam-------------	CL, CL-ML	A-4, A-6	0-3	85-95	80-90	75-85	50-65	20-30	5-15
352----------------- Palms	0-8	Silty clay loam	MH, CH, CL	A-6, A-7	0	100	100	95-100	85-100	35-60	15-30
	8-46	Sapric material	PT	A-8	0	---	---	---	---	---	---
	46-60	Fine sandy loam, loam, clay loam.	CL-ML, CL	A-4, A-6	0	85-100	80-100	70-95	50-90	25-40	5-20
386B---------------- Downs	0-13	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	13-37	Silty clay loam	CL	A-7, A-6	0	100	100	100	95-100	35-45	15-25
	37-60	Silt loam--------	CL	A-6	0	100	100	100	95-100	30-40	11-20
440C2--------------- Jasper	0-15	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	15-24	Loam, fine sandy loam, loam.	CL	A-6	0	100	100	85-95	60-75	20-35	10-20
	24-55	Fine sandy loam, loam, sandy clay loam.	SC, SM-SC	A-4, A-2-4	0	100	85-100	60-70	30-40	20-30	5-10
	55-60	Stratified silt loam to loamy fine sand.	SC, CL-ML, CL, SM-SC	A-4	0	100	85-100	75-90	35-85	<30	5-10

TABLE 14.--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	
451----------- Lawson	0-10	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	85-100	35-45	15-25
	10-37	Silt loam--------	CL, CL-ML	A-4	0	100	100	90-100	85-100	20-30	5-10
	37-60	Silty clay loam, loam, silt loam.	CL	A-6	0	100	100	90-100	60-100	20-40	10-25
481A---------- Raub	0-12	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	75-95	25-35	5-15
	12-35	Silty clay loam	CL, CH	A-6, A-7	0	100	100	95-100	80-95	35-55	20-35
	35-50	Clay loam, loam, sandy clay loam.	CL	A-6, A-7	0	95-100	90-100	85-95	60-85	35-50	15-25
	50-60	Loam, clay loam	CL, ML, SC, SM	A-4, A-6	0-5	85-95	80-90	70-85	40-65	15-30	NP-15
533*. Urban land											
684B---------- Broadwell	0-11	Silt loam--------	ML, CL	A-6, A-7, A-4	0	100	100	90-100	85-100	30-45	5-20
	11-50	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	90-100	30-45	10-25
	50-60	Loamy fine sand, fine sandy loam, fine sand.	SM, SP-SM, SP, SM-SC	A-3, A-2	0	100	100	75-95	4-35	<20	NP-5
802B, 802D. Orthents											
865*. Pits											
1083---------- Wabash	0-4	Silty clay loam	CL, CH	A-7	0	100	100	95-100	90-100	45-55	20-30
	4-60	Silty clay-------	CH	A-7	0	100	100	95-100	95-100	50-75	30-55
2027C*, 2027D*, 2027F*:											
Miami----------	0-7	Loam-------------	CL, CL-ML, ML	A-4	0	100	95-100	80-100	50-90	15-30	3-10
	7-30	Clay loam, silty clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	40-95	30-40	15-25
	30-40	Loam, clay loam	CL, SC	A-4, A-6	0-3	85-100	85-100	70-90	40-90	25-35	8-15
	40-60	Loam-------------	CL, CL-ML, SC, SM-SC	A-4, A-6	0-3	85-100	85-100	70-90	45-70	20-40	5-20
Urban land.											
2152*:											
Drummer---------	0-11	Silty clay loam	CL	A-6, A-7	0	100	95-100	95-100	85-95	30-50	15-30
	11-48	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	95-100	95-100	85-95	30-50	15-30
	48-54	Loam, silt loam, clay loam.	CL	A-6, A-7	0-5	95-100	90-100	75-95	60-85	30-50	15-30
	54-60	Stratified sandy loam to silty clay loam.	SC, CL	A-4, A-6	0-5	95-100	85-95	75-95	45-80	20-35	7-20
Urban land.											
2154A*:											
Flanagan--------	0-18	Silt loam--------	CL	A-7, A-6	0	100	100	95-100	85-100	35-50	15-30
	18-58	Silty clay loam	CL, CH	A-7	0	100	100	95-100	85-100	40-60	15-30
	58-65	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	85-100	80-100	70-95	50-85	20-45	5-30
Urban land.											

See footnote at end of table.

TABLE 14.--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	
2171B*:											
Catlin----------	0-13	Silt loam--------	ML, CL	A-6, A-7	0	100	100	95-100	85-100	30-50	11-20
	13-41	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	90-100	80-100	35-50	20-30
	41-60	Loam, clay loam, silty clay loam.	CL	A-6, A-7	0	90-100	90-100	85-100	60-100	25-45	11-20
Urban land.											
2233B*:											
Birkbeck--------	0-6	Silt loam--------	CL, ML	A-4, A-6	0	100	100	95-100	95-100	28-40	5-15
	6-47	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	95-100	95-100	85-100	30-50	10-25
	47-60	Loam, silty clay loam, clay loam.	CL, CL-ML	A-4, A-6	0-5	95-100	85-100	70-100	55-80	25-40	5-20
Urban land.											
2236A*:											
Sabina----------	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	8-46	Silty clay loam	CL, CH	A-7	0	100	100	95-100	85-100	40-60	20-40
	46-60	Clay loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	0-5	95-100	90-100	70-100	55-75	20-50	5-30
Urban land.											
2322C*:											
Russell---------	0-7	Silt loam--------	CL-ML, CL, ML	A-4	0	100	100	90-100	70-90	<25	3-8
	7-26	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-40	10-20
	26-55	Clay loam--------	CL	A-6	0	95-100	90-95	80-95	60-80	30-35	10-15
	55-60	Loam-------------	CL-ML, CL	A-4	0-3	85-95	80-90	65-90	50-75	<25	4-8
Urban land.											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--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 K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
27C2------------- Miami	0-6	27-35	1.35-1.60	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.37	3	6	.5-2
	6-40	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-6.0	Moderate-----	0.37			
	40-60	15-25	1.55-1.90	0.2-0.6	0.05-0.19	7.4-8.4	Moderate-----	0.37			
27D2------------- Miami	0-6	11-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.37	5	5	.5-2
	6-27	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-6.0	Moderate-----	0.37			
	27-33	20-27	1.45-1.65	0.6-2.0	0.14-0.19	6.6-7.8	Low----------	0.37			
	33-60	15-25	1.55-1.90	0.2-0.6	0.05-0.19	7.4-8.4	Moderate-----	0.37			
27E3------------- Miami	0-7	27-35	1.35-1.60	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.37	3	6	.5-1
	7-26	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-6.0	Moderate-----	0.37			
	26-29	20-27	1.45-1.65	0.6-2.0	0.14-0.19	6.6-7.8	Low----------	0.37			
	29-60	15-25	1.55-1.90	0.2-0.6	0.05-0.19	7.4-8.4	Moderate-----	0.37			
27F, 27G--------- Miami	0-11	11-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.37	5	5	2-3
	11-28	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-7.3	Moderate-----	0.37			
	28-36	20-27	1.45-1.65	0.6-2.0	0.14-0.19	6.6-7.8	Low----------	0.37			
	36-60	15-25	1.55-1.90	0.2-0.6	0.05-0.19	7.4-8.4	Moderate-----	0.37			
36B-------------- Tama	0-13	20-29	1.25-1.30	0.6-2.0	0.22-0.24	5.1-7.3	Moderate-----	0.32	5	7	3-4
	13-38	27-35	1.30-1.35	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.43			
	38-60	20-30	1.35-1.40	0.6-2.0	0.18-0.20	5.6-7.8	Moderate-----	0.43			
43A-------------- Ipava	0-16	20-30	1.15-1.35	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-----	0.28	5	6	4-5
	16-36	35-43	1.25-1.50	0.2-0.6	0.11-0.20	5.6-7.8	High---------	0.43			
	36-60	20-27	1.30-1.55	0.2-0.6	0.20-0.22	6.1-8.4	Moderate-----	0.43			
45--------------- Denny	0-8	20-27	1.25-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	3	6	3-4
	8-18	15-22	1.25-1.45	0.2-0.6	0.18-0.20	5.6-6.5	Low----------	0.37			
	18-40	35-45	1.20-1.40	0.06-0.2	0.11-0.22	5.6-6.5	High---------	0.37			
	40-60	25-35	1.40-1.60	0.2-0.6	0.20-0.22	5.6-7.8	Moderate-----	0.37			
56B, 56C2-------- Dana	0-10	11-22	1.40-1.55	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.32	5	5	3-5
	10-28	27-35	1.45-1.65	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.43			
	28-49	27-35	1.45-1.65	0.6-2.0	0.15-0.19	6.1-7.8	Moderate-----	0.43			
	49-60	15-27	1.55-1.90	0.2-0.6	0.05-0.19	6.6-8.4	Low----------	0.43			
67--------------- Harpster	0-18	22-35	1.05-1.25	0.6-2.0	0.21-0.24	7.4-8.4	Moderate-----	0.28	5	4L	5-6
	18-32	27-35	1.20-1.50	0.6-2.0	0.18-0.22	7.4-8.4	Moderate-----	0.28			
	32-54	22-35	1.25-1.55	0.6-2.0	0.17-0.22	7.4-8.4	Moderate-----	0.28			
	54-60	15-30	1.40-1.60	0.6-2.0	0.11-0.22	7.4-8.4	Low----------	0.28			
68--------------- Sable	0-17	27-35	1.15-1.35	0.6-2.0	0.21-0.23	5.6-7.3	Moderate-----	0.28	5	6	5-6
	17-52	24-35	1.30-1.50	0.6-2.0	0.18-0.20	5.6-7.8	Moderate-----	0.28			
	52-60	20-28	1.30-1.50	0.6-2.0	0.20-0.22	6.6-8.4	Low----------	0.28			
88C-------------- Sparta	0-17	3-10	1.20-1.40	2.0-6.0	0.09-0.12	5.1-7.3	Low----------	0.17	5	2	1-2
	17-40	1-8	1.40-1.60	6.0-20	0.05-0.11	5.1-6.5	Low----------	0.17			
	40-60	0-5	1.50-1.70	6.0-20	0.04-0.07	5.1-6.5	Low----------	0.17			
107-------------- Sawmill	0-21	27-35	1.20-1.40	0.6-2.0	0.21-0.23	6.1-7.8	Moderate-----	0.28	5	7	4-5
	21-48	27-35	1.20-1.40	0.6-2.0	0.21-0.23	6.1-7.8	Moderate-----	0.28			
	48-60	25-35	1.30-1.45	0.6-2.0	0.17-0.20	6.1-7.8	Moderate-----	0.28			
119C2------------ Elco	0-5	20-27	1.20-1.35	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	4	6	1-3
	5-23	23-35	1.25-1.45	0.6-2.0	0.18-0.21	5.1-7.8	Moderate-----	0.37			
	23-60	23-35	1.40-1.60	0.2-0.6	0.16-0.20	5.1-7.8	Moderate-----	0.37			

TABLE 15.--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 K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
132------------- Starks	0-11	18-27	1.15-1.35	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	6	1-3
	11-31	27-35	1.35-1.55	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.37			
	31-60	18-30	1.45-1.65	0.6-2.0	0.16-0.19	5.1-7.8	Moderate-----	0.37			
134B------------ Camden	0-8	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
	8-25	22-35	1.35-1.55	0.6-2.0	0.16-0.20	5.1-7.3	Moderate-----	0.37			
	25-49	18-30	1.45-1.65	0.6-2.0	0.11-0.22	5.1-7.3	Low----------	0.37			
	49-60	5-20	1.55-1.75	0.6-6.0	0.11-0.22	5.6-8.4	Low----------	0.37			
136------------- Brooklyn	0-8	20-27	1.20-1.40	0.2-0.6	0.22-0.24	5.1-7.3	Low----------	0.37	4	6	3-4
	8-15	20-27	1.25-1.40	0.2-0.6	0.20-0.22	5.1-7.3	Low----------	0.37			
	15-49	35-45	1.35-1.55	0.06-0.2	0.11-0.20	5.1-7.3	High---------	0.37			
	49-60	10-30	1.40-1.70	0.2-0.6	0.11-0.19	6.6-8.4	Low----------	0.37			
138------------- Shiloh	0-12	35-40	1.30-1.50	0.2-0.6	0.18-0.21	6.1-7.8	High---------	0.28	5	7	4-6
	12-44	35-45	1.35-1.55	0.2-0.6	0.09-0.18	6.1-7.8	High---------	0.28			
	44-60	25-45	1.30-1.50	0.2-0.6	0.18-0.20	6.1-8.4	High---------	0.28			
148B------------ Proctor	0-11	18-25	1.10-1.30	0.6-2.0	0.22-0.24	5.1-7.8	Low----------	0.32	5	6	3-4
	11-25	25-35	1.20-1.45	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.43			
	25-31	22-35	1.20-1.45	0.6-2.0	0.15-0.19	5.6-7.8	Moderate-----	0.43			
	31-60	15-32	1.40-1.70	0.6-6.0	0.07-0.19	6.1-7.8	Low----------	0.43			
148C2----------- Proctor	0-6	18-25	1.10-1.30	0.6-2.0	0.22-0.24	5.1-7.8	Low----------	0.32	5	6	3-4
	6-27	25-35	1.20-1.45	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.43			
	27-55	22-35	1.20-1.45	0.6-2.0	0.15-0.19	5.6-7.8	Moderate-----	0.43			
	55-60	15-32	1.40-1.70	0.6-6.0	0.07-0.19	6.1-7.8	Low----------	0.43			
152------------- Drummer	0-18	27-35	1.10-1.30	0.6-2.0	0.21-0.23	5.6-7.8	Moderate-----	0.28	5	7	5-7
	18-45	20-35	1.20-1.45	0.6-2.0	0.21-0.24	5.6-7.8	Moderate-----	0.28			
	45-60	15-32	1.40-1.70	0.6-2.0	0.11-0.19	6.6-8.4	Low----------	0.28			
153------------- Pella	0-11	27-35	1.10-1.30	0.6-2.0	0.21-0.23	6.1-7.8	Moderate-----	0.28	5	7	5-6
	11-45	27-35	1.20-1.45	0.6-2.0	0.21-0.24	6.6-8.4	Moderate-----	0.28			
	45-50	15-30	1.35-1.60	0.6-2.0	0.15-0.20	7.4-8.4	Moderate-----	0.28			
	50-60	15-30	1.40-1.70	0.6-2.0	0.10-0.22	7.4-8.4	Low----------	0.28			
154A------------ Flanagan	0-14	20-30	1.20-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Moderate-----	0.28	5	6	4-5
	14-52	35-42	1.25-1.45	0.6-2.0	0.15-0.22	5.6-7.3	High---------	0.43			
	52-70	20-30	1.45-1.70	0.2-0.6	0.15-0.22	6.1-8.4	Low----------	0.43			
171B------------ Catlin	0-19	18-27	1.15-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.32	5	6	3-4
	19-53	27-35	1.25-1.55	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.43			
	53-60	20-30	1.40-1.70	0.6-2.0	0.07-0.11	6.1-8.4	Low----------	0.43			
198A------------ Elburn	0-13	22-27	1.10-1.30	0.6-2.0	0.22-0.24	5.6-7.8	Low----------	0.28	5	6	4-5
	13-50	27-35	1.20-1.40	0.6-2.0	0.18-0.20	5.6-7.8	Moderate-----	0.43			
	50-60	15-25	1.50-1.70	0.6-6.0	0.12-0.18	6.1-8.4	Low----------	0.43			
199A, 199B------- Plano	0-17	18-27	1.10-1.30	0.6-2.0	0.22-0.24	6.1-7.3	Low----------	0.32	5	6	3-5
	17-50	25-35	1.20-1.40	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.43			
	50-60	10-20	1.50-1.70	0.6-2.0	0.11-0.22	5.6-8.4	Low----------	0.43			
199C2----------- Plano	0-9	18-27	1.10-1.30	0.6-2.0	0.22-0.24	6.1-7.3	Low----------	0.32	5	6	3-4
	9-39	25-35	1.20-1.40	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.43			
	39-60	10-20	1.50-1.70	0.6-2.0	0.11-0.22	5.6-8.4	Low----------	0.43			
206------------- Thorp	0-19	20-27	1.15-1.35	0.2-0.6	0.22-0.24	5.1-7.8	Low----------	0.37	4	6	4-6
	19-53	27-35	1.35-1.55	0.06-0.2	0.18-0.20	5.1-7.3	Moderate-----	0.37			
	53-61	20-30	1.40-1.60	0.06-0.2	0.15-0.22	5.6-7.8	Moderate-----	0.37			
	61-66	5-20	1.50-1.70	2.0-6.0	0.05-0.13	6.6-8.4	Low----------	0.37			

TABLE 15.--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 K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
221B2, 221C2-----	0-8	12-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.32	5	5	2-3
Parr	8-33	22-32	1.40-1.55	0.6-2.0	0.15-0.19	5.6-7.3	Moderate-----	0.32			
	33-39	20-25	1.55-1.65	0.6-2.0	0.15-0.17	6.6-8.4	Moderate-----	0.32			
	39-60	10-20	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Low-----------	0.32			
233B-------------	0-4	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
Birkbeck	4-9	15-27	1.25-1.50	0.6-2.0	0.20-0.24	4.5-7.3	Low-----------	0.37			
	9-54	25-35	1.30-1.50	0.6-2.0	0.18-0.22	4.5-7.3	Moderate-----	0.37			
	54-60	20-30	1.40-1.60	0.2-0.6	0.14-0.20	5.6-7.8	Low-----------	0.37			
	60-67	17-30	1.55-1.90	0.2-0.6	0.05-0.19	6.6-8.4	Low-----------	0.37			
234--------------	0-12	20-27	1.20-1.40	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.32	5	6	2-4
Sunbury	12-49	35-45	1.35-1.55	0.6-2.0	0.18-0.20	5.6-7.8	High----------	0.43			
	49-72	20-30	1.40-1.60	0.2-0.6	0.07-0.11	6.6-8.4	Low-----------	0.43			
236A-------------	0-11	20-27	1.25-1.45	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.37	5	6	1-3
Sabina	11-54	35-42	1.35-1.55	0.2-0.6	0.18-0.20	5.6-7.3	High----------	0.37			
	54-60	20-35	1.50-1.80	0.2-0.6	0.07-0.11	7.4-8.4	Low-----------	0.37			
244--------------	0-16	23-33	1.15-1.35	0.6-2.0	0.21-0.24	6.1-7.8	Moderate-----	0.28	5	4	3-5
Hartsburg	16-36	27-35	1.20-1.50	0.6-2.0	0.18-0.20	6.6-8.4	Moderate-----	0.28			
	36-60	20-27	1.30-1.55	0.6-2.0	0.20-0.22	7.4-8.4	Low-----------	0.28			
257--------------	0-17	20-27	1.25-1.50	0.6-2.0	0.22-0.24	5.1-6.0	Moderate-----	0.37	5	6	2-3
Clarksdale	17-52	35-42	1.30-1.50	0.2-0.6	0.11-0.20	5.1-7.3	High----------	0.37			
	52-60	20-30	1.40-1.60	0.2-0.6	0.20-0.22	6.1-8.4	Moderate-----	0.37			
279B-------------	0-8	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	8-12	12-27	1.20-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low-----------	0.37			
	12-41	27-35	1.35-1.55	0.6-2.0	0.18-0.22	4.5-6.0	Moderate-----	0.37			
	41-60	20-27	1.40-1.60	0.6-2.0	0.20-0.22	5.6-7.8	Low-----------	0.37			
284--------------	0-21	22-35	1.25-1.45	0.6-2.0	0.21-0.24	6.1-7.8	Moderate-----	0.32	5	7	2-3
Tice	21-58	22-35	1.30-1.50	0.6-2.0	0.18-0.20	5.6-7.8	Moderate-----	0.32			
	58-66	15-30	1.40-1.60	0.6-2.0	0.11-0.18	5.6-7.8	Moderate-----	0.32			
291B-------------	0-11	11-22	1.40-1.55	0.6-2.0	0.22-0.24	6.6-7.3	Low-----------	0.37	5	5	1-3
Xenia	11-28	27-35	1.45-1.65	0.2-0.6	0.18-0.20	5.1-7.3	Moderate-----	0.37			
	28-51	27-35	1.45-1.65	0.2-0.6	0.15-0.19	5.1-7.3	Moderate-----	0.37			
	51-60	20-27	1.55-1.90	0.2-0.6	0.05-0.19	7.9-8.4	Low-----------	0.37			
306--------------	0-24	25-40	1.35-1.55	0.6-2.0	0.21-0.24	5.6-7.8	Moderate-----	0.28	5	6	2-4
Allison	24-44	25-35	1.30-1.50	0.6-2.0	0.18-0.21	6.1-7.8	Moderate-----	0.28			
	44-60	25-40	1.35-1.60	0.6-2.0	0.15-0.21	6.1-7.8	Moderate-----	0.28			
322C2------------	0-7	10-20	1.30-1.45	0.6-2.0	0.22-0.24	6.1-6.5	Low-----------	0.37	5	5	.5-2
Russell	7-25	27-35	1.35-1.50	0.6-2.0	0.18-0.20	5.6-6.5	Moderate-----	0.37			
	25-47	25-32	1.40-1.60	0.6-2.0	0.15-0.19	5.6-7.8	Moderate-----	0.37			
	47-60	12-20	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Low-----------	0.37			
330--------------	0-14	33-40	1.20-1.40	0.2-0.6	0.12-0.23	5.6-7.8	High----------	0.28	5	4	5-7
Peotone	14-44	35-45	1.30-1.60	0.2-0.6	0.11-0.20	6.1-7.8	High----------	0.28			
	44-60	25-42	1.40-1.65	0.2-0.6	0.18-0.20	6.6-8.4	High----------	0.28			
333--------------	0-10	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	10-60	10-17	1.30-1.50	0.6-2.0	0.20-0.22	5.6-7.8	Low-----------	0.37			
348B-------------	0-7	16-27	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.32	5	5	2-4
Wingate	7-33	25-33	1.35-1.55	0.2-0.6	0.18-0.20	5.1-7.3	Moderate-----	0.43			
	33-49	25-35	1.40-1.60	0.2-0.6	0.15-0.19	5.1-7.3	Moderate-----	0.43			
	49-60	15-27	1.40-1.60	0.2-2.0	0.05-0.19	7.4-8.4	Low-----------	0.43			

TABLE 15.--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 K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
352	0-8	27-35	0.80-1.20	0.6-2.0	0.15-0.23	5.6-7.3	Moderate	0.28	5	7	7-19
Palms	8-46	---	0.25-0.45	0.2-6.0	0.35-0.45	5.1-7.8	Low	----			
	46-60	7-35	1.45-1.75	0.2-2.0	0.14-0.22	6.1-8.4	Low	----			
386B	0-13	15-25	1.25-1.30	0.6-2.0	0.21-0.23	5.1-7.3	Low	0.32	5	6	2-3
Downs	13-37	27-35	1.30-1.35	0.6-2.0	0.18-0.20	5.1-7.3	Moderate	0.43			
	37-60	18-27	1.35-1.45	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.43			
440C2	0-15	10-22	1.30-1.45	0.6-2.0	0.20-0.24	5.1-7.3	Low	0.28	5	5	3-5
Jasper	15-24	18-25	1.35-1.50	0.6-2.0	0.17-0.19	5.1-6.5	Low	0.28			
	24-55	12-20	1.40-1.60	0.6-2.0	0.14-0.16	5.6-7.8	Low	0.28			
	55-60	5-20	1.50-1.70	0.6-2.0	0.19-0.21	6.6-8.4	Low	0.28			
451	0-10	27-35	1.35-1.60	0.6-2.0	0.21-0.23	6.1-7.8	Low	0.28	5	7	3-5
Lawson	10-37	10-20	1.20-1.55	0.6-2.0	0.20-0.22	6.1-7.8	Low	0.28			
	37-60	18-30	1.55-1.65	0.6-2.0	0.18-0.20	6.1-7.8	Moderate	0.43			
481A	0-12	20-27	1.30-1.50	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.28	5	5	2-4
Raub	12-35	27-35	1.50-1.70	0.2-0.6	0.18-0.20	5.1-7.3	Moderate	0.37			
	35-50	27-35	1.50-1.70	0.2-0.6	0.15-0.19	6.1-7.8	Moderate	0.37			
	50-60	20-32	1.50-1.70	0.2-0.6	0.05-0.19	7.4-8.4	Low	0.37			
533*. Urban land											
684B	0-11	20-27	1.20-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low	0.32	5	6	3-5
Broadwell	11-50	27-35	1.25-1.45	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.43			
	50-60	3-10	1.20-2.00	6.0-20	0.05-0.09	5.6-7.3	Low	0.15			
802B, 802D. Orthents											
865*. Pits											
1083	0-4	35-40	1.20-1.30	0.2-0.6	0.18-0.20	5.6-7.3	High	0.28	5	7	2-4
Wabash	4-60	40-55	1.20-1.30	<0.06	0.10-0.14	5.6-7.8	Very high	0.28			
2027C*, 2027D*, 2027F*:											
Miami	0-7	11-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low	0.37	5	5	.5-3
	7-30	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-6.0	Moderate	0.37			
	30-40	20-30	1.45-1.65	0.6-2.0	0.14-0.19	6.6-7.8	Low	0.37			
	40-60	15-25	1.55-1.90	0.2-0.6	0.05-0.19	7.4-8.4	Low	0.37			
Urban land.											
2152*:											
Drummer	0-11	27-35	1.10-1.30	0.6-2.0	0.21-0.23	5.6-7.8	Moderate	0.28	5	7	5-7
	11-48	20-35	1.20-1.45	0.6-2.0	0.21-0.24	5.6-7.8	Moderate	0.28			
	48-54	22-33	1.30-1.55	0.6-2.0	0.17-0.20	6.1-8.4	Moderate	0.28			
	54-60	15-32	1.40-1.70	0.6-2.0	0.11-0.19	6.6-8.4	Low	0.28			
Urban land.											
2154A*:											
Flanagan	0-18	20-30	1.20-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Moderate	0.28	5	6	4-5
	18-58	35-42	1.25-1.45	0.6-2.0	0.15-0.22	5.6-7.3	High	0.43			
	58-65	20-30	1.45-1.70	0.2-0.6	0.15-0.22	6.1-8.4	Low	0.43			
Urban land.											

See footnote at end of table.

TABLE 15.--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 K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
2171B*:											
Catlin----------	0-13	18-27	1.15-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.32	5	6	3-4
	13-41	27-35	1.25-1.55	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.43			
	41-60	20-30	1.40-1.70	0.6-2.0	0.07-0.11	6.1-8.4	Low----------	0.43			
Urban land.											
2233B*:											
Birkbeck--------	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
	6-47	25-35	1.30-1.50	0.6-2.0	0.18-0.22	4.5-7.3	Moderate-----	0.37			
	47-60	20-30	1.40-1.60	0.2-0.6	0.14-0.20	5.6-7.8	Low----------	0.37			
Urban land.											
2236A*:											
Sabina----------	0-8	20-27	1.25-1.45	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	6	1-3
	8-46	35-42	1.35-1.55	0.2-0.6	0.18-0.20	5.6-7.3	High---------	0.37			
	46-60	20-35	1.50-1.80	0.2-0.6	0.07-0.11	7.4-8.4	Low----------	0.37			
Urban land.											
2322C*:											
Russell---------	0-7	10-20	1.30-1.45	0.6-2.0	0.22-0.24	6.1-6.5	Low----------	0.37	5	5	.5-2
	7-26	27-35	1.35-1.50	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.37			
	26-55	27-32	1.40-1.60	0.6-2.0	0.15-0.19	5.6-7.8	Moderate-----	0.37			
	55-60	12-20	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Low----------	0.37			
Urban land.											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--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					
27C2, 27D2, 27E3, 27F, 27G Miami	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
36B Tama	B	None	---	---	4.0-6.0	Apparent	Nov-Jun	High	Moderate	Moderate.
43A Ipava	B	None	---	---	1.0-3.0	Apparent	Mar-Jun	High	High	Moderate.
45 Denny	D	None	---	---	+.5-2.0	Apparent	Mar-Jun	High	High	Moderate.
56B, 56C2 Dana	B	None	---	---	3.0-6.0	Perched	Mar-Apr	High	Moderate	Moderate.
67 Harpster	B/D	None	---	---	+.5-2.0	Apparent	Feb-Jun	High	High	Low.
68 Sable	B/D	None	---	---	+.5-2.0	Apparent	Mar-Jun	High	High	Low.
88C Sparta	A	None	---	---	>6.0	---	---	Low	Low	Moderate.
107 Sawmill	B/D	Frequent	Brief	Mar-Jun	0-2.0	Apparent	Mar-Jun	High	High	Low.
119C2 Elco	B	None	---	---	2.5-4.5	Perched	Mar-May	High	High	Moderate.
132 Starks	C	None	---	---	1.0-3.0	Apparent	Mar-Jun	High	High	Moderate.
134B Camden	B	None	---	---	>6.0	---	---	High	Low	Moderate.
136 Brooklyn	C/D	None	---	---	+.5-2.0	Apparent	Mar-Jun	High	High	Moderate.
138 Shiloh	B/D	None	---	---	+1-2.0	Apparent	Mar-Jun	High	High	Low.
148B, 148C2 Proctor	B	None	---	---	>6.0	---	---	High	Moderate	Moderate.
152 Drummer	B/D	None	---	---	+.5-2.0	Apparent	Mar-Jun	High	High	Moderate.
153 Pella	B/D	None	---	---	+.5-2.0	Apparent	Dec-Jun	High	High	Low.
154A Flanagan	B	None	---	---	1.5-3.5	Apparent	Mar-Jun	High	High	Moderate.
171B Catlin	B	None	---	---	3.5-6.0	Apparent	Feb-May	High	High	Moderate.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
198A-------------- Elburn	B	None--------	---	---	1.0-3.0	Apparent	Jan-May	High-----	High-----	Moderate.
199A, 199B, 199C2- Plano	B	None--------	---	---	3.0-6.0	Apparent	Mar-May	High-----	Moderate	Low.
206--------------- Thorp	C/D	None--------	---	---	+.5-2.0	Apparent	Feb-Jun	High-----	High-----	Moderate.
221B2, 221C2------ Parr	B	None--------	---	---	>6.0	---	---	Moderate	High-----	Moderate.
233B-------------- Birkbeck	B	None--------	---	---	3.0-6.0	Apparent	Mar-May	High-----	High-----	Moderate.
234--------------- Sunbury	B	None--------	---	---	1.5-3.5	Apparent	Mar-Jun	High-----	High-----	Moderate.
236A-------------- Sabina	C	None--------	---	---	1.5-3.5	Apparent	Mar-Jun	High-----	High-----	Moderate.
244--------------- Hartsburg	B/D	None--------	---	---	+.5-2.0	Apparent	Mar-Jun	High-----	High-----	Low.
257--------------- Clarksdale	C	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
279B-------------- Rozetta	B	None--------	---	---	4.0-6.0	Apparent	Mar-Jun	High-----	Moderate	Moderate.
284--------------- Tice	B	Frequent----	Brief-----	Jan-Jun	1.5-3.0	Apparent	Mar-Jun	High-----	High-----	Low.
291B-------------- Xenia	B	None--------	---	---	2.0-6.0	Apparent	Mar-Apr	High-----	High-----	Moderate.
306--------------- Allison	B	Occasional	Brief-----	Jan-May	3.0-6.0	Apparent	Mar-Jun	High-----	High-----	Low.
322C2------------- Russell	B	None--------	---	---	>6.0	---	---	High-----	Moderate	Moderate.
330--------------- Peotone	B/D	None--------	---	---	+.5-1.0	Apparent	Feb-Jul	High-----	High-----	Moderate.
333--------------- Wakeland	C	Frequent----	Brief-----	Jan-May	1.0-3.0	Apparent	Jan-Apr	High-----	High-----	Low.
348B-------------- Wingate	B	None--------	---	---	3.0-6.0	Apparent	Mar-Apr	High-----	High-----	Moderate.
352--------------- Palms	A/D	Frequent----	Brief-----	Jan-May	+1-1.0	Apparent	Nov-May	High-----	Moderate	Moderate.
386B-------------- Downs	B	None--------	---	---	4.0-6.0	Apparent	Mar-Jun	High-----	Moderate	Moderate.
440C2------------- Jasper	B	None--------	---	---	>6.0	---	---	Moderate	Moderate	High.
451--------------- Lawson	C	Frequent----	Brief-----	Mar-Jun	1.0-3.0	Apparent	Nov-May	High-----	Moderate	Low.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
481A-------------- Raub	C	None--------	---	---	1.0-3.0	Apparent	Jan-Apr	High-----	High-----	Moderate.
533*. Urban land										
684B-------------- Broadwell	B	None--------	---	---	>6.0	---	---	High-----	Moderate	Moderate.
802B, 802D. Orthents										
865*. Pits										
1083-------------- Wabash	D	Frequent----	Long------	Nov-Jul	+.5-1.0	Apparent	Nov-May	High-----	High-----	Moderate.
2027C*, 2027D*, 2027F*: Miami-----------	B	None--------	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
Urban land.										
2152*: Drummer----------	B/D	None--------	---	---	+.5-2.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
Urban land.										
2154A*: Flanagan---------	B	None--------	---	---	1.5-3.5	Apparent	Mar-Jun	High-----	High-----	Moderate.
Urban land.										
2171B*: Catlin-----------	B	None--------	---	---	3.5-6.0	Apparent	Feb-May	High-----	High-----	Moderate.
Urban land.										
2233B*: Birkbeck---------	B	None--------	---	---	3.0-6.0	Apparent	Mar-May	High-----	High-----	Moderate.
Urban land.										
2236A*: Sabina-----------	C	None--------	---	---	1.5-3.5	Apparent	Mar-Jun	High-----	High-----	Moderate.
Urban land.										
2322C*: Russell----------	B	None--------	---	---	>6.0	---	---	High-----	Moderate	Moderate.
Urban land.										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--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 designation	Depth	Moisture density: MAX	Moisture density: OPT	Percentage passing sieve--: No. 4	No. 10	No. 40	No. 200	LL	PI	Classification: AASHTO	Classification: UN
			In	Lb/ft3	Pct					Pct			
Allison silt loam:	81IL115-5-1	Ap	0-9	110	16	100	100	100	77	30	10	A-6(6)	CL
1,580 feet west,	-5	Bt2	33-44	110	16	100	100	100	96	32	14	A-6(13)	CL
1,730 feet north of													
southeast corner,													
sec. 22, T. 16 N.,													
R. 1 W.													
Birkbeck silt loam:	80IL115-35-1	A	0-4	93	23	100	100	99	97	44	10	A-7(14)	M
1,600 feet east,	-2	E	4-9	104	18	100	100	99	97	29	7	A-4(7)	CL
750 feet south of	-5 and 6	Bt2, Bt3	24-42	102	20	100	100	100	97	41	22	A-7(22)	CL
northwest corner,	-9	2C	60-67	125	11	97	94	86	66	21	4	A-4	CL-ML
sec. 25, T. 17 N.,													
R. 3 E.													
Brooklyn silt loam:	80IL115-16-1	Ap	0-8	105	16	100	99	97	90	27	5	A-4(3)	ML
1,200 feet south,	-2	E	8-15	109	17	99	98	95	90	30	8	A-4(7)	CL
1,600 feet east of	-4	Btg2	20-34	98	23	100	100	99	98	55	30	A-7(33)	CH
northwest corner,	-7	2Cg	56-60	125	10	76	75	60	20	22	5	A-2	CL
sec. 4, T. 16 N.,													
R. 4 E.													
Dana silt loam:	80IL115-19-1	Ap	0-10	104	19	100	100	99	90	35	12	A-6(11)	CL
1,130 feet north,	-3	Bt2	15-22	100	21	100	100	99	92	41	20	A-7(20)	CL
75 feet west of	-5	2Bt4	28-42	110	17	98	95	90	69	39	21	A-6(13)	CL
southeast corner,	-7	2C	49-60	123	12	95	90	85	65	25	10	A-6(4)	CL
sec. 17, T. 15 N.,													
R. 3 E.													
Plano silt loam:	81IL115-48-1	Ap	0-8	103	19	100	100	96	92	37	13	A-6(12)	ML
800 feet north, 20	-5	Bt2	23-32	101	22	100	100	100	98	44	20	A-7(22)	CL
feet west of	-7	2BC	41-60	118	14	100	100	93	59	24	9	A-4(3)	CL
southeast corner,													
sec. 13, T. 16 N.,													
R. 3 E.													
Sabina silt loam:	81IL115-9-1	Ap	0-9	107	16	100	100	98	94	27	6	A-4(5)	CL-ML
880 feet east,	-4	Bt2	16-26	97	25	100	100	100	98	56	34	A-7(38)	CH
1,760 feet south of	-6 and 7	2BC, 2C	54-60	124	12	97	93	87	64	22	7	A-4(1)	CL-ML
northwest corner,													
sec. 25, T. 17 N.,													
R. 3 E.													
Shiloh silty clay													
loam:	80IL115-40-1	Ap	0-9	96	24	100	100	99	97	50	24	A-7(27)	CL
1,295 feet south,	-4	Btg2	18-26	99	22	100	100	99	95	51	30	A-7(32)	CH
1,305 feet east of													
northwest corner,													
sec. 11, T. 17 N.,													
R. 1 E.													

TABLE 17.--ENGINEERING INDEX TEST DATA--Continued

Soil name and location	Sample number	Horizon designation	Depth	Moisture density MAX	Moisture density OPT	Percentage passing sieve-- No. 4	No. 10	No. 40	No. 200	LL	PI	Classification AASHTO	Classification UN
			In	Lb/ft3	Pct					Pct			
Tice silty clay loam: 960 feet east, 325 feet south of center, sec. 22, T. 16 N., R. 1 W.	80IL115-46-1	Ap	0-6	101	21	100	100	100	97	45	22	A-7(24)	CL
	-4	Bw2	34-46	105	20	100	100	99	95	42	22	A-7(23)	CL
Xenia silt loam: 1,900 feet west, 300 feet south of northeast corner, sec. 16, T. 17 N., R. 4 E.	81IL115-36												
	-1 and 2	A, E	0-8	106	17	100	100	99	94	28	3	A-4(3)	ML
	-4 and 5	Bt2, Bt3	11-28	104	20	100	100	99	95	38	8	A-6(18)	CL
	-6	2Bt4	28-36	113	15	95	92	85	63	29	15	A-6(6)	CL
	-8	2C	50-58	126	11	95	90	82	58	21	7	A-4(1)	CL-ML
Xenia silt loam: 2,060 feet north, 600 feet west of center, sec. 1, T. 15 N., R. 2 E.	81IL115-49-1	Ap	0-6	102	18	100	100	97	93	32	3	A-4(4)	ML
	-4 and 5	Bt2, Bt3	15-28	102	21	100	100	99	97	43	22	A-7(23)	CL
	-6	2Bt4	28-42	110	16	98	95	91	70	38	22	A-6(13)	CL
	-8	2C	51-60	121	13	97	94	86	65	26	12	A-6(5)	CL

TABLE 18.--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
Allison	Fine-silty, mixed, mesic Cumulic Hapludolls
Birkbeck	Fine-silty, mixed, mesic Typic Hapludalfs
Broadwell	Fine-silty, mixed, mesic Typic Argiudolls
Brooklyn	Fine, montmorillonitic, mesic Mollic Albaqualfs
Camden	Fine-silty, mixed, mesic Typic Hapludalfs
Catlin	Fine-silty, mixed, mesic Typic Argiudolls
*Clarksdale	Fine, montmorillonitic, mesic Udollic Ochraqualfs
Dana	Fine-silty, mixed, mesic Typic Argiudolls
Denny	Fine, montmorillonitic, mesic Mollic Albaqualfs
Downs	Fine-silty, mixed, mesic Mollic Hapludalfs
Drummer	Fine-silty, mixed, mesic Typic Haplaquolls
Elburn	Fine-silty, mixed, mesic Aquic Argiudolls
Elco	Fine-silty, mixed, mesic Typic Hapludalfs
Flanagan	Fine, montmorillonitic, mesic Aquic Argiudolls
Harpster	Fine-silty, mesic Typic Calciaquolls
Hartsburg	Fine-silty, mixed, mesic Typic Haplaquolls
Ipava	Fine, montmorillonitic, mesic Aquic Argiudolls
*Jasper	Fine-loamy, mixed, mesic Typic Argiudolls
Lawson	Fine-silty, mixed, mesic Cumulic Hapludolls
Miami	Fine-loamy, mixed, mesic Typic Hapludalfs
Orthents	Loamy, mixed, mesic Udorthents
Palms	Loamy, mixed, euic, mesic Terric Medisaprists
*Parr	Fine-loamy, mixed, mesic Typic Argiudolls
Pella	Fine-silty, mixed, mesic Typic Haplaquolls
Peotone	Fine, montmorillonitic, mesic Cumulic Haplaquolls
Plano	Fine-silty, mixed, mesic Typic Argiudolls
Proctor	Fine-silty, mixed, mesic Typic Argiudolls
Raub	Fine-silty, mixed, mesic Aquic Argiudolls
Rozetta	Fine-silty, mixed, mesic Typic Hapludalfs
Russell	Fine-silty, mixed, mesic Typic Hapludalfs
Sabina	Fine, montmorillonitic, mesic Aeric Ochraqualfs
Sable	Fine-silty, mixed, mesic Typic Haplaquolls
Sawmill	Fine-silty, mixed, mesic Cumulic Haplaquolls
Shiloh	Fine, montmorillonitic, mesic Cumulic Haplaquolls
Sparta	Sandy, mixed, mesic Entic Hapludolls
*Starks	Fine-silty, mixed, mesic Aeric Ochraqualfs
Sunbury	Fine, montmorillonitic, mesic Aquollic Hapludalfs
Tama	Fine-silty, mixed, mesic Typic Argiudolls
Thorp	Fine-silty, mixed, mesic Argiaquic Argialbolls
Tice	Fine-silty, mixed, mesic Fluvaquentic Hapludolls
Wabash	Fine, montmorillonitic, mesic Vertic Haplaquolls
Wakeland	Coarse-silty, mixed, nonacid, mesic Aeric Fluvaquents
Wingate	Fine-silty, mixed, mesic Mollic Hapludalfs
Xenia	Fine-silty, mixed, mesic Aquic Hapludalfs

☆ U.S. GOVERNMENT PRINTING OFFICE : 1990 O - 205-550 : QL 3

NRCS Accessibility Statement