United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
Illinois Agricultural
Experiment Station

Soil Survey of Piatt County, Illinois

How To Use This Soil Survey

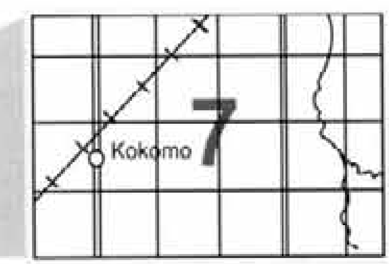
General Soil Map

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.

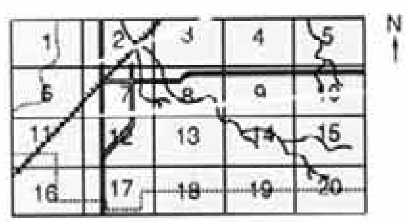
Detailed Soil Maps

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

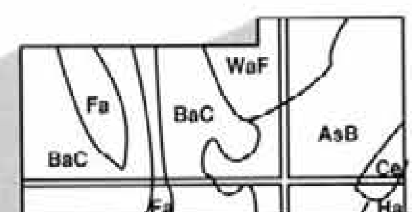
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

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

MAP SHEET



AREA OF INTEREST

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

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

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

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

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.

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

This soil survey is Illinois Agricultural Experiment Station Soil Report No. 134.

Cover: Allerton House in Allerton Park, which is the most popular recreational area in Piatt County.

Contents

Issued December 1991

Index to Map Units

Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Piatt 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 shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

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

Charles Whitmore
State Conservationist
Soil Conservation Service

Location of Piatt County in Illinois.

Soil Survey of
Piatt County, Illinois

By W. Scott Martin, Soil Conservation Service

Fieldwork by W. Scott Martin and Mark G. Carlson, Soil Conservation Service, and
Loraine M. Rhode and Randall G. Timmons, Piatt County

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

PIATT COUNTY is in the east-central part of Illinois. It has an area of about 279,680 acres, or 437 square miles. It is bordered on the north by McLean County, on the east by Champaign and Douglas Counties, on the south by Douglas and Moultrie Counties, and on the west by Macon and De Witt Counties. In 1980, the population of Piatt County was 16,581. Monticello, the county seat, had a population of 4,753 *(21)*.

This soil survey updates the survey of Piatt County published in 1930 *(14)*. It presents more recent information based on the modern system of soil classification and provides larger maps, which show the soils in greater detail.

General Nature of the County

The following paragraphs provide general information about Piatt County. They describe climate; history and development; transportation facilities; natural resources and farming; and relief, physiography, and drainage.

Climate

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

Table 1 gives data on temperature and precipitation for the survey area as recorded at 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 winter, the average temperature is 25.2 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 degrees. In summer, the average temperature is 74 degrees and the average daily maximum temperature is 85 degrees. The highest recorded temperature, which occurred at Decatur on July 9, 1954, is 113 degrees.

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

The total annual precipitation is about 38 inches. Of this, 23 inches, or about 61 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 3.56 inches at Urbana on October 6, 1955. Thunderstorms occur on about 34 days each year, and most occur in June.

The average seasonal snowfall is about 24 inches. The greatest snow depth at any one time during the period of record was 22 inches.

History and Development

The area now known as Piatt County was considered prosperous long before the arrival of the first settlers. Since postglacial times many tribes of Indians thrived on the abundant fauna and flora of the region. In 1822, the first settler, George Haworth, arrived. He served as a government agent who dealt with the Indians. As word about the region spread, more settlers gradually built along the Sangamon River and its tributaries.

Piatt County was originally part of Macon and De Witt Counties. It was formed when a group of men from the Monticello area unsuccessfully lobbied to move the Macon County seat to a central location. Disappointed by their failure, the men applied to the Illinois State Legislature for approval of the formation of a separate county. The new county, named after James A. Piatt, Sr., who had led the fight to move the county seat, was approved on January 27, 1841. Monticello, which had been laid out in 1837, was named as the county seat.

The early settlers cleared and farmed the timbered areas because they were accustomed to the light colored forested soils of the Eastern States and because they believed that prairie soils were less fertile, producing grasses rather than towering forests. The prairie served mainly as open grazing land for cattle and hogs. After the development of the moldboard plow and other labor-saving equipment and the organization of drainage districts in the late 1800's, grain farming became the major enterprise in the prairie areas.

In the mid-1800's, Samuel Allerton, who had made a fortune in the stockyards of Chicago, purchased large tracts of land in Willow Branch and Bement Townships. Later, his son, Robert Allerton, managed his father's farms and built a mansion on grounds that included extensive gardens. He donated the farms to the University of Illinois in 1946. Today, hundreds of visitors walk through Allerton Park each year *(10)*.

Transportation Facilities

Piatt County has a good network of highways. Interstate Highways 72 and 74, Federal Highways 36 and 150, and State Highways 10, 47, 48, and 105 are the major routes. Also, there are about 721 miles of county and township roads.

Many railroads pass through the county. Passenger service is not available in the county. Freight service, however, is available in most of the towns in the county.

Natural Resources and Farming

Soil is the chief natural resource in Piatt County. An estimated 640 farms make up more than 95 percent of the total acreage *(20)*. Corn and soybeans are the major crops. Secondary farm products include wheat, oats, hay, cattle, and hogs. 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 material under tall prairie grasses. Combined with a favorable climate, these factors result in highly productive farmland.

About 6,000 acres in the county is used as woodland *(12)*. Much of this acreage is unimproved land along the major drainageways. Wildlife generally are scarce in all areas, except for those adjacent to woodland, because most of the suitable habitat has been destroyed. There are no natural lakes in the county.

Subsurface natural resources in the county include water, sand and gravel, and coal. Most of the water is pumped from an aquifer system in the Mahomet Valley, a major bedrock valley that extends across the county, parallel to the Sangamon River.

Beneath the alluvium in the valley of the Sangamon River, sand is at a depth of more than 10 feet *(9)*. Also, in a few small areas glacial meltwater left stream terrace deposits of sand and gravel *(8)*. Two sand and gravel mining enterprises are active in the county (fig. 1). Their annual production is 100,000 to 500,000 tons *(13)*.

An estimated 1,036,517 tons of coal is below the surface of the county. The coal is at a depth of 400 to 800 feet. The coal seam averages 4 feet in thickness *(15)*. In 1982 and 1983, three oil test wells were drilled near Deland, but there is no evidence of drilling in other areas of the county.

Relief, Physiography, and Drainage

Piatt County is in the part of Illinois that was covered by the Kansan, Illinoian, and Wisconsin glaciers during the Pleistocene. The glaciers deposited 50 to more than 250 feet of glacial drift throughout the county. In most areas the drift was covered with as much as 6 feet of windblown silt, or loess.

Though most of the drift was deposited as broad, generally level plains, two areas of glacial deposition are evident. The Blue Ridge Moraine, part of the Champaign Morainic System, extends across the northeast corner of the county. The Cerro Gordo Moraine extends across the county in a northeast-southwest direction, parallel to and south of the Sangamon River. The moraine is 1.5 to 3.0 miles wide. The two morainal areas are characterized by a rolling landscape and noticeable changes in elevation.

Elevation in Piatt County ranges from 793 feet above sea level on the Blue Ridge Moraine to 688 feet on the flood plain along Lake Fork Creek, in the southeast corner of the county.

Generally, Piatt County is crossed from northeast to southwest by the Sangamon River. Tributaries, such as Goose, Madden, and Camp Creeks, help to drain the northern half of the county. The northernmost part of

Figure 1.—An area along the Sangamon River being mined for gravel and sand.

the county is drained by Salt Creek. Tributaries of the West Okaw River drain the southwestern part of the county, south of the Sangamon River. Lake Fork Creek drains the southeastern part. Drainage ditches have been dug in many areas throughout the county. They serve as outlets for the extensive subsurface drainage system in the county and help to remove excess water from the broad flats. Flood plains are along both sides of the Sangamon River and along its tributaries. The soils in these areas generally are flooded yearly and have a seasonal high water table.

How This Survey Was Made

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

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

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

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

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

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

Map Unit Composition

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

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are 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 soils identified on the general soil map of this county do not fully agree with those of the soils identified on the general soil maps in the published soil surveys of Champaign and Douglas Counties. Also, the lines on the maps do not perfectly join. Differences result from variations in the extent of the major soils. They do not necessarily affect broad land use planning because the soils and the kinds of parent material are similar in terms of use and behavior.

Soil Descriptions

1. Drummer-Flanagan Association

Nearly level, poorly drained and somewhat poorly drained, silty soils formed in loess and in glacial outwash or glacial till; on till plains and moraines

This association is on swells and on broad flats and low, broad ridges. It also is in small circular depressions.

This association makes up about 38 percent of the county. It is about 56 percent Drummer and similar soils, 40 percent Flanagan soils, and 4 percent minor soils (fig. 2).

The poorly drained Drummer soils are on upland flats and in shallow depressions and drainageways. These soils are briefly ponded during wet periods in most years. They formed in 40 to 60 inches of loess and in the underlying loamy outwash. Typically, the surface layer is very dark gray, friable silty clay loam about 16 inches thick. The subsurface layer also is very dark gray, friable silty clay loam. It is about 8 inches thick. The subsoil is about 35 inches thick. It is mottled. The upper part is olive gray, friable silty clay loam. The lower part is gray, very friable loam. The underlying material to a depth of 60 inches or more is gray, mottled, calcareous, stratified sandy loam and loam.

The somewhat poorly drained Flanagan soils are on broad ridges with slopes that are 100 to more than 500 feet long. These soils formed in 40 to 60 inches of loess and in the underlying glacial till. Typically, the surface layer is very dark gray, friable silt loam about 8 inches thick. The subsurface layer also is very dark gray, friable silt loam. It is about 4 inches thick. The subsoil is about 36 inches thick. It is mottled. The upper part is brown, friable and firm silty clay loam. The next part is light olive brown, friable silty clay loam. The lower part is light olive brown, firm, calcareous clay loam. The underlying material to a depth of 60 inches or more is light olive brown, mottled, firm, calcareous loam.

Minor in this association are the Catlin, Harpster, and Peotone soils. The moderately well drained Catlin soils generally are on the higher ridges. The poorly drained Harpster soils are in areas closely intermingled with the Drummer soils. They have carbonates at or near the surface. The very poorly drained Peotone soils are in circular depressions adjacent to the Drummer soils.

Most areas of this association are used for cultivated crops. The soils are well suited to the cultivated crops commonly grown in the county. Fertility and organic matter content are high in the major soils. Available water capacity is very high in the Drummer soils and high in the Flanagan soils. The main management needs are measures that control soil blowing, maintain or improve the drainage system, and maintain tilth and fertility.

Mainly because of the seasonal high water table, the hazard of ponding, the shrink-swell potential, and

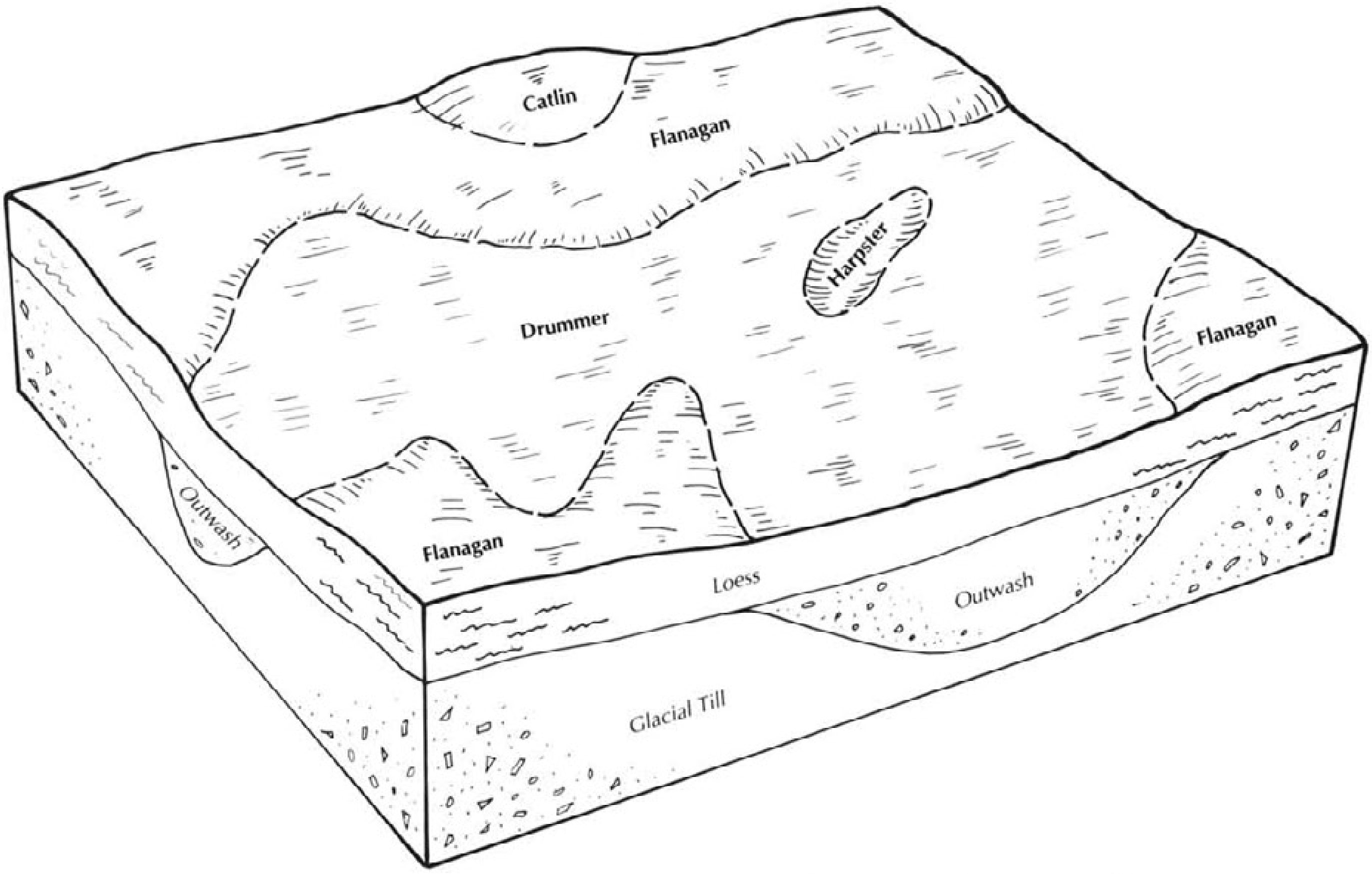


Figure 2.—Typical pattern of soils and parent material in the Drummer-Flanagan association.

restricted permeability, this association is poorly suited to dwellings and septic tank absorption fields.

2. Flanagan-Dana-Catlin Association

Nearly level and gently sloping, somewhat poorly drained and moderately well drained, silty soils formed in loess and glacial till; on till plains and moraines

This association is on broad ridges, knolls, and side slopes along the head of drainageways on till plains. It also is on prominent convex slopes, knolls, and side slopes on the Cerro Gordo Moraine.

This association makes up about 15 percent of the county. It is about 35 percent Flanagan soils, 28 percent Dana and similar soils, 20 percent Catlin soils, and 17 percent minor soils (fig. 3).

The nearly level, somewhat poorly drained Flanagan soils are on broad ridges with slopes that are 100 to more than 300 feet long. These soils formed in 40 to 60 inches of loess and in the underlying glacial till. Typically, the surface layer is very dark gray, friable silt loam about 8 inches thick. The subsurface layer also is very dark gray, friable silt loam. It is about 4 inches thick. The subsoil is about 36 inches thick. It is mottled. The upper part is brown, friable and firm silty clay loam. The next part is light olive brown, friable silty clay loam. The lower part is light olive brown, firm, calcareous clay loam. The underlying material to a depth of 60 inches or more is light olive brown, mottled, firm, calcareous loam.

The gently sloping, moderately well drained Dana soils are on knolls, ridges, and short, uneven side slopes. These soils formed in 22 to 40 inches of loess and in the underlying glacial till. Typically, the surface layer is very dark grayish brown, friable silt loam about 6 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam about 6 inches thick. The subsoil is about 43 inches thick. The upper part is dark brown, friable silt loam. The next part is dark brown and yellowish brown, mottled, friable silty clay loam. The lower part is dark brown and yellowish brown, mottled, firm clay loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm, calcareous loam.

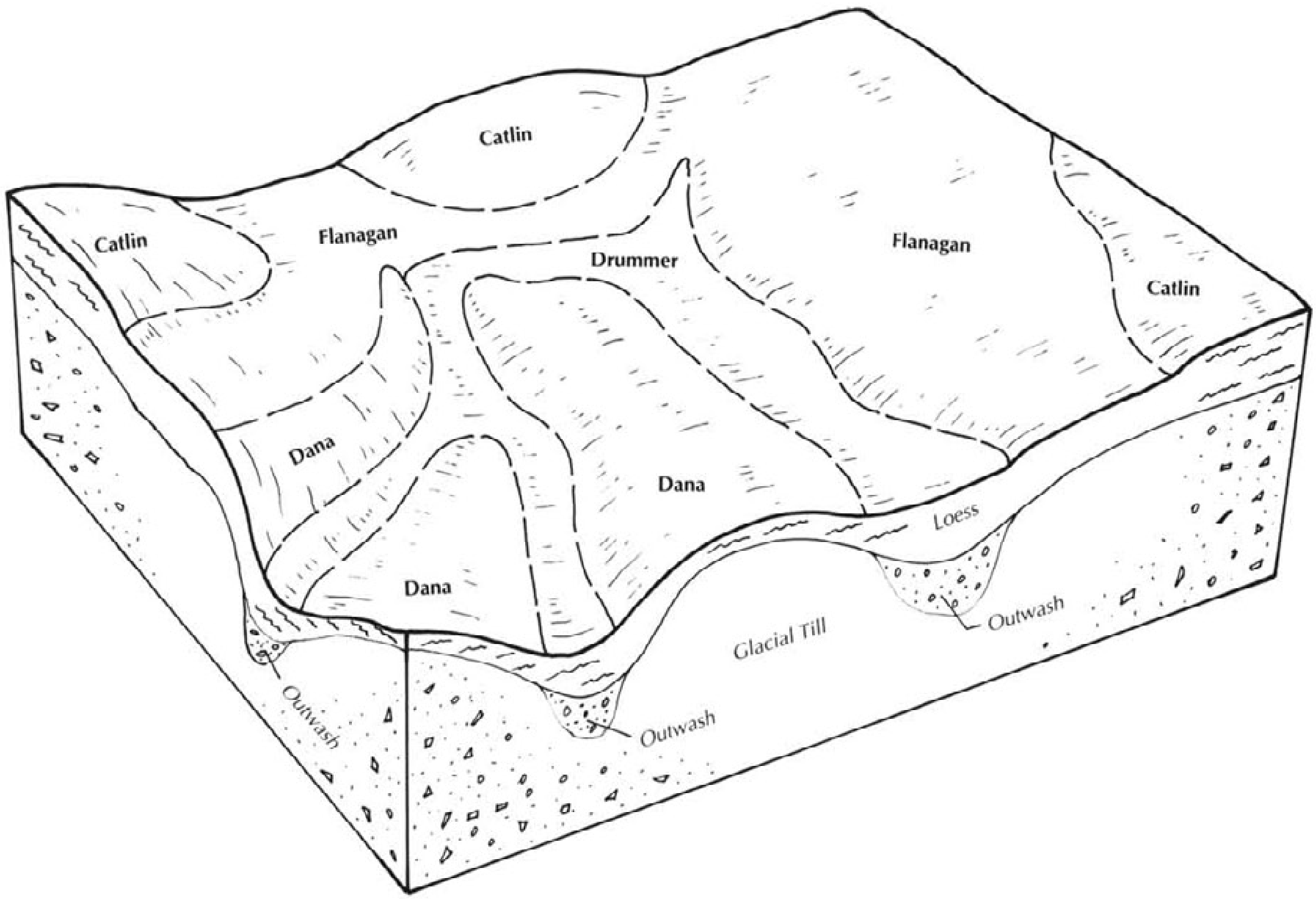


Figure 3.—Typical pattern of soils and parent material in the Flanagan-Dana-Catlin association.

The gently sloping, moderately well drained Catlin soils are on knolls, ridges, and short, uneven side slopes. These soils formed in 40 to 60 inches of loess and in the underlying glacial till. Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam. It is about 3 inches thick. The subsoil is about 49 inches thick. The upper part is dark brown, dark yellowish brown, and yellowish brown, friable silty clay loam. The next part is yellowish brown, mottled, friable silty clay loam. The lower part is brown, mottled, firm clay loam. The underlying material to a depth of 62 inches or more is brown, mottled, firm, calcareous loam.

Minor in this association are the Drummer and Peotone soils. The poorly drained Drummer soils are in shallow depressions and drainageways below the major soils. The very poorly drained Peotone soils are in depressions.

Most areas of this association are used for cultivated crops, but a few areas are used for hay and pasture. The soils are well suited to the cultivated crops commonly grown in the county. Fertility generally is high in the major soils. Organic matter content is high in the Dana and Flanagan soils and moderate in the Catlin soils. Available water capacity is high in all three soils. The main management needs are measures that control water erosion on the Catlin and Dana soils, that maintain the drainage system in areas of the Drummer and Flanagan soils, and that maintain tilth and fertility in all three soils.

3. Dana-Flanagan-Drummer Association

Gently sloping and nearly level, moderately well drained to poorly drained, silty soils formed in loess and in glacial till or glacial outwash; on moraines and till plains

This association is on or near the Blue Ridge Moraine in the northern part of the county. It is on prominent ridges and knolls; on low, broad ridges; and on narrow flats between the higher areas.

This association makes up about 3 percent of the county. It is about 36 percent Dana soils, 32 percent Flanagan soils, 27 percent Drummer soils, and 5 percent minor soils.

The gently sloping, moderately well drained Dana soils are on knolls and ridges above the Flanagan and Drummer soils. The Dana soils formed in 22 to 40 inches of loess and in the underlying glacial till. Typically, the surface layer is very dark grayish brown, friable silt loam about 6 inches thick. The subsurface layer also is very dark grayish brown, friable silt about 6 inches thick. The subsoil is about 43 inches thick. The upper part is dark brown, friable silt loam. The next part is dark brown and yellowish brown, mottled, friable silty clay loam. The lower part is dark brown and yellowish brown, mottled, firm clay loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm, calcareous loam.

The nearly level, somewhat poorly drained Flanagan soils are on slight rises and low, broad ridges above the Drummer soils and below the Dana soils. The Flanagan soils formed in 40 to 60 inches of loess and in the underlying glacial till. Typically, the surface layer is very dark gray, friable silt loam about 8 inches thick. The subsurface layer also is very dark gray, friable silt loam. It is about 4 inches thick. The subsoil is about 36 inches thick. It is mottled. The upper part is brown, friable and firm silty clay loam. The next part is light olive brown, friable silty clay loam. The lower part is light olive brown, firm, calcareous clay loam. The underlying material to a depth of 60 inches or more is light olive brown, mottled, firm, calcareous loam.

The nearly level, poorly drained Drummer soils are in shallow depressions and drainageways below the Dana and Flanagan soils. The Drummer soils formed in 40 to 60 inches of loess and in the underlying loamy outwash. Typically, the surface layer is very dark gray, friable silty clay loam about 8 inches thick. The subsurface layer is very dark gray, friable silt loam about 8 inches thick. The subsoil is about 35 inches thick. It is mottled. The upper part is olive gray, friable silty clay loam. The lower part is gray, very friable loam. The underlying material to a depth of 60 inches or more is gray, mottled, loose, calcareous, stratified sandy loam and loam.

Minor in this association are the well drained Varna soils. These soils are in landscape positions similar to those of the Dana soils.

Most areas of this association are used for cultivated crops, but a few areas are used for hay and pasture. The soils are well suited to the cultivated crops commonly grown in the county. Fertility and organic matter content are high in the major soils. Available water capacity is high in the Dana and Flanagan soils and very high in the Drummer soils. The main management needs are measures that control water erosion on the Dana soils and that maintain or improve the drainage system in areas of the Flanagan and Drummer soils.

4. Russell-Sabina-Miami Association

Nearly level to very steep, well drained and somewhat poorly drained, silty and loamy soils formed in loess and glacial till or in glacial till; on till plains

This association is characterized by a well defined natural drainage system. It is in narrow to wide stream valleys near the Sangamon River and Lake Fork Creek.

This association makes up about 6 percent of the county. It is about 40 percent Russell and similar soils, 27 percent Sabina and similar soils, 23 percent Miami soils, and 10 percent minor soils (fig. 4).

The gently sloping and moderately sloping, well drained Russell soils are on ridges and short, uneven side slopes. These soils formed in 20 to 40 inches of loess and in the underlying glacial till. Typically, the surface layer is dark brown, friable silt loam about 5 inches thick. The subsurface layer also is dark brown, friable silt loam. It is about 2 inches thick. The subsoil is about 51 inches thick. It is yellowish brown and friable. The upper part is silty clay loam, the next part is clay loam, and the lower part is loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm loam.

The nearly level, somewhat poorly drained Sabina soils are on low, broad ridges. These soils formed in 40 to 60 inches of loess and in the underlying glacial till. Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is brown, friable silt loam about 5 inches thick. The subsoil is about 46 inches thick. It is mottled and friable. The upper part is brown silty clay loam. The next part is yellowish brown silty clay loam. The lower part is yellowish brown, calcareous loam. The underlying material to a depth of 63 inches or more is yellowish brown, mottled, firm, calcareous loam.

The moderately sloping to very steep, well drained Miami soils are on short, uneven side slopes along drainageways. These soils formed in glacial till. Typically, the surface layer is mixed dark brown and yellowish brown, friable loam about 5 inches thick. The subsoil is yellowish brown, mottled, firm clay loam about 31 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, very firm, calcareous loam.

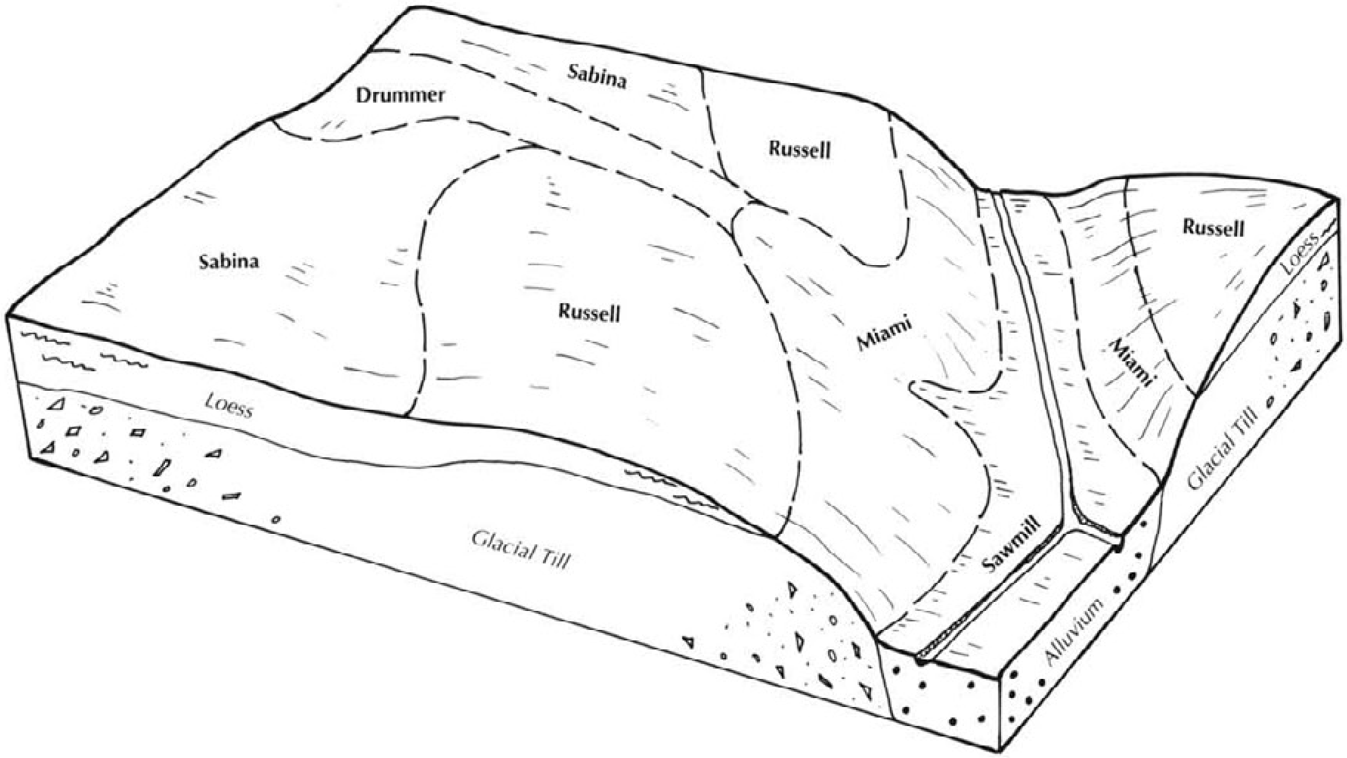


Figure 4.—Typical pattern of soils and parent material in the Russell-Sabina-Miami association.

Minor in this association are the Drummer, Radford, and Sawmill soils. The poorly drained Drummer soils generally are in areas below the Sabina soils. The somewhat poorly drained Radford and poorly drained Sawmill soils are on bottom land.

In most areas this association is used for cultivated crops, pasture, or hay. In some areas it is wooded. It has the major portion of the woodland remaining in the county. The Russell and Sabina soils and the moderately sloping and strongly sloping Miami soils are suited to cultivated crops. The steep and very steep Miami soils are unsuited to cultivated crops because of a severe hazard of water erosion. Fertility is moderate in the Russell and Sabina soils and low in the Miami soils. Organic matter content is moderate or moderately low in all three soils. Available water capacity is high in the Russell and Sabina soils and moderate in the Miami soils. The main management needs are measures that control water erosion in cultivated areas of the Miami and Russell soils, that maintain or improve the drainage system in areas of the Sabina soils, and that maintain tilth and fertility in all three soils.

5. Drummer-Elburn Association

Nearly level, poorly drained and somewhat poorly drained, silty soils formed in loess and glacial outwash; on outwash plains

This association is on broad flats and low ridges with long, even side slopes. The soils formed in 40 to 60 inches of loess and in the underlying loamy glacial outwash.

This association makes up about 10 percent of the county. It is about 51 percent Drummer and similar soils, 36 percent Elburn and similar soils, and 13 percent minor soils (fig. 5).

The nearly level, poorly drained Drummer soils are on broad flats and in shallow depressions and drainageways. They are frequently ponded for brief periods during the wetter parts of the year. Typically, the surface layer is very dark gray, friable silty clay loam about 8 inches thick. The subsurface layer also is very dark gray, friable silty clay loam about 8 inches thick. The subsoil is about 35 inches thick. It is mottled. The upper part is olive gray, friable silty clay loam. The lower part is gray, very friable loam. The underlying material to a depth of 60 inches or more is gray, mottled, loose, calcareous, stratified sandy loam and loam.

The nearly level, somewhat poorly drained Elburn soils are on slight rises above the Drummer soils.

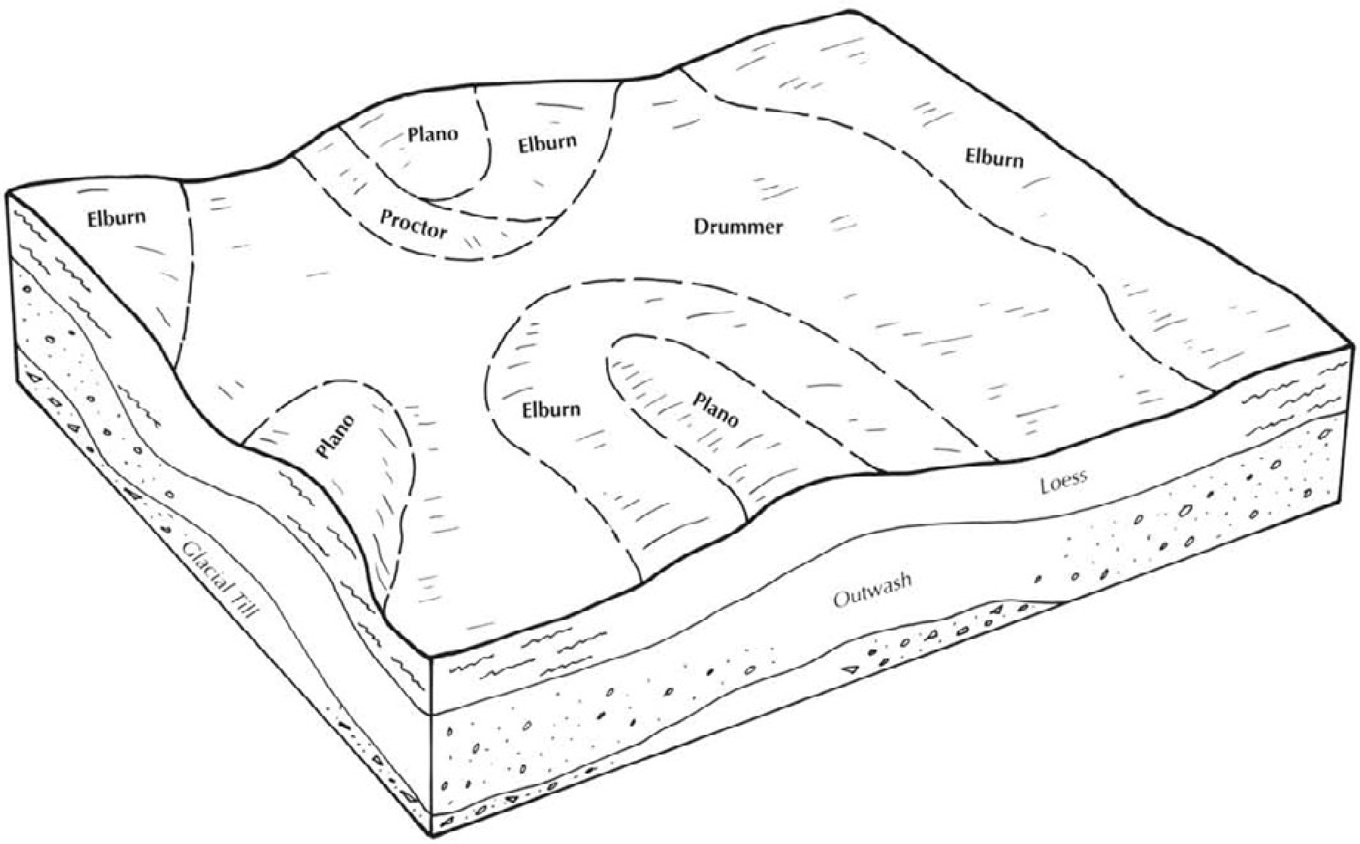


Figure 5.—Typical pattern of soils and parent material in the Drummer-Elburn association.

Typically, the surface soil is very dark gray, friable silt loam about 12 inches thick. The subsoil extends to a depth of more than 60 inches. It is mottled and friable. The upper part is dark brown silty clay loam. The next part is brown and yellowish brown silty clay loam. The lower part is yellowish brown, stratified sandy loam and silt loam.

Minor in this association are the Harpster, Plano, and Proctor soils. The poorly drained Harpster soils are in landscape positions similar to those of the Drummer soils. They have carbonates at or near the surface. The moderately well drained Plano and well drained Proctor soils are on ridges above the major soils.

Most areas of this association are used for cultivated crops. The soils are well suited to the cultivated crops commonly grown in the county. Fertility and organic matter content are high in the major soils. Available water capacity is very high in the Drummer soils and high in the Elburn soils. The main management needs are measures that control soil blowing, maintain or improve the drainage system, and maintain tilth and fertility.

Mainly because of the seasonal high water table in both of the major soils and the hazard of ponding on the Drummer soils, this association is poorly suited to dwellings and septic tank absorption fields.

6. Sable-Ipava Association

Nearly level, poorly drained and somewhat poorly drained, silty soils formed in loess; on loess-covered till plains and outwash plains

This association is on broad flats and low, broad ridges with long, even side slopes. The soils formed in more than 60 inches of loess.

This association makes up about 25 percent of the county. It is about 54 percent Sable and similar soils, 41 percent Ipava soils, and 5 percent minor soils (fig. 6).

The poorly drained Sable soils are on broad flats and in shallow depressions and drainageways. They generally are in the lowest positions on the landscape. They are briefly ponded during wet periods. Typically, the surface layer is black, friable silty clay loam about

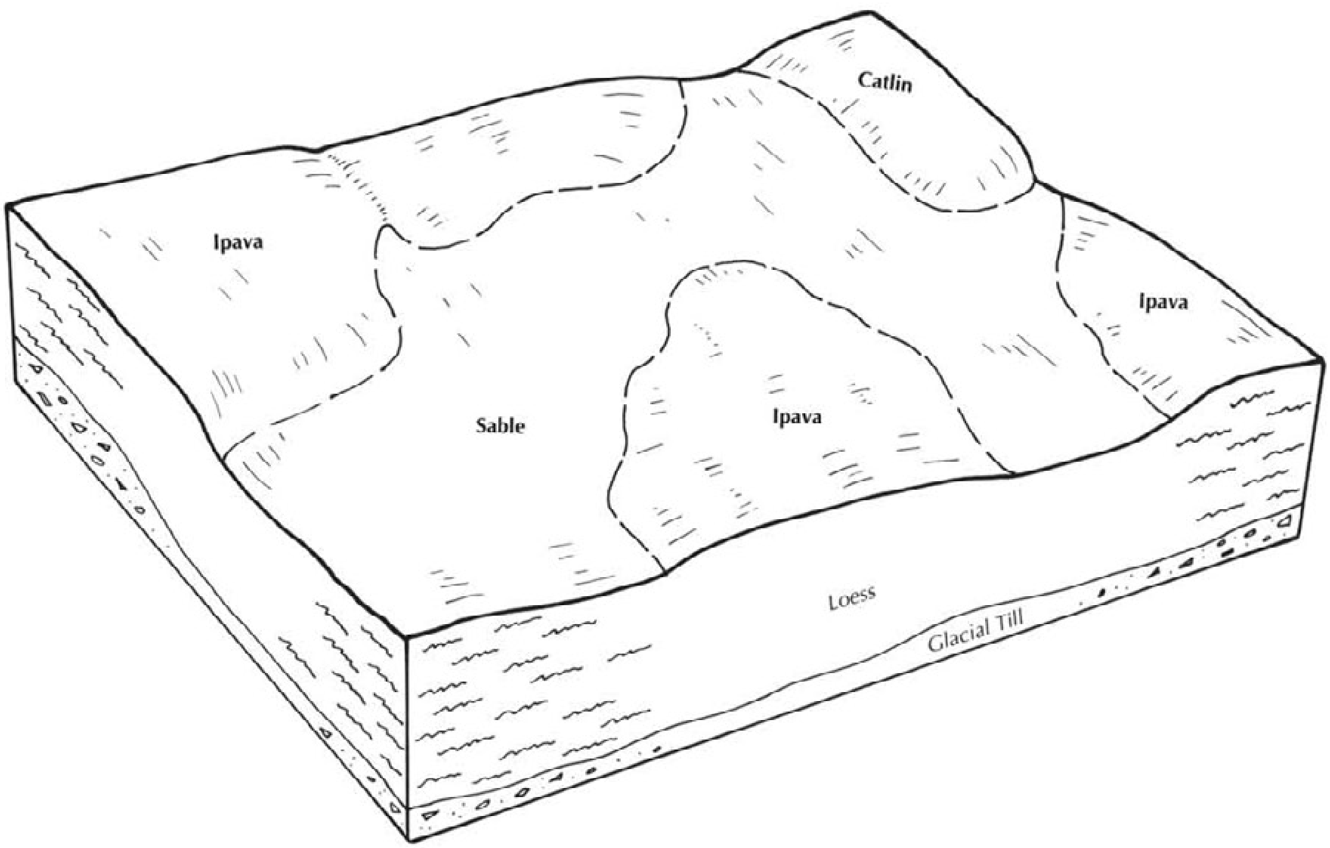


Figure 6.—Typical pattern of soils and parent material in the Sable-Ipava association.

7 inches thick. The subsurface layer is black and very dark gray, firm silty clay loam about 16 inches thick. The subsoil extends to a depth of more than 60 inches. It is mottled. The upper part is olive gray, firm silty clay loam. The next part is light olive gray, firm silty clay loam. The lower part is light olive gray, friable silt loam.

The somewhat poorly drained Ipava soils are on broad 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 also is black, friable silt loam. It is about 6 inches thick. The subsoil is about 29 inches thick. It is mottled and friable. The upper part is brown silty clay loam. The next part is dark grayish brown silty clay. The lower part is grayish brown silty clay loam. The underlying material to a depth of 60 inches or more is light brownish gray, mottled, friable, calcareous silt loam.

Minor in this association are the Catlin and Harpster soils. The moderately well drained Catlin soils are on the higher ridges. The poorly drained Harpster soils are in landscape positions similar to those of the Sable soils. They have carbonates at or near the surface.

Most areas of this association are used for cultivated crops. The soils are well suited to the cultivated crops commonly grown in the county. Fertility and organic matter content are high in both of the major soils. Available water capacity is very high in the Sable soils and high in the Ipava soils. The main management needs are measures that control soil blowing, maintain or improve the drainage system, and maintain tilth and fertility.

Mainly because of the seasonal high water table, the hazard of ponding, and the shrink-swell potential, this association is poorly suited to dwellings and septic tank absorption fields.

7. Sawmill-Tice Association

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

This association is in low areas and on broad flats and very slight rises on wide flood plains along the Sangamon River. The soils are frequently flooded for brief periods, generally in late winter and early spring.

This association makes up about 3 percent of the county. It is about 75 percent Sawmill soils, 20 percent

Tice and similar soils, and 5 percent minor soils.

The poorly drained Sawmill soils are in areas below the Tice soils. Typically, the surface layer is black, friable silty clay loam about 8 inches thick. The subsurface layer also is black, friable silty clay loam. It is about 9 inches thick. The subsoil is friable silty clay loam about 28 inches thick. The upper part is very dark gray and dark gray, and the lower part is dark gray and mottled. The underlying material to a depth of 60 inches or more is gray, mottled, friable silty clay loam.

The somewhat poorly drained Tice soils are in areas above the Sawmill soils. Typically, the surface layer is very dark gray, friable silty clay loam about 6 inches thick. The subsurface layer is friable silty clay loam about 15 inches thick. The upper part is very dark gray, and the lower part is very dark grayish brown. The subsoil is brown, friable silty clay loam about 32 inches thick. It is mottled in the lower part. The underlying material to a depth of 60 inches or more is brown, mottled, friable, stratified loam and sandy loam.

Minor in this association are the Armiesburg and Camden soils. The well drained Armiesburg soils generally are in areas above the major soils. The well drained Camden soils are on stream terraces above the major soils.

Most areas of this association are used for cultivated crops or for woodland. If protected from flooding, the soils generally are well suited to the cultivated crops commonly grown in the county. Fertility is high in both of the major soils. Organic matter content is high in the Sawmill soils and moderate in the Tice soils. Available water capacity is very high in the Sawmill soils and high in the Tice soils. The main management needs are measures that protect the cultivated areas from flooding, maintain or improve the drainage system, and maintain tilth and fertility.

This association generally is well suited to woodland. The seasonal high water table and the hazard of flooding are management concerns. The main management needs are measures that control competing vegetation and protect the woodland from fire and grazing.

Because of the hazard of flooding, this association generally is unsuitable as a site for dwellings and septic tank absorption fields.

Broad Land Use Considerations

The soils in Piatt County vary in their suitability for major land uses. About 93 percent of the acreage is used for cultivated crops, dominantly corn and soybeans *(6)*. Most of the acreage in associations 1 through 6 is cultivated. Erosion is the main hazard in associations 2 and 4. The seasonal high water table is the main limitation in associations 1, 3, 5, and 6.

The soils in association 7 are commonly flooded, mainly in winter and early spring. The floodwater occasionally causes slight or moderate crop damage. Wetness also is a major limitation affecting the use of this association for crops.

Only a small acreage in the county is used for pasture. All of the associations have areas that are suitable for grasses and legumes. Brief periods of flooding may restrict the use of association 7 for pasture. The very steep Miami soils in association 4 generally are unsuited to grasses and legumes.

A small acreage in the county is wooded. The largest areas of woodland are adjacent to the Sangamon River and its tributaries. The suitability for trees is good or excellent in all of the associations. Because of wetness or slope, the equipment limitation is moderate or severe on some of the soils. It can be overcome by harvesting only during the drier periods or by using special equipment.

A few areas of the county are developed for urban uses. In general, the gently sloping and sloping, moderately well drained and well drained soils are the best soils for building site development. The Dana, Catlin, Russell, and Miami soils in associations 2, 3, and 4 are examples. In most of the other associations, the seasonal high water table, the hazard of ponding, restricted permeability, and the shrink-swell potential are the main management concerns. The soils on flood plains, such as those in association 7, are generally unsuitable as sites for buildings because of flooding.

In some areas of Piatt County, private sewage disposal systems are used. Camden and Parr soils are well suited to septic tank absorption fields *(19)*. The seasonal high water table is a major limitation in all of the associations in the county. Alternative waste disposal systems can be used in areas where the water table cannot be sufficiently lowered.

The limitations affecting the suitability of the associations for recreational uses range from severe to slight, depending on the intensity of the expected use. Association 7 is poorly suited to many of these uses because of flooding. All of the associations are suitable for some recreational uses, such as paths and trails for hiking or horseback riding. Small areas that are suitable for intensive recreational uses generally are available in the associations that otherwise have severe limitations.

The suitability for wildlife habitat generally is good throughout the county. All of the associations have major soils that are generally well suited to habitat for openland wildlife, woodland wildlife, or both. Scattered areas in association 7 are suitable for wetland wildlife habitat.

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 loam, 5 to 10 percent slopes, eroded, is a phase of the Miami series.

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 that are too small to be shown are identified by a special symbol on the soil maps.

In some areas the detailed soil maps of Piatt County do not join with those of Champaign, Douglas, and Macon Counties. Differences result from refinements in series concepts, variations in the extent of individual soils, and the application of the latest soil classification system. The soils in these map units have similar properties and similar potentials for major land uses. Differences in the map unit names do not significantly affect the use and management of the soils.

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 loam, 5 to 10 percent slopes, eroded. This moderately sloping, well drained soil is on short, uneven 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 mixed dark brown and yellowish brown, friable loam. Erosion has reduced the thickness of this layer to about 5 inches. The subsoil is yellowish brown, mottled, firm clay loam about 31 inches thick. It is calcareous in the lower part. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, very firm, calcareous loam. In some areas the surface layer and the upper part of the subsoil contain less sand. In other areas the subsoil and underlying material are stratified, loamy outwash. In places the subsoil is exposed.

Included with this soil in mapping are small areas of the poorly drained Drummer and Sawmill soils and the somewhat poorly drained Sabina soils. Drummer and Sawmill soils are in shallow depressions and drainageways below the Miami soil. Sabina soils are in nearly level areas above the Miami soil. Included soils make up 1 to 5 percent of the unit.

Water and air move through the subsoil of the Miami soil at a moderate rate and through the underlying material at a moderately slow rate. Surface runoff is medium in cultivated areas. Available water capacity is moderate. Organic matter content is moderately low. In cultivated areas the surface tends to crust after periods of heavy rainfall. The shrink-swell potential and the potential for frost action are moderate.

Most areas are cultivated. Some areas are used for pasture or woodland. This soil is well suited to woodland. It is moderately suited to cultivated crops, pasture and hay, and dwellings. It is poorly suited to septic tank absorption fields.

In areas used for corn, soybeans, or small grain, further water erosion is a hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, terraces, or a combination of these can help to control water erosion and maintain the productivity of the soil. Designing and installing terrace systems can be difficult because of the short, uneven side slopes. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake.

Growing a mixture of alfalfa and either orchardgrass or smooth bromegrass for pasture or hay helps to control water erosion. Overgrazing, however, reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and control water erosion. The pasture should be tilled on the contour when a seedbed is prepared.

In the areas used for woodland, plant competition is a management concern. It hinders the growth of desirable seedlings. The undesirable vegetation in openings created by harvesting activities can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch, compaction of the soil, and damage to tree roots and to desirable young trees. 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 foundation helps to prevent the structural damage caused by shrinking and swelling. The slope is a limitation in the steeper areas. Cutting and filling can help to overcome this limitation.

If this soil is used as a site for septic tank absorption fields, the moderately slow permeability is a limitation. It can be overcome by enlarging the absorption area. The slope is a limitation in the steeper areas. Installing the distribution lines on the contour helps to overcome this limitation.

The land capability classification is IIIe.

27D2—Miami loam, 10 to 15 percent slopes, eroded. This strongly sloping, well drained soil is on short, uneven side slopes on till plains adjacent to flood plains. Individual areas are irregularly shaped or are long and narrow. They range from 3 to 40 acres in size.

Typically, the surface layer is mixed dark brown and yellowish brown, friable loam. Erosion has reduced the thickness of this layer to about 7 inches. The subsoil is yellowish brown, friable clay loam about 26 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown, very firm, calcareous clay loam. In some areas the subsoil is exposed. In other areas the surface layer and the upper part of the subsoil contain less sand. In places the subsoil and underlying material are stratified, loamy outwash.

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

Water and air move through the subsoil of the Miami soil at a moderate rate and through the underlying material at a moderately slow rate. Surface runoff is rapid in cultivated areas. Available water capacity is moderate. Organic matter content is moderately low. In cultivated areas the surface tends to crust after periods of heavy rainfall. The shrink-swell potential and the potential for frost action are moderate.

Most areas are used for cultivated crops or for pasture or hay. Some areas are used for woodland. This soil is well suited to woodland. It is moderately suited to pasture and dwellings. It is poorly suited to cultivated crops, hay, and septic tank absorption fields.

Further water erosion is a hazard in areas of this soil used for corn, soybeans, or small grain. A crop rotation that is dominated by forage crops, contour farming, and a conservation tillage system that leaves crop residue on the surface after planting can help to control erosion. Incorporating organic material into the soil minimizes crusting and improves tilth.

Growing a mixture of alfalfa and either orchardgrass or smooth bromegrass for pasture or hay helps to control erosion. Overgrazing, however, reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and control erosion. The pasture should be tilled on the contour when a seedbed is prepared.

In the areas used for woodland, plant competition is a management concern. It hinders the growth of desirable seedlings. The undesirable vegetation in openings created by harvesting activities can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch, compaction of the soil, and damage to tree roots and to desirable young trees. Measures that protect the woodland from fire are needed.

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

The moderately slow permeability and the slope are limitations if this soil is used as a site for septic tank absorption fields. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome the moderately slow permeability. Installing the filter lines on the contour or cutting and filling help to overcome the slope.

The land capability classification is IVe.

27E—Miami loam, 15 to 25 percent slopes. This steep, well drained soil is on short, uneven side slopes on till plains adjacent to flood plains. Individual areas are long and narrow and range from 5 to 50 acres in size.

Typically, the surface layer is very dark grayish brown, friable loam about 4 inches thick. The subsurface layer is dark brown, friable loam about 5 inches thick. The subsoil is about 26 inches thick. The upper part is dark yellowish brown, friable clay loam. The next part is dark yellowish brown, firm loam. The lower part is yellowish brown, mottled, very firm, calcareous loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, very firm, calcareous loam. In some areas the subsoil is exposed. In other areas carbonates are within a depth of 24 inches. In places the subsoil and underlying material are stratified, loamy outwash.

Included with this soil in mapping are small areas of the poorly drained Sawmill soils. These soils are on bottom land below the Miami soil. They make up 1 to 7 percent of the unit.

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

Most areas are used for pasture or woodland. This soil is well suited to woodland. It is moderately suited to pasture. It is poorly suited to dwellings and septic tank absorption fields. It is generally unsuited to cultivated crops and hay because of a severe hazard of water erosion.

Establishing pasture plants or hay on this soil helps to control water erosion. Overgrazing, however, reduces forage yields and causes excessive runoff and water erosion. Proper stocking rates and rotation grazing help to keep the pasture in good condition. Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.

In areas where this soil is used for woodland, water erosion is a hazard and the use of equipment is limited because of the slope. Plant competition hinders the growth of desirable seedlings. Erosion can be controlled by building logging roads and skid trails on or nearly on the contour, skidding logs or trees uphill with a cable and winch on the steeper slopes, establishing grass firebreaks, and seeding bare areas to grass or to a grass-legume mixture after logging activities have been completed. The use of machinery is limited to periods when the soil is firm. The competing plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, 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 slope and the shrink-swell potential are limitations. Cutting and filling help to overcome the slope. Extending foundation footings below the subsoil or reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.

The moderately slow permeability and the slope are limitations if this soil is used as a site for septic tank absorption fields. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome the moderately slow permeability. Installing the filter lines on the contour or cutting and filling help to overcome the slope.

The land capability classification is VIe.

27G—Miami loam, 25 to 50 percent slopes. This very steep, well drained soil is on uneven side slopes on till plains adjacent to flood plains. Individual areas are long and narrow and range from 4 to 40 acres in size.

Typically, the surface layer is very dark grayish brown, friable loam about 4 inches thick. The subsoil is clay loam about 32 inches thick. The upper part is dark brown and friable, the next part is dark yellowish brown and firm, and the lower part is dark yellowish brown, firm, and calcareous. The underlying material to a depth

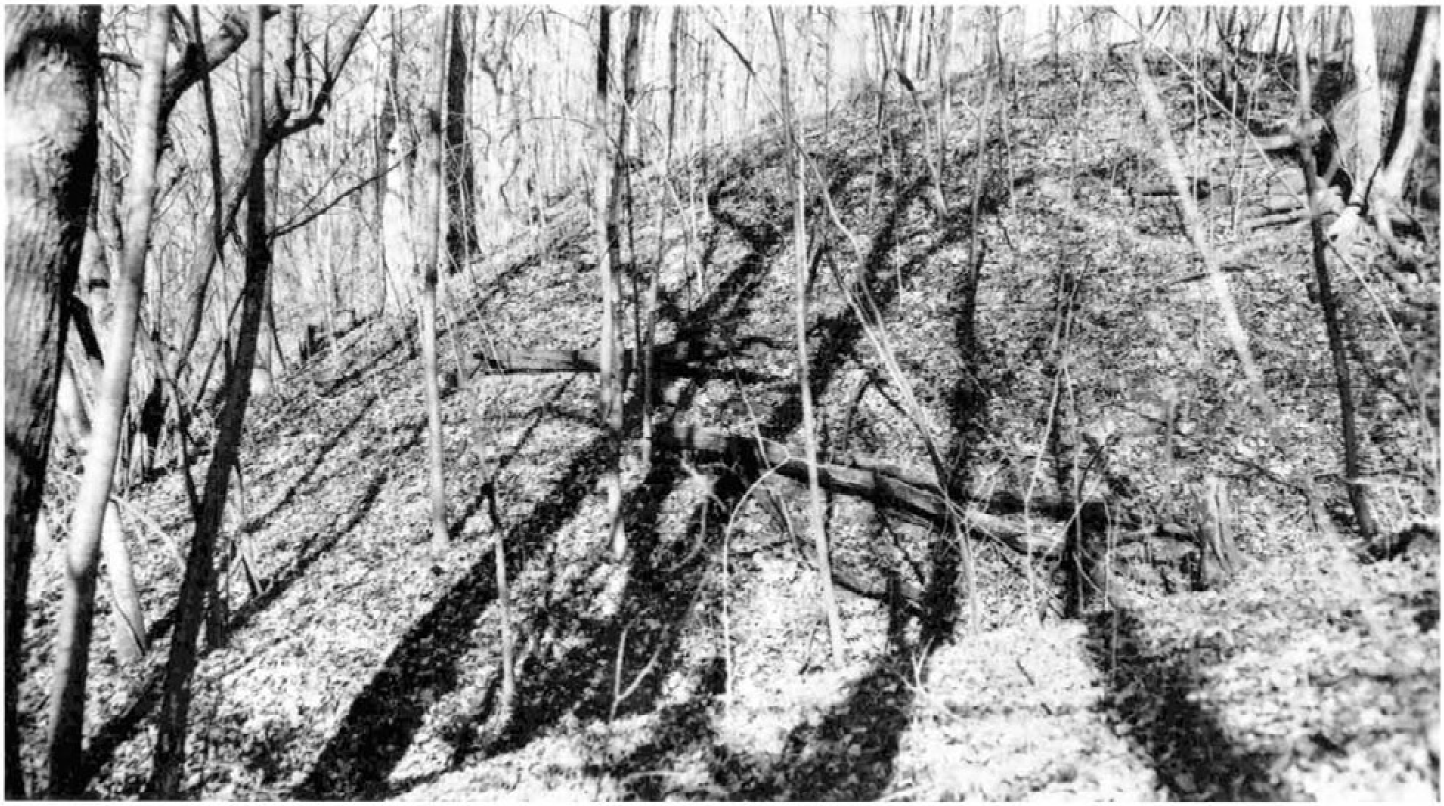


Figure 7.—A wooded area of Miami loam, 25 to 50 percent slopes.

of 60 inches or more is dark yellowish brown, mottled, firm, calcareous clay loam. In some areas carbonates are within a depth of 24 inches. In other areas the subsoil and underlying material are stratified, loamy outwash. In places the subsoil is exposed.

Included with this soil in mapping are small areas of the poorly drained Sawmill and somewhat poorly drained Tice soils. These soils are on bottom land below the Miami soil. They make up 2 to 7 percent of the unit.

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

Most areas are wooded (fig. 7). This soil is well suited to woodland. It is poorly suited to pasture. It is generally unsuited to cultivated crops and hay and to dwellings and septic tank absorption fields because of the slope.

In areas where this soil is used for woodland, water erosion is a hazard and the use of equipment is limited because of the slope. Plant competition hinders the growth of desirable seedlings. Water erosion can be controlled by building logging roads and skid trails on or nearly on the contour, skidding logs or trees uphill with a cable and winch on the steeper slopes, establishing grass firebreaks, and seeding bare areas to grass or to a grass-legume mixture after logging activities have been completed. The use of machinery is limited to periods when the soil is firm. The competing plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The land capability classification is VIIe.

43—Ipava silt loam. This nearly level, somewhat poorly drained soil is on slight rises on loess-covered outwash plains and till plains. Individual areas are irregular in shape and range from 2 to more than 300 acres in size.

Typically, the surface layer is black, friable silt loam about 9 inches thick. The subsurface layer also is black, friable silt loam. It is about 6 inches thick. The subsoil is about 29 inches thick. It is mottled and friable. The upper part is brown silty clay loam. The next part is dark grayish brown silty clay. The lower part is grayish brown silty clay 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 lower part of the subsoil and the underlying material are stratified, loamy outwash. In other areas the subsoil contains less clay and more silt.

Included with this soil in mapping are small areas of the moderately well drained Catlin and poorly drained Sable soils. Catlin soils are on slight rises above the Ipava soil and on side slopes along drainageways below the Ipava soil. Sable soils are in depressions and drainageways below the Ipava soil. Included soils make up 5 to 10 percent of the unit.

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

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, and hay. It is poorly suited to 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. A conservation tillage system that leaves crop residue on the surface after planting helps to maintain tilth and fertility.

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundation helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundation 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 the moderately slow permeability are limitations. Subsurface tile drains lower the water table. Grading and land shaping help to remove surface water. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome the moderately slow permeability.

The land capability classification is I.

56B—Dana silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on knolls, ridges, and short, uneven 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 grayish brown, friable silt loam about 6 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam about 6 inches thick. The subsoil is about 43 inches thick. The upper part is dark brown, friable silt loam. The next part is dark brown and yellowish brown, mottled, friable silty clay loam. The lower part is dark brown and 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 lower part of the subsoil contains less sand and more silt. In other areas the surface soil is thinner. In areas north of Mansfield, the underlying material contains more clay. In places the lower part of the subsoil and the underlying material are stratified, loamy outwash.

Included with this soil in mapping are small areas of the poorly drained Drummer and somewhat poorly drained Flanagan soils. These soils are in shallow depressions and drainageways below the Dana soil. They make up 5 to 10 percent of the unit.

Water and air move through the subsoil of the Dana soil at a moderate rate and through the underlying material at a moderately slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is 3 to 6 feet below the surface in late winter and in early spring. Available water capacity is high. Organic matter content also is high. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, and hay. It is moderately suited to dwellings. It is poorly suited to septic tank absorption fields.

In areas used for corn, soybeans, or small grain, water 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.

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 foundation helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundation 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 the moderately slow permeability are limitations. Subsurface tile drains lower the water table. Grading and land shaping help to remove surface water. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome the moderately slow permeability.

The land capability classification is IIe.

67—Harpster silty clay loam. This nearly level, poorly drained soil is on upland flats and in shallow depressions on outwash plains and till plains. It is occasionally ponded for brief periods in winter and spring. Individual areas are long and narrow or horseshoe shaped and range from 2 to 100 acres in size.

Typically, the surface layer is very dark gray, friable, calcareous silt loam about 9 inches thick. The subsurface layer is very dark gray, friable silt loam about 6 inches thick. The subsoil is about 22 inches thick. It is calcareous, friable, and mottled. The upper part is dark gray and olive gray silty clay loam. The next part is light brownish gray silty clay loam. The lower part is light brownish gray 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 surface layer does not have carbonates. In other areas the underlying material is stratified, loamy outwash.

Included with this soil in mapping are small areas of the somewhat poorly drained Elburn, Flanagan, and Ipava soils. These soils are on slight rises above the Harpster soil. They make up 1 to 8 percent of the unit.

Water and air move through the Harpster soil at a moderate rate. Surface runoff is slow to ponded in cultivated areas. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below during winter and spring. Available water capacity is high. Organic matter content also is high. The surface layer is friable but becomes compact and cloddy if plowed when wet. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, and hay. It generally is unsuitable as a site for dwellings and septic tank absorption fields because of the ponding.

Because a drainage system has been installed, most areas of this soil can be used for corn, soybeans, or small grain. Measures that maintain or improve the drainage system are needed. Subsurface tile drains and surface inlet tile can be used. Keeping tillage to a minimum and leaving crop residue on the surface after planting help to maintain tilth and productivity and increase the rate of water intake.

The land capability classification is IIw.

68—Sable silty clay loam. This nearly level, poorly drained soil is on upland flats and in shallow depressions and drainageways on loess-covered outwash plains and till plains. It is occasionally ponded for brief periods in late winter and early spring. Individual areas are irregular in shape. They average about 10,000 acres but range from 2 to more than 20,000 acres in size.

Typically, the surface layer is black, friable silty clay loam about 7 inches thick. The subsurface layer is black and very dark gray, firm silty clay loam about 16 inches thick. The subsoil extends to a depth of more than 60 inches. It is mottled. The upper part is olive gray, firm silty clay loam. The next part is light olive gray, firm silty clay loam. The lower part is light olive gray, friable silt loam. In some areas carbonates are within a depth of 35 inches. In other areas the lower part of the subsoil is stratified, loamy outwash. In places the subsurface layer is thinner.

Included with this soil in mapping are small areas of the poorly drained Harpster, somewhat poorly drained Elburn and Ipava, and moderately well drained Catlin soils. Catlin, Elburn, and Ipava soils are on knobs and rises above the Sable soil. Harpster soils have a calcareous surface layer. They are in landscape positions similar to those of the Sable soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the Sable soil at a moderate rate. Surface runoff is slow to ponded in cultivated areas. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below in late winter and in spring. Available water capacity is very high. Organic matter content is high. The surface layer is friable but becomes compact and cloddy if plowed when too wet. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, and hay. It generally is unsuitable as a site for dwellings and septic tank absorption fields because of the ponding.

Because a drainage system has been installed, most areas of this soil can be used for corn, soybeans, or small grain. Measures that maintain or improve the drainage system are needed. Subsurface tile drains and surface inlet tile can be used. Keeping tillage to a minimum and leaving crop residue on the surface after planting help to maintain tilth and productivity and increase the rate of water intake.

The land capability classification is IIw.

74—Radford silt loam. This nearly level, somewhat poorly drained soil is on bottom land. It is frequently flooded for brief periods in winter and spring, but the flooding damages crops less often than once in 2 years. 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 about 6 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam. It is about 11 inches thick. The underlying material is very dark grayish brown, friable silt loam. It extends to a buried soil at a depth of about 33 inches. The buried soil to a depth of 60 inches or more is black, friable and firm silt loam and silty clay loam. In some areas the soil contains more clay and less silt. In other areas the surface soil is thinner. In places the buried soil contains more sand.

Included with this soil in mapping are small areas of the poorly drained Sawmill soils. These soils are in areas below the Radford soil. They make up 2 to 15 percent of the unit.

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

Most areas are cultivated. This soil is well suited to cultivated crops and hay. It is moderately suited to pasture. Because it is subject to flooding, it generally is unsuitable as a site for dwellings and septic tank absorption fields.

Because a drainage system has been installed, most areas of this soil can be used for corn, soybeans, or small grain. Flooding can damage crops in some years, but the soil is not frequently flooded during the growing season. Subsurface tile drains help to lower the seasonal high water table. Levees reduce the extent of the crop damage caused by floodwater. Keeping tillage to a minimum and leaving crop residue on the surface after planting help to maintain tilth and productivity.

If this soil is used for pasture or hay, the flooding is a hazard and the seasonal wetness is a limitation. Levees and diversions help to control flooding, and subsurface drains lower the water table. Overgrazing causes surface compaction and deterioration of tilth. Proper stocking rates, rotation grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition. The flooding delays harvesting of hay in some years.

The land capability classification is IIIw.

107—Sawmill silty clay loam. This nearly level, poorly drained soil is on bottom land. It is frequently flooded for brief periods in winter and spring. Individual areas are irregular in shape and range from 10 to more than 1,000 acres in size.

Typically, the surface layer is black, friable silty clay loam about 8 inches thick. The subsurface layer also is black, friable silty clay loam. It is about 9 inches thick. The subsoil is friable silty clay loam about 28 inches thick. The upper part is very dark gray, and the lower part is dark gray and mottled. The underlying material to a depth of 60 inches or more is gray, mottled, friable silty clay loam. In some areas it is stratified loamy sand. In other areas the surface layer is friable silt loam overwash.

Included with this soil in mapping are small areas of the well drained Armiesburg and somewhat poorly drained Tice soils. These soils are on slight rises above the Sawmill soil. They make up 5 to 10 percent of the unit.

Water and air move through the Sawmill soil at a moderate rate. Surface runoff is slow in cultivated areas. The seasonal high water table is within a depth of 2 feet in late winter and in spring. Available water capacity is very high. Organic matter content is high. The surface layer is friable but becomes compact and cloddy if plowed when too wet. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are cultivated. Some areas are used for pasture or woodland. This soil is well suited to cultivated crops, pasture, hay, and woodland. Because it is subject to flooding, it generally is unsuitable as a site for dwellings and septic tank absorption fields.

Because a drainage system has been installed, most areas of this soil can be used for corn, soybeans, or small grain. Flooding can damage crops in some years, but the soil is not frequently flooded during the growing season. Subsurface tile drains help to lower the seasonal high water table. Levees reduce the extent of the crop damage caused by floodwater. Keeping tillage to a minimum and leaving crop residue on the surface after planting help to maintain tilth and productivity.

If this soil is used for pasture or hay, the flooding is a hazard and the seasonal wetness is a limitation. Levees and diversions help to control flooding, and subsurface drains lower the water table. Overgrazing causes surface compaction and deterioration of tilth. Proper stocking rates, rotation grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition. The flooding delays harvesting of hay in some years.

In areas where this soil is used for woodland, the seasonal high water table limits the use of equipment and causes seedling mortality and a hazard of windthrow. Plant competition is a management concern. The use of equipment is limited to periods when the soil is firm. Planting mature nursery stock on ridges reduces the seedling mortality rate. Using a harvesting method that does not isolate the remaining trees or leave them widely spaced and removing only high-value trees from a strip 50 feet wide along the west and south edges of the woodland reduce the hazard of windthrow. The competing plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The land capability classification is IIIw.

136—Brooklyn silt loam. This nearly level, poorly drained soil is in shallow depressions on outwash plains, till plains, and moraines. It is occasionally ponded for brief periods from March through June. Individual areas are round or oblong and range from 3 to 20 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is gray, mottled, friable silt loam about 6 inches thick. The subsoil extends to a depth of more than 60 inches. It is mottled. The upper part is grayish brown, friable silty clay loam. The next part is grayish brown, firm silty clay loam. The lower part is grayish brown and yellowish brown, firm, stratified silt loam and sandy clay loam. In some areas the surface layer is thicker. In other areas the lower part of the subsoil contains less sand and more silt. In places the upper part of the subsoil contains less clay and more silt.

Included with this soil in mapping are small areas of the somewhat poorly drained Flanagan and Ipava and moderately well drained Catlin and Dana soils. These soils are on slight rises above the Brooklyn soil. They make up 1 to 5 percent of the unit.

Water and air move through the Brooklyn soil at a slow rate. Surface runoff is slow to ponded in cultivated areas. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below in late winter and in early spring. Available water capacity is high. Organic matter content is moderate. In cultivated areas the surface tends to crust after periods of heavy rainfall. The shrink-swell potential and the potential for frost action are high.

Most areas are cultivated. This soil is well suited to cultivated crops. It is moderately suited to pasture and hay. It generally is unsuitable as a site for dwellings and septic tank absorption fields because of the slow permeability and the ponding.

Because a drainage system has been installed, most areas of this soil can be used for corn, soybeans, or small grain. Measures that maintain or improve the drainage system are needed. Surface drains and surface inlet tile 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 improve tilth, help to prevent surface compaction and crusting, and increase the rate of water intake.

If this soil is used for pasture or hay, overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction and deterioration of tilth. The seasonal high water table and the ponding restrict the growth of some forage crops. Shallow surface ditches and tile inlets help remove water from the soil. Reed canarygrass and alsike clover or ladino clover are suitable for planting. Proper stocking rates, rotation grazing, and deferred grazing when the soil is wet help to keep the pasture in good condition.

The land capability classification is IIw.

145C2—Saybrook silt loam, 5 to 8 percent slopes, eroded. This moderately sloping, moderately well drained soil is on 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 grayish brown and dark brown, friable silt loam about 8 inches thick. The subsoil is about 49 inches thick. The upper part is dark brown and yellowish brown, friable silty clay loam. The next part is yellowish brown, mottled, friable silty clay loam. The lower part is brown, mottled, firm clay loam. The underlying material to a depth of 60 inches or more is brown, firm, calcareous loam. In some areas the subsoil is exposed. In other areas the upper part of the subsoil contains more sand and less silt. In places the lower part of the subsoil and the underlying material are stratified, loamy outwash.

Included with this soil in mapping are small areas of the poorly drained Drummer and somewhat poorly drained Flanagan soils. These soils are in drainageways and nearly level areas below the Saybrook soil. They make up 2 to 12 percent of the unit.

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

Most areas are cultivated. This soil is well suited to pasture. It is moderately suited to cultivated crops, hay, and dwellings. It is poorly suited to septic tank absorption fields.

In areas used for corn, soybeans, or small grain, further water erosion is a hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, terraces, or a combination of these can help to control water erosion and maintain the productivity of the soil. Designing and installing terrace systems can be difficult because of short, uneven side slopes. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake.

Growing a mixture of alfalfa and either orchardgrass or smooth bromegrass for pasture or hay helps to control water erosion. Overgrazing, however, reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to water erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and control water erosion. The pasture should be tilled on the contour when a seedbed is prepared.

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 foundation helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.

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

The land capability classification is IIIe.

152—Drummer silty clay loam. This nearly level, poorly drained soil is on upland flats and in shallow depressions and drainageways on outwash plains and till plains. It is occasionally ponded for brief periods in late winter and in spring. Individual areas are irregular in shape. They average about 5,000 acres but range from 3 to more than 25,000 acres in size.

Typically, the surface layer is very dark gray, friable silty clay loam about 8 inches thick. The subsurface layer also is very dark gray, friable silty clay loam about 8 inches thick. The subsoil is about 35 inches thick. It is mottled. The upper part is olive gray, friable silty clay loam. The lower part is gray, very friable loam. The underlying material to a depth of 60 inches or more is gray, mottled, loose, calcareous, stratified sandy loam and loam. In some areas the lower part of the subsoil and the underlying material contain less sand and more silt. In other areas carbonates are within a depth of 35 inches. In places the surface soil is thinner.

Included with this soil in mapping are small areas of the somewhat poorly drained Elburn, Flanagan, and Sabina and moderately well drained Catlin and Dana soils. These soils are on knobs and rises above the Drummer soil. They make up 5 to 15 percent of the unit.

Water and air move through the Drummer soil at a moderate rate. Surface runoff is slow to ponded in cultivated areas. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below in late winter and in spring. Available water capacity is very high. Organic matter content is high. The surface soil is friable but becomes compact and cloddy if plowed when too wet. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, and hay. It is generally unsuited to dwellings and septic tank absorption fields because of the ponding.

Because a drainage system has been installed, most areas of this soil can be used for corn, soybeans, or small grain. Measures that maintain or improve the drainage system are needed. Subsurface tile drains and surface inlet tile can be used. Keeping tillage to a minimum and leaving crop residue on the surface after planting help to maintain tilth and productivity and increase the rate of water intake.

The land capability classification is IIw.

153—Pella silty clay loam. This nearly level, poorly drained soil is on upland flats and in depressions 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 3 to 100 acres in size.

Typically, the surface layer is black, friable silty clay loam about 10 inches thick. The subsoil is about 44 inches thick. The upper part is dark grayish brown and grayish brown, mottled, friable silty clay loam. The lower part is grayish brown, mottled, firm, calcareous silt loam. The underlying material to a depth of 60 inches or more is light brownish gray, mottled, firm, calcareous loam. In some areas it contains less sand. In other areas the surface soil is thicker and contains more clay.

Included with this soil in mapping are small areas of the moderately well drained Catlin and somewhat poorly drained Elburn and Flanagan soils. These soils are on slight rises above the Pella soil. They make up 2 to 5 percent of the unit.

Water and air move through the Pella soil at a moderate rate. Surface runoff is slow to ponded in cultivated areas. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below during spring.

Available water capacity is high. Organic matter content also is high. The surface layer becomes compact and cloddy if plowed when too wet. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are cultivated. This soil is well suited to cultivated crops. It is moderately suited to pasture and hay. It is generally unsuited to dwellings and septic tank absorption fields because of the ponding.

Because a drainage system has been installed, most areas of this soil can be used for corn, soybeans, or small grain. Measures that maintain or improve the drainage system are needed. Subsurface tile drains and surface inlet tile can be used. Keeping tillage to a minimum and leaving crop residue on the surface after planting help to maintain tilth and productivity and increase the rate of water intake.

The land capability classification is IIw.

154—Flanagan silt loam. This nearly level, somewhat poorly drained soil is on slight rises 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 gray, friable silt loam about 8 inches thick. The subsurface layer also is very dark gray, friable silt loam. It is about 4 inches thick. The subsoil is about 36 inches thick. It is mottled. The upper part is brown, friable and firm silty clay loam. The next part is light olive brown, friable silty clay loam. The lower part is light olive brown, firm, calcareous clay loam. The underlying material to a depth of 60 inches or more is light olive brown, mottled, calcareous loam. In some areas the lower part of the subsoil and the underlying material contain less sand and more silt. In other areas they are stratified, loamy outwash. In areas north of Mansfield, the underlying material contains more clay. In places the surface soil is thinner.

Included with this soil in mapping are small areas of the poorly drained Drummer and moderately well drained Catlin and Dana soils. Drummer soils are in shallow depressions and drainageways below the Flanagan soil. Catlin and Dana soils are on slight rises above the Flanagan soil. Included soils make up 5 to 15 percent of the unit.

Water and air move through the upper part of the Flanagan soil at a moderate rate and through the lower part at a moderately slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 1.5 to 3.5 feet below the surface in late winter and in spring. Available water capacity and organic matter content are high. The shrink-swell potential and the potential for frost action also are high.

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, and hay. It is poorly suited to 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. A conservation tillage system that leaves crop residue on the surface after planting helps to maintain tilth and fertility.

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundation helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundation 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 the moderately slow permeability are limitations. Subsurface tile drains lower the water table. Grading and land shaping help to remove surface water. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome the moderately slow permeability.

The land capability classification is I.

171B—Catlin silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on broad ridges and short, uneven side slopes on till plains and 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 silt loam about 8 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam. It is about 3 inches thick. The subsoil is about 49 inches thick. The upper part is dark brown, dark yellowish brown, and yellowish brown, friable silty clay loam. The next part is yellowish brown, mottled, friable silty clay loam. The lower part is brown, mottled, firm clay loam. The underlying material to a depth of 62 inches or more is brown, mottled, firm, calcareous loam. In some areas the upper part of the subsoil contains more sand and less silt. In other areas the lower part of the subsoil and the underlying material contain less sand and more silt. In areas north of Mansfield, the underlying material contains more clay. In places the surface layer is thinner.

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

Water and air move through the Catlin soil at a moderate rate. Surface runoff is medium in cultivated areas. The seasonal high water table is 3.5 to 6.0 feet below the surface during winter and spring. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential also is moderate, and the potential for frost action is high.

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, and hay. It is moderately suited to dwellings. It is poorly suited to septic tank absorption fields.

In areas used for corn, soybeans, or small grain, water 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.

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 foundation helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.

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

The land capability classification is IIe.

198—Elburn silt loam. This nearly level, somewhat poorly drained soil is on slight rises on outwash plains. Individual areas are irregular in shape and range from 3 to 120 acres in size.

Typically, the surface layer is very dark gray, friable silt loam about 8 inches thick. The subsurface layer also is very dark gray, friable silt loam. It is about 4 inches thick. The subsoil extends to a depth of more than 60 inches. It is mottled and friable. The upper part is dark brown silty clay loam. The next part is brown and yellowish brown silty clay loam. The lower part is yellowish brown, stratified sandy loam and silt loam. In some areas the lower part of the subsoil contains less sand and more silt. In other areas it is calcareous loam till. In places the upper part of the subsoil contains more sand and less silt.

Included with this soil in mapping are small areas of the poorly drained Drummer and Sable, moderately well drained Plano, and well drained Proctor soils. Drummer and Sable soils are in drainageways and depressions below the Elburn soil. Plano and Proctor soils are on slight rises above the Elburn soil. Included soils make up 5 to 10 percent of the unit.

Water and air move through the upper part of the Elburn soil at a moderate rate and through the lower part at a moderately rapid rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 1 to 3 feet below the surface during winter and spring. Available water capacity is high. Organic matter content also is high. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, and hay. It is poorly suited to 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. A conservation tillage system that leaves crop residue on the surface after planting helps to maintain tilth and fertility.

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

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

The land capability classification is I.

199B—Plano silt loam, 1 to 5 percent slopes. This gently sloping, moderately well drained soil is on slight rises, ridges, and short, uneven side slopes on outwash plains. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is very 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 48 inches thick. It is friable. The upper part is brown and dark yellowish brown silty clay loam. The next part is yellowish brown, mottled silty clay loam. The lower part is yellowish brown sandy clay loam. The underlying material to a depth of 63 inches or more is yellowish brown, loose, calcareous sandy loam. In some areas the lower part of the subsoil and the underlying material contain less sand and more silt. In other areas they are calcareous loam till. In places the upper part of the subsoil contains more sand and less silt.

Included with this soil in mapping are small areas of the poorly drained Drummer and Sable and somewhat poorly drained Elburn and Ipava soils. These soils are in shallow depressions and drainageways and in nearly level areas below the Plano soil. They make up 3 to 12 percent of the unit.

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

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, and hay. It is moderately suited to dwellings. It is poorly suited to septic tank absorption fields.

In areas used for corn, soybeans, or small grain, water 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.

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 foundation helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.

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

The land capability classification is IIe.

221C2—Parr loam, 5 to 10 percent slopes, eroded. This moderately sloping, well drained soil is on knolls and short, uneven side slopes on till plains and moraines (fig. 8). Individual areas are irregular in shape and range from 3 to 80 acres in size.

Typically, the surface layer is mixed dark brown and yellowish brown, friable loam. Erosion has reduced the thickness of this layer to about 7 inches. The subsoil is yellowish brown clay loam about 24 inches thick. The upper part is friable, and the lower part is firm. The underlying material to a depth of 60 inches or more is yellowish brown, firm, calcareous loam. In some areas the upper part of the subsoil contains less sand. In other areas the subsoil is exposed. In places the subsoil and underlying material are stratified, loamy outwash.

Included with this soil in mapping are small areas of the poorly drained Drummer and somewhat poorly drained Flanagan soils. These soils are in drainageways and nearly level areas 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 soil at a moderate rate and through the lower part at a moderately slow rate. Surface runoff is medium in cultivated areas. Available water capacity is moderate. Organic matter content also is moderate. In areas where the plow layer contains subsoil material, a surface crust can form after periods of heavy rainfall. The shrink-swell potential and the potential for frost action are moderate.

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, and hay. It is moderately suited to dwellings. It is poorly suited to septic tank absorption fields.

In areas used for corn, soybeans, or small grain, further water erosion is a hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, terraces, or a combination of these can help to control water erosion and maintain the productivity of the soil. Designing and installing terrace systems can be difficult because of the short, uneven side slopes. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake.

If this soil is used as a site for dwellings, the shrink-swell potential is a limitation. Reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling. The slope is a limitation in the steeper areas. Cutting and filling can help to overcome this limitation.

The moderate permeability is a limitation if this soil is used as a site for septic tank absorption fields. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome this limitation. The slope is a limitation in the steeper areas. Installing the distribution lines on the contour helps to overcome this limitation.

The land capability classification is IIIe.

223B2—Varna silty clay loam, 2 to 6 percent slopes, eroded. This gently sloping, well drained soil is on knolls and ridges on moraines. Individual areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is very dark gray, friable

Figure 8.—An area of Parr loam, 5 to 10 percent slopes, eroded, along a drainageway. The lighter colored areas are severely eroded.

silty clay loam. Erosion has reduced the thickness of this layer to about 7 inches. The subsoil is silty clay loam about 20 inches thick. The upper part is dark yellowish brown and friable. The lower part is light olive brown and firm. The underlying material to a depth of 60 inches or more is light olive brown, mottled, very firm, calcareous clay loam. In some areas the upper part of the subsoil has a band of loamy outwash overlying the silty clay loam till. In other areas the surface layer is thicker and contains less clay and more silt.

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

Water and air move through the Varna soil at a moderately slow rate. Surface runoff is medium in cultivated areas. Available water capacity is moderate. Organic matter content also is moderate. In areas where the plow layer contains subsoil material, a surface crust can form after periods of heavy rainfall. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, hay, and dwellings with basements. It is moderately suited to dwellings without basements. It is poorly suited to septic tank absorption fields.

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

Growing a mixture of alfalfa and either orchardgrass or smooth bromegrass for pasture or hay helps to control water erosion. Overgrazing, however, reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to water erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and control water erosion. The pasture should be tilled on the contour when a seedbed is prepared.

If this soil is used as a site for dwellings without basements, the shrink-swell potential is a limitation. Reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.

The moderately slow permeability is a limitation if this soil is used as a site for septic tank absorption fields. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome this limitation.

The land capability classification is IIe.

234—Sunbury silt loam. This nearly level, somewhat poorly drained soil is on slight rises on till plains. Individual areas are irregular in shape and range from 4 to 80 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsoil is about 47 inches thick. It is mottled. The upper part is brown, friable and firm silty clay loam. The lower part 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 some areas the surface layer is thicker. In other areas it is thinner or lighter in color. In places the lower part of the subsoil is stratified, loamy outwash.

Included with this soil in mapping are small areas of the moderately well drained Catlin and poorly drained Drummer soils. Catlin soils are on slight rises above the Sunbury soil. Drummer soils are in drainageways below 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 soil at a moderate rate and through the lower part at a moderately slow rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 1.5 to 3.5 feet below the surface in late winter and in spring. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential and the potential for frost action are high.

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, and hay. It is poorly suited to 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. A conservation tillage system that leaves crop residue on the surface after planting helps to maintain tilth and fertility.

If this soil is used as a site for dwellings, the seasonal high water table and the shrink-swell potential are limitations. Installing subsurface tile drains near the foundation helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundation 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 the moderately slow permeability are limitations. Subsurface tile drains lower the water table. Grading and land shaping help to remove surface water. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome the moderately slow permeability.

The land capability classification is I.

236—Sabina silt loam. This nearly level, somewhat poorly drained soil is on slight rises on till plains. Individual areas are irregular in shape and range from 3 to 160 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is brown, friable silt loam about 5 inches thick. The subsoil is about 46 inches thick. It is mottled and friable. The upper part is brown silty clay loam. The next part is yellowish brown silty clay loam. The lower part is yellowish brown, calcareous loam. The underlying material to a depth of 63 inches or more is yellowish brown, mottled, firm, calcareous loam. In some areas the surface layer is darker. In other areas the lower part of the subsoil and the underlying material are stratified, loamy outwash.

Included with this soil in mapping are small areas of the poorly drained Drummer, moderately well drained Xenia, and well drained Russell soils. Drummer soils are in shallow depressions and drainageways below the Sabina soil. Xenia and Russell soils are on slight rises above 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 in cultivated areas. The seasonal high water table is 1.5 to 3.5 feet below the surface in late winter and in spring. Available water capacity is high. Organic matter content is moderately low. In cultivated areas the surface tends to crust after periods of heavy rainfall. The shrink-swell potential and the potential for frost action are high.

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, and hay. It is poorly suited to dwellings and septic tank absorption fields.

Because a drainage system has been installed, most areas of this soil can be used for corn, soybeans, or small grain. Measures that maintain or improve the drainage system are needed. Subsurface tile drains can be used if outlets are available. Keeping tillage to a minimum and leaving crop residue on the surface after planting help to maintain tilth and minimize crusting.

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 foundation helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundation 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 the moderately slow permeability are limitations. Subsurface tile drains lower the water table. Grading and land shaping help to remove surface water. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome the moderately slow permeability.

The land capability classification is IIw.

244—Hartsburg silty clay loam. This nearly level, poorly drained soil is on flats and in shallow depressions on outwash plains and till plains. It is occasionally ponded for brief periods late in winter and early in spring. Individual areas are irregular in shape and range from 3 to 300 acres in size.

Typically, the surface layer is black, firm silty clay loam about 7 inches thick. The subsurface layer is very dark gray, friable silty clay loam about 10 inches thick. The subsoil is about 13 inches thick. It is mottled and friable. The upper part is dark gray silty clay loam. The lower part is light olive gray, calcareous silt loam. The underlying material to a depth of 60 inches or more is light olive gray, mottled, friable, calcareous silt loam. In some areas the underlying material is stratified, loamy outwash. In other areas the lower part of the subsoil does not contain carbonates. In places the surface layer is calcareous.

Included with this soil in mapping are small areas of the somewhat poorly drained Ipava and moderately well drained Catlin soils. These soils are on slight rises above the Hartsburg soil. They make up 2 to 5 percent of the unit.

Water and air move through the Hartsburg soil at a moderate rate. Surface runoff is slow to ponded in cultivated areas. The seasonal high water table is 0.5 foot above the surface to 2.0 feet below in late winter and in spring. Available water capacity is very high. Organic matter content is high. The surface layer becomes compact and cloddy if plowed when too wet. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, and hay. It generally is unsuitable as a site for dwellings and septic tank absorption fields because of the ponding.

Because a drainage system has been installed, most areas of this soil can be used for corn, soybeans, or small grain. Measures that maintain or improve the drainage system are needed. Subsurface tile drains and surface inlet tile can be used. Keeping tillage to a minimum and leaving crop residue on the surface after planting help to maintain tilth and productivity and increase the rate of water intake.

The land capability classification is IIw.

284—Tice silty clay loam. This nearly level, somewhat poorly drained soil is on bottom land. It is frequently flooded for brief periods in winter and spring, but the flooding damages crops less often than once in 2 years. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is very dark gray, friable silty clay loam about 6 inches thick. The subsurface layer is friable silty clay loam about 15 inches thick. The upper part is very dark gray, and the lower part is very dark grayish brown. The subsoil is brown, friable silty clay loam about 32 inches thick. It is mottled in the lower part. The underlying material to a depth of 60 inches or more is brown, mottled, friable, stratified loam and sandy loam. In some areas the dark colors extend to a depth of more than 24 inches. In other areas the surface soil and the upper part of the subsoil contain less clay and more silt.

Included with this soil in mapping are small areas of the poorly drained Sawmill soils. These soils are in areas below the Tice soil. They make up 2 to 15 percent of the unit.

Water and air move through the Tice soil at a moderate rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 1.5 to 3.0 feet below the surface in late winter and in spring. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential also is moderate, and the potential for frost action is high.

Most areas are cultivated. Some areas are used for woodland. This soil is well suited to cultivated crops, pasture, hay, and woodland. Because it is subject to flooding, it generally is unsuitable as a site for dwellings and septic tank absorption fields.

Because a drainage system has been installed, most areas of this soil can be used for corn, soybeans, or small grain. Flooding can damage crops in some years, but the soil is not frequently flooded during the growing season. Subsurface tile drains help to lower the seasonal high water table. Levees reduce the extent of the crop damage caused by floodwater. Keeping tillage to a minimum and leaving crop residue on the surface after planting help to maintain tilth and productivity.

If this soil is used for pasture or hay, the flooding is a hazard and the seasonal wetness is a limitation. Levees and diversions help to control flooding, and subsurface drains lower the water table. Overgrazing causes surface compaction and deterioration of tilth. Proper stocking rates, rotation grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition. The flooding delays harvesting of hay in some years.

The main management concern in the areas used for woodland is plant competition, which hinders the growth of desirable seedlings. The competing plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The land capability classification is IIw.

291B—Xenia silt loam, 1 to 5 percent slopes. This gently sloping, moderately well drained soil is on ridges on till plains. Individual areas are irregular in shape and range from 3 to 60 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 6 inches thick. The subsurface layer is brown, friable silt loam about 3 inches thick. The subsoil is about 46 inches thick. It is yellowish brown and mottled. The upper part is friable silty clay loam. The next part is friable clay loam. The lower part is firm, calcareous clay loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm, calcareous loam. In some areas the lower part of the subsoil contains less sand and more silt. In other areas the surface layer is darker and thicker. In places the lower part of the subsoil and the underlying material are stratified, loamy outwash.

Included with this soil in mapping are small areas of the poorly drained Drummer and somewhat poorly drained Sabina and Sunbury soils. Drummer soils are in drainageways below the Xenia soil. Sabina and Sunbury soils are in nearly level areas generally above the Xenia soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the Xenia soil at a moderately slow rate. Surface runoff is medium in cultivated areas. The seasonal high water table is 2 to 6 feet below the surface in late winter and in early spring. Available water capacity is high. Organic matter content is moderately low. In cultivated areas the surface tends to crust after periods of heavy rainfall. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are cultivated. Some areas are used for pasture or woodland. This soil is well suited to cultivated crops, pasture, hay, and woodland. It is moderately suited to dwellings without basements. It is poorly suited to dwellings with basements and to septic tank absorption fields.

In areas used for corn, soybeans, or small grain, water 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.

Growing a mixture of alfalfa and either orchardgrass or smooth bromegrass for pasture or hay helps to control water erosion. Overgrazing, however, reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to water erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and control water erosion. The pasture should be tilled on the contour when a seedbed is prepared.

The main management concern in the areas used for woodland is plant competition, which hinders the growth of desirable seedlings. The competing plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The seasonal high water table and the shrink-swell potential are limitations if this soil is used as a site for dwellings. The wetness is a more severe limitation on sites for dwellings with basements than on sites for dwellings without basements. Reinforcing footings and the foundation helps to prevent the structural damage caused by shrinking and swelling. Installing subsurface drains around the foundation lowers the water table.

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

The land capability classification is IIe.

322B—Russell silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on ridges on till plains. Individual areas are irregular in shape and range from 3 to 300 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 5 inches thick. The subsurface layer also is dark brown, friable silt loam. It is about 2 inches thick. The subsoil is about 51 inches thick. It is yellowish brown and friable. The upper part is silty clay loam. The next part is clay loam. The lower part is loam. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, firm loam. In some areas the lower part of the subsoil contains less sand and more silt. In other areas the upper part of the subsoil contains more sand. In places the soil is eroded and has a surface layer of silty clay loam.

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

Water and air move through the Russell soil at a moderate rate. Surface runoff is medium in cultivated areas. Available water capacity is high. Organic matter content is moderately low. In cultivated areas the surface tends to crust after periods of heavy rainfall. The shrink-swell potential is moderate, and the potential for frost action is high.

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

In areas used for corn, soybeans, or small grain, water erosion is a hazard. It can be controlled by a 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.

Growing a mixture of alfalfa and either orchardgrass or smooth bromegrass for pasture or hay helps to control water erosion. Overgrazing, however, reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to water erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and control water erosion. The pasture should be tilled on the contour when a seedbed is prepared.

In the areas used for woodland, plant competition is a management concern. It hinders the growth of desirable seedlings. The undesirable vegetation in openings created by harvesting activities can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch, compaction of the soil, and damage to tree roots and to desirable young trees. 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 foundation helps to prevent the structural damage caused by shrinking and swelling.

The moderate permeability is a limitation if this soil is used as a site for septic tank absorption fields. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome this limitation.

The land capability classification is IIe.

322C2—Russell silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, well drained soil is on short, uneven side slopes on till plains. Individual areas are irregular in shape and range from 3 to 75 acres in size.

Typically, the surface layer is friable silt loam about 7 inches thick. It is dominantly dark brown but has been mixed by tillage with yellowish brown material from the subsoil. The subsoil is about 40 inches thick. It is yellowish brown. The upper part is friable silty clay loam. The next part is firm clay loam. The lower part is mottled, firm clay loam. The underlying material to a depth of 60 inches or more is dark yellowish brown, firm clay loam. In some areas the upper part of the subsoil contains more sand and less silt. In other areas the lower part of the subsoil and the underlying material are stratified, loamy outwash. In places the subsoil is exposed.

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

Water and air move through the Russell soil at a moderate rate. Surface runoff is medium in cultivated areas. Available water capacity is high. Organic matter content is low. In cultivated areas the surface tends to crust after periods of heavy rainfall. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are cultivated. Some areas are used as pasture, hayland, or woodland. This soil is well suited to pasture, hay, and woodland. It is moderately suited to cultivated crops and to dwellings and septic tank absorption fields.

In areas used for corn, soybeans, or small grain, further water erosion is a hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, terraces, or a combination of these can help to control water erosion and maintain the productivity of the soil. Designing and installing terrace systems can be difficult because of the short, uneven side slopes. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake.

Growing a mixture of alfalfa and either orchardgrass or smooth bromegrass for pasture or hay helps to control water erosion. Overgrazing, however, reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to water erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and control water erosion. The pasture should be tilled on the contour when a seedbed is prepared.

The main management concern in the areas used for woodland is plant competition, which hinders the growth of desirable seedlings. The competing plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, 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 foundation helps to prevent the structural damage caused by shrinking and swelling. The slope is a limitation in the steeper areas. Cutting and filling can help to overcome this limitation.

The moderate permeability is a limitation if this soil is used as a site for septic tank absorption fields. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome this limitation. The slope is a limitation in the steeper areas. Installing the distribution lines on the contour helps to overcome this limitation.

The land capability classification is IIIe.

330—Peotone silty clay loam. This nearly level, very poorly drained soil is in shallow depressions on outwash plains and till plains. It is occasionally ponded for brief or long periods in winter and early spring. Individual areas are round or oval and range from 3 to 10 acres in size.

Typically, the surface layer is black, friable silty clay loam about 7 inches thick. The subsurface layer is black, friable and firm silty clay loam about 11 inches thick. The subsoil is firm silty clay loam about 35 inches thick. The upper part is very dark gray. The next part is very dark gray and mottled. The lower part is olive gray and gray and is mottled. The underlying material to a depth of 60 inches or more is light gray, mottled, firm silty clay loam. In some areas the dark surface soil is less than 10 inches thick. In other areas the subsoil contains less clay and more silt. In places the underlying material is stratified, loamy outwash.

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

Water and air move through the Peotone soil at a moderately slow rate. Surface runoff is very slow or ponded in cultivated areas. The seasonal high water table is 0.5 foot above the surface to 1.0 foot below during winter and spring. Available water capacity is high. Organic matter content also is high. The surface layer becomes compact and cloddy if plowed when too wet. The shrink-swell potential and the potential for frost action are high.

Most areas are cultivated. This soil is well suited to cultivated crops. Because it is subject to ponding, it generally is unsuitable as a site for dwellings and septic tank absorption fields.

Because a drainage system has been installed, most areas of this soil can be used for corn, soybeans, or small grain. Measures that maintain or improve the drainage system are needed. Subsurface tile drains and surface inlet tile can be used. Keeping tillage to a minimum and leaving crop residue on the surface after planting help to maintain tilth and productivity and increase the rate of water intake.

The land capability classification is IIw.

371B—St. Charles silt loam, sandy substratum, 1 to 5 percent slopes. This gently sloping, well drained soil is on ridges and slight rises on outwash plains. Individual areas are irregular in shape and range from 10 to 80 acres in size.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 46 inches thick. The upper part is yellowish brown, friable and firm silty clay loam. The next part is yellowish brown, friable silt loam. The lower part is dark yellowish brown, friable, stratified clay loam and sandy loam. The underlying material to a depth of 66 inches or more is yellowish brown, very friable loamy sand that has a few thin strata of sandy loam. In a few places the surface layer is darker. In some areas the underlying material is calcareous loam till. In other areas the sandy material is within a depth of 40 inches.

Included with this soil in mapping are small areas of the poorly drained Drummer and somewhat poorly drained Kendall soils. These soils are in shallow depressions and drainageways below the St. Charles soil. They make up 3 to 12 percent of the unit.

Water and air move through the subsoil of the St. Charles soil at a moderate rate and through the underlying material at a rapid rate. Surface runoff is medium in cultivated areas. Available water capacity is high. Organic matter content is moderately low. In cultivated areas the surface tends to crust after periods of heavy rainfall. The shrink-swell potential is moderate, and the potential for frost action is high.

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

In areas used for corn, soybeans, or small grain, water erosion is a hazard. It can be controlled by a 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.

Growing a mixture of alfalfa and either orchardgrass or smooth bromegrass for pasture or hay helps to control water erosion. Overgrazing, however, reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to water erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and control water erosion. The pasture should be tilled on the contour when a seedbed is prepared.

The main management concern in the areas used for woodland is plant competition, which hinders the growth of desirable seedlings. The competing plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, 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 foundation helps to prevent the structural damage caused by shrinking and swelling.

The moderate permeability is a limitation if this soil is used as a site for septic tank absorption fields. Increasing the size of the absorption field or replacing the soil with more permeable material helps to overcome this limitation.

The land capability classification is IIe.

372—Kendall silt loam, sandy substratum. This nearly level, somewhat poorly drained soil is on slight rises on outwash plains. Individual areas are irregular in shape and range from 5 to 35 acres in size.

Typically, the surface layer is grayish brown, friable silt loam about 8 inches thick. The subsurface layer is brown, mottled, friable silt loam about 3 inches thick. The subsoil is about 41 inches thick. The upper part is brown and yellowish brown, mottled, firm silty clay loam. The next part is mottled yellowish brown and grayish brown, friable silty clay loam. The lower part is mottled, gray, brown, and yellowish brown, very friable sandy clay loam. The underlying material to a depth of 60 inches or more is mottled yellowish brown and grayish brown loamy sand that has a few thin strata of sandy loam. In some areas the lower part of the subsoil and the underlying material are calcareous loam till. In other areas the lower part of the subsoil contains less sand and more silt. In places the surface layer is darker.

Included with this soil in mapping are small areas of Camden, Drummer, and St. Charles soils. The well drained Camden and St. Charles soils are on the higher rises above the Kendall soil. The poorly drained Drummer soils are in shallow depressions and drainageways below the Kendall soil. Included soils make up 2 to 10 percent of the unit.

Water and air move through the subsoil of the Kendall soil at a moderate rate and through the underlying material at a rapid rate. Surface runoff is slow in cultivated areas. The seasonal high water table is 1 to 3 feet below the surface during spring. Available water capacity is high. Organic matter content is moderately low. In cultivated areas the surface tends to crust after periods of heavy rainfall. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are cultivated. This soil is well suited to cultivated crops, pasture, and hay. It is poorly suited to dwellings and septic tank absorption fields.

Because a drainage system has been installed, most areas of this soil can be used for corn, soybeans, or small grain. Measures that maintain or improve the drainage system are needed. Subsurface tile drains can be used if outlets are available. Keeping tillage to a minimum and leaving crop residue on the surface after planting help to maintain tilth and minimize crusting.

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 foundation helps to overcome the wetness. Extending the footings below the subsoil or reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.

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

The land capability classification is IIw.

373B—Camden silt loam, sandy substratum, 1 to 5 percent slopes. This gently sloping, well drained soil is on slight rises and ridges on outwash plains and stream terraces. Individual areas are irregular in shape and range from 3 to 50 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 8 inches thick. The subsoil is about 45 inches thick. The upper part is dark yellowish brown, friable silty clay loam. The next part is yellowish brown, friable clay loam. The lower part is yellowish brown, very friable sandy loam. The underlying material to a depth of 60 inches or more is dark yellowish brown, loose loamy sand that has a few strata of sandy loam. In some areas the underlying material is calcareous loam till. In other areas the lower part of the subsoil contains less sand and more silt. In places the surface layer is darker.

Included with this soil in mapping are small areas of the poorly drained Drummer and somewhat poorly drained Kendall soils. These soils are in shallow depressions and drainageways below the Camden soil. They make up 5 to 15 percent of the unit.

Water and air move through the subsoil of the Camden soil at a moderate rate and through the underlying material at a rapid rate. Surface runoff is medium in cultivated areas. Available water capacity is high. Organic matter content is moderately low. In cultivated areas the surface tends to crust after periods of heavy rainfall. The shrink-swell potential is moderate, and the potential for frost action is high.

Most areas are cultivated. Some areas are used for woodland. This soil is well suited to cultivated crops, pasture, hay, and woodland, to dwellings with basements, and to septic tank absorption fields. It is moderately suited to dwellings without basements.

In areas used for corn, soybeans, or small grain, water 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.

Growing a mixture of alfalfa and either orchardgrass or smooth bromegrass for pasture or hay helps to control water erosion. Overgrazing, however, reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to water erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and control water erosion. The pasture should be tilled on the contour when a seedbed is prepared.

The main management concern in the areas used for woodland is plant competition, which hinders the growth of desirable seedlings. The competing plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

If this soil is used as a site for dwellings without basements, the shrink-swell potential is a limitation. Reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.

The land capability classification is IIe.

374B—Proctor silt loam, sandy substratum, 2 to 5 percent slopes. This gently sloping, well drained soil is on slight rises and short, uneven side slopes on outwash 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 about 8 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam. It is about 4 inches thick. The subsoil is about 32 inches thick. It is friable. The upper part is dark yellowish brown and yellowish brown silty clay loam. The next part is yellowish brown clay loam. The lower part is yellowish brown sandy loam. The underlying material to a depth of 60 inches or more is yellowish brown, loose loamy sand that has a few strata of sandy loam. In some areas the lower part of the subsoil contains less sand and more silt. In other areas the lower part of the subsoil and the underlying material are calcareous loam till. In places the dark surface soil is less than 10 inches thick.

Included with this soil in mapping are small areas of the somewhat poorly drained Elburn and poorly drained Drummer soils. These soils are in shallow depressions and drainageways below the Proctor soil. They make up 5 to 10 percent of the unit.

Water and air move through the upper part of the Proctor soil at a moderate rate, through the next part at a moderately rapid rate, and through the lower part at a rapid rate. Surface runoff is medium in cultivated areas. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential also is moderate, and the potential for frost action is high.

Most areas are cultivated. This soil is well suited to cultivated crops, pasture and hay, and septic tank absorption fields. It is moderately suited to dwellings.

In areas used for corn, soybeans, or small grain, water 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.

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

The land capability classification is IIe.

374C2—Proctor silt loam, sandy substratum, 5 to 10 percent slopes, eroded. This moderately sloping, well drained soil is on short, uneven side slopes on outwash plains and moraines. Individual areas are irregular in shape and range from 3 to 30 acres in size.

Typically, the surface layer is mixed very dark grayish brown and dark yellowish brown, firm silt loam. Erosion has reduced the thickness of this layer to about 9 inches. The subsoil is about 45 inches thick. It is friable. The upper part is dark yellowish brown silty clay loam. The next part is yellowish brown silty clay loam. The lower part is dark yellowish brown clay loam. The underlying material to a depth of 60 inches or more is dark yellowish brown loamy sand. In some areas the lower part of the subsoil and the underlying material are calcareous loam till. In other areas the surface layer is thinner.

Included with this soil in mapping are small areas of the poorly drained Drummer and somewhat poorly drained Elburn soils. These soils are in shallow depressions and drainageways below the Proctor soil. They make up 3 to 8 percent of the unit.

Water and air move through the upper part of the Proctor soil at a moderate rate, through the next part at a moderately rapid rate, and through the lower part at a rapid rate. Surface runoff is medium in cultivated areas. Available water capacity is high. Organic matter content is moderate. The shrink-swell potential also is moderate, and the potential for frost action is high.

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

In areas used for corn, soybeans, or small grain, further water erosion is a hazard. A crop rotation in which forage crops are grown for 1 year or more, a system of conservation tillage that leaves crop residue on the surface after planting, contour farming, terraces, or a combination of these can help to control water erosion and maintain the productivity of the soil. Designing and installing terrace systems can be difficult because of the short, uneven side slopes. Returning crop residue to the soil or regularly adding other organic material helps to maintain fertility and tilth and increases the rate of water intake.

Growing a mixture of alfalfa and either orchardgrass or smooth bromegrass for pasture or hay helps to control water erosion. Overgrazing, however, reduces forage yields, causes surface compaction and excessive runoff, and increases the susceptibility to water erosion. Rotation grazing, timely deferment of grazing, and applications of fertilizer help to keep the pasture in good condition and control water erosion. The pasture should be tilled on the contour when a seedbed is prepared.

If this soil is used as a site for dwellings, the shrink-swell potential is a limitation. Reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling. The slope is a limitation in the steeper areas. Cutting and filling can help to overcome this limitation.

The land capability classification is IIIe.

597—Armiesburg silt loam. This nearly level, well drained soil is on low ridges, natural levees, and alluvial fans on flood plains. It is occasionally flooded for brief periods in winter and spring. Individual areas are 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 8 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam. It is about 6 inches thick. The subsoil is friable silty clay loam about 38 inches thick. The upper part is dark brown. The next part is dark yellowish brown. The lower part is yellowish brown. The underlying material to a depth of 60 inches or more is yellowish brown, mottled, stratified silty clay loam, loam, sandy loam, and loamy sand. In some areas the upper part of the soil contains more sand. In other areas the dark surface soil is less than 10 inches thick. In places the subsoil contains less clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Radford and Tice and poorly drained Sawmill soils. These soils are lower on the flood plains than the Armiesburg soil. They make up 5 to 15 percent of the unit.

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

Most areas are cultivated. Some areas are used for woodland. This soil is well suited to cultivated crops and woodland. Because it is subject to flooding, it generally is unsuitable as a site for dwellings and septic tank absorption fields.

In areas used for corn or soybeans, the flooding is a hazard. Dikes or diversions reduce the extent of the crop damage caused by floodwater.

The main management concern in the areas used for woodland is plant competition, which hinders the growth of desirable seedlings. The competing plants in openings created by timber harvesting can be controlled by chemical or mechanical means. Excluding livestock from the wooded areas helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots. Measures that protect the woodland from fire are needed.

The land capability classification is IIw.

802B—Orthents, loamy, undulating. These moderately fine textured to moderately coarse textured, moderately well drained and somewhat poorly drained soils are in areas where the landscape has been modified by filling and leveling. Examples of this unit are cloverleafs on interstate highways, railroad beds, and revegetated gravel pits and fill areas. In most areas the soils are nearly level or gently sloping. In a few areas near interstate cloverleafs, however, they are moderately sloping or strongly sloping. Slopes generally range from 1 to 5 percent. Individual areas are square, rectangular, or irregularly shaped and range from 10 to more than 200 acres in size.

In a typical area, the loamy material has been deposited, removed, or shaped. Soil borings indicate that the soil material does not occur in a consistent pattern.

Included with these soils in mapping are highway interchanges, gravel pits, and some urban areas where concrete, asphalt, buildings, streets, and parking lots cover as much as 65 percent of the surface.

Available water capacity varies in the Orthents but generally is moderate. Permeability also varies because the soils have been compacted by construction equipment and because textures vary. In most areas, organic matter content is moderate and fertility is medium.

Most of the acreage is idle land or is developed for residential or other nonfarm uses. Unless a good plant cover protects the surface, water erosion is a severe hazard, especially in the more sloping areas. In severely eroded areas, special management is needed to establish and maintain a plant cover that controls runoff and water erosion. Newly exposed areas are bare, and some developed areas have a good cover of sod. Onsite investigation is needed to determine the limitations and hazards affecting the development of specific areas for urban uses.

This map unit is not assigned a land capability classification.

865—Pits, gravel. This map unit consists of open excavations from which sand and gravel have been removed. Most of the pits are near the Sangamon River or near the interchanges of Interstate Highways 72 and 74. The excavations are commonly 10 to 30 feet deep. Slopes range from 0 to more than 60 percent. Individual areas are square or irregularly shaped and range from 3 to 30 acres in size.

Typically, the surface material was loamy or sandy. It has been mixed or compacted during excavation and generally supports little or no vegetation. In some of the pits, the soil material supports vegetation, such as trees, shrubs, weeds, and grasses.

Included in mapping are perennial water areas and small areas of loamy Orthents adjacent to the pits. Included areas make up 10 to 50 percent of the unit.

Most of the acreage is idle land. Some of the pits are currently being excavated. Without major reclamation, gravel pits are generally unsuited to farming and to building site development. Some areas are suitable as sources of sand and gravel, as sites for sanitary landfills, or as recreational areas. If the unit is used for onsite waste disposal, special precautions may be necessary to prevent the pollution of ground water. Some areas are well suited to hiking trails, camping areas, and fishing areas. If vegetation is to be established, special site preparation, such as land smoothing and leveling and topdressing with surface soil material, may be needed.

This map unit is not 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 or 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 expenditure 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.

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 Piatt County that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify for prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures. In Piatt 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 to prevent construction failures caused by unfavorable soil properties.

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

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

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

Crops and Pasture

Paul Youngstrum, district conservationist, Soil Conservation Service, helped prepare this section.

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

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

About 242,100 acres in Piatt County is cropland, and 14,400 acres is permanent pasture *(11)*. The main field crops are corn and soybeans. Small grain and forage crops also are grown. The soils have good potential for continued crop production, particularly if the latest crop production technology is applied to all of the cropland in the county. This soil survey can greatly facilitate the application of such technology. The paragraphs that follow describe the main management concerns on the cropland and pasture in the county.

Water erosion is the major hazard if slopes are more than 2 percent. It also is a hazard in areas where slopes are long and less than 2 percent. Additional erosion control is needed on about 59 percent of the cropland in the county *(11)*.

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

Second, severe erosion on sloping soils results in deterioration of tilth in the surface soil and reduces the rate of water intake. The more clayey soils tend to become cloddy if worked when wet. Preparing a good seedbed is difficult on these soils. Also, the soils tend to crust after hard rains. As a result, the runoff rate is increased.

Third, uncontrolled erosion allows sediments to enter drainage ditches, streams, rivers, ponds, and road ditches. Removing these sediments is expensive. Management that controls erosion also helps to prevent the pollution caused by sedimentation and improves the quality of water for municipal and recreational uses and for fish and wildlife.

Measures that control erosion reduce the length of slopes or provide an adequate plant cover. Cropping systems that keep a cover of plants or crop residue on the surface during critical rainfall periods help to prevent excessive erosion and thus help to maintain the productive capacity of the soil. Including grasses and legumes in the crop rotation not only helps to control erosion but also improves tilth and provides nitrogen for the following crop.

Terraces, diversions, and contour farming help to control water erosion, reduce the runoff rate, and increase the rate of water intake. They are suitable on soils that have smooth, uniform slopes, such as Catlin, Dana, Parr, Plano, Proctor, Saybrook, and Varna soils. They are not feasible on some soils, such as Miami and Russell soils, because slopes are short and the topography is irregular. On these soils tillage systems or crop rotations that provide an adequate plant cover can be used to control erosion.

Grassed waterways in drainageways safely dispose of surface runoff. When used with other conservation practices, they help to prevent gully erosion. Grassed waterways also can serve as safe outlets for terraces.

A system of conservation tillage that leaves crop residue on the surface after planting helps to prevent excessive water erosion, reduces the runoff rate, and increases the rate of water intake. It is effective on most of the sloping soils in the county that can be cultivated.

Soil blowing is a hazard during part of the winter and early in spring. The hazard is most severe on broad flats where the surface layer is silty clay loam that has a high content of organic matter. The Drummer-Flanagan, Drummer-Elburn, and Sable-Ipava associations, which are described under the heading "General Soil Map Units," include most of the broad flats in the county. Soil blowing can be controlled by maintaining a good plant cover or leaving crop residue on the surface throughout the winter. Windbreaks of suitable trees or shrubs also are effective in controlling soil blowing.

Further information about measures that control water erosion and soil blowing is provided in the Technical Guide, which is available in local offices of the Soil Conservation Service.

A drainage system has been installed in most of the poorly drained and very poorly drained soils in the county. Many of these soils are naturally so wet that production of the crops commonly grown in the county is not feasible unless a drainage system is installed. Examples are the poorly drained Brooklyn, Drummer, Harpster, Hartsburg, Pella, and Sable and very poorly drained Peotone soils on uplands and the poorly drained Sawmill soils on bottom land. Unless drained, somewhat poorly drained soils are wet enough in some years for crop growth and productivity to be reduced *(4)*. Examples are Elburn, Flanagan, Ipava, Sabina, and Sunbury soils.

The design of surface and subsurface drainage systems varies with the kind of soil. Tile drains alone are inadequate on some soils. A combination of shallow surface drains and tile drains is needed in some areas of poorly drained and very poorly drained soils. Moderately permeable and moderately slowly permeable soils can be adequately drained by tile if outlets are available.

Information about the drainage system suitable for each kind of soil is provided in the Technical Guide, which is available in local offices of the Soil Conservation Service.

Soil fertility is naturally medium or high in most of the soils in the county. Most of the dark soils are slightly acid, and all of the light colored soils are naturally acid. On most acid soils, applications of agricultural limestone raise the pH level high enough for optimum plant growth. Harpster soils should not be limed, however, because they have secondary carbonates in the surface layer.

Most of the light colored soils, such as Camden, Miami, Russell, and Sabina soils, have a naturally low supply of nitrogen. 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 replenish the nitrogen supply.

Additions of lime, nitrogen, phosphorus, potassium, or other elements needed for optimum yields should be based on the results of soil tests. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime needed.

Soil tilth is an important factor influencing the germination of seeds, the amount of runoff, and the intake of water into the soil. It is good in soils that are granular and porous and is best in soils having a silt loam surface layer that has a high content of organic matter and granular structure. Elburn, Flanagan, Ipava, and Radford are examples of soils with good tilth.

Soils that have a low content of organic matter have weak structure in the surface layer. Examples are Camden, Miami, Russell, and Sabina soils. During periods of heavy rainfall, a crust forms at the surface of these soils. This crust is hard when dry. As a result, the rate of water infiltration is decreased and runoff and water erosion are excessive. Returning crop residue to the soil and adding manure or other organic material improve the tilth of these soils.

Poor tilth is a problem in the very poorly drained Peotone and poorly drained Drummer, Harpster, Hartsburg, Pella, Sable, and Sawmill soils. These soils often stay wet until late in spring. If plowed when wet, they tend to become very cloddy as they dry. As a result of the cloddiness, preparing a good seedbed is difficult. If crop residue is left on the surface, chisel plowing or tilling in the fall generally results in good tilth in the spring.

Pastures should not be grazed during wet periods. Rotation grazing and other measures that prevent overgrazing help to keep the pasture in good condition and increase forage production. Seeding and maintaining legumes, such as alfalfa, red clover, and birdsfoot trefoil, in the grass stand can improve the quality and productivity of the pasture and provide nitrogen for the grasses. Erosion can be controlled by good pasture management. Annual applications of fertilizer can help to keep the pasture productive and maintain a dense stand of grasses and legumes. Lime and fertilizer should be applied according to the results of soil tests.

Yields Per Acre

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

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered *(5)*.

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. 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 *(17)*. Only class and subclass are used in this survey.

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

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

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

Woodland Management and Productivity

Randall Timmons, soil scientist, Piatt County, helped prepare this section.

Hardwood forests originally covered about 8 percent of Piatt County. In 1983, about 6,000 acres in the county, or 2.2 percent of the total acreage, was woodland *(12)*. This acreage included county forest preserves and Allerton Park. Most of the woodland is in areas of the Russell-Sabina-Miami and Sawmill-Tice associations, which are described under the heading "General Soil Map Units."

During the settlement period, most of the trees were cleared from the soils suitable for cultivated crops. As a result, much of the remaining woodland occurs as soils that are unsuitable for cultivation, commonly because they are too steep, are too wet, or are in isolated areas. The wooded soils have fair or good potential for trees of high quality if the best suited species are selected for planting and the woodland is well managed. Generally, the remaining woodland in the uplands supports white oak, red oak, hickory, common hackberry, white ash, and black cherry. Areas on bottom land generally support silver maple, slippery elm, eastern cottonwood, American sycamore, black walnut, and bur oak.

The trees most commonly planted on well drained and moderately well drained soils on terraces and bottom land are eastern white pine, white oak, northern red oak, white ash, sugar maple, and black walnut. The ones most commonly planted on somewhat poorly drained soils are bur oak, eastern white pine, eastern cottonwood, American sycamore, white oak, and European larch. The ones most commonly planted on poorly drained and very poorly drained soils are silver maple, pin oak, green ash, and baldcypress. Also, yellow poplar and European larch are planted in drained areas of these soils.

Much of the commercial woodland can be improved by harvesting mature trees and by removing cull trees and other undesirable trees that retard the growth of the desirable species. Timber management can be planned with the help of a district forester. Woodland owners should apply measures that prevent fires and exclude grazing livestock. Control of competing vegetation is needed if seedlings are planted. Seedlings are planted when current stocking is inadequate, a change of species is needed, or natural seed sources are deficient. A cover of grasses between the rows of seedlings helps to control erosion in the more sloping bare areas. If erosion is excessive or the slope is more than 15 percent, runoff should be diverted away from haul roads and skid trails. Machinery can be used only if the soil is firm enough to support the equipment. On wet soils, a surface drainage system is needed and harvesting may be limited to the drier summer months or to winter months when the ground is frozen.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

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

In table 7, *slight*, *moderate*, and *severe* indicate the degree of the major soil limitations to be considered in management.

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

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

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

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

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

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

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

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

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow (fig. 9). They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

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

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

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the Illinois Department of Conservation, the Soil Conservation Service, or the Cooperative Extension Service or from a commercial nursery.

Figure 9.—A 16-year-old windbreak on Ipava silt loam. Snow drifts on the leeward side of the windbreak.

Recreation

About 1 percent of Piatt County is used for recreational purposes. The recreational land in the county was purposefully set aside. Allerton Park is the busiest recreational area in the county. The park's scenic hiking trails and picnic areas, as well as the 4-H Memorial Camp, attract many visitors each year. Other recreational facilities in scattered areas throughout the county include campgrounds, county forest preserves, city parks, athletic fields, and playgrounds.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

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

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

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

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

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

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

Wildlife Habitat

Loraine Rhode, soil scientist, Piatt County, helped 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 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations 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, and soybeans.

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, 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, ragweed, and foxtail.

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, and blackberry. 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, cordgrass, rushes, sedges, and reeds.

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

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

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

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

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

The kind and abundance of wildlife in Piatt County reflect the soil types, the land uses, and the vegetation. About 47 percent of the soils originally had a seasonal high water table within 1 foot of the surface, and nearly 37 percent had one at or above the surface. The dominant native plants were tall prairie grasses, although areas bordering the Sangamon River and the major creeks were wooded. Because of the influence of the seasonal high water table, the prairie landscape included many wet prairie or marsh plants.

The wildlife species that were formerly abundant include waterfowl, 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 other kinds of wildlife. 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. These changes 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.

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

Wildlife area 1 consists of the Drummer-Flanagan, Flanagan-Dana-Catlin, Dana-Flanagan-Drummer, Drummer-Elburn, and Sable-Ipava associations. The major soils in these associations are nearly level and gently sloping and are poorly drained to moderately well drained. They are on uplands.

This area is mainly cropland. A few small areas are pastured or wooded. The areas along field borders and the minor streams and the pastured areas provide habitat for openland wildlife. The wildlife attracted to this area include coyotes, cottontail rabbits, red fox, pheasant, and many types of songbirds.

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

Wildlife area 2 consists of the Russell-Sabina-Miami and Sawmill-Tice associations. The major soils in these associations are nearly level to very steep and are poorly drained to well drained. Those in the Sawmill-Tice association are subject to flooding.

This area is mainly on bottom land along the major streams. It is cropland, open meadow, woodland, or wetland. The wildlife population is more diverse than that in wildlife area 1. It includes a variety of wetland, woodland, and openland wildlife. Examples are deer, squirrels, raccoons, pheasant, rabbits, muskrat, frogs, snakes, and many types of birds.

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

Engineering

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

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

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

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

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

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

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

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

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

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

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

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

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

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, 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 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

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

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

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

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

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

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

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

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good*, *fair*, or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

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

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

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

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

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

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

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

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

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

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

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

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

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and 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 in the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

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 in the aquifer, and quality of the water as inferred from the salinity of the soil. The depth to bedrock and the content of large stones affect the ease of excavation.

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

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

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

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

Soil Properties

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

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 18.

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

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

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

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

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

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

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

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

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 18.

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

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

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

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

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

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

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

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓ 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. Coarse sands, 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 coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, 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 loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous 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. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

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

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

Soil and Water Features

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

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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

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

If a soil is assigned to two hydrologic groups in table

17, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

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

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

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

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

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

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

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

Engineering Index Test Data

Table 18 shows laboratory test data for 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 *(18)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is 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. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, mesic Typic 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 (16)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (18)*. 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."

Armiesburg Series

The Armiesburg series consists of well drained, moderately permeable soils on flood plains and alluvial fans. These soils formed in silty and loamy alluvium. Slopes range from 0 to 2 percent.

Armiesburg soils commonly are adjacent to the poorly drained Sawmill and somewhat poorly drained Tice soils. The adjacent soils are on bottom land below the Armiesburg soils.

Typical pedon of Armiesburg silt loam, 1,400 feet north and 306 feet west of the southeast corner of sec. 10, T. 19 N., R. 6 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; moderate medium granular structure; friable; few fine roots; few fine accumulations of iron and manganese oxide; medium acid; abrupt smooth boundary.

AB—8 to 14 inches; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; weak fine subangular blocky structure parting to moderate medium granular; friable; few fine roots; few fine accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

Bw1—14 to 22 inches; dark brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

Bw2—22 to 33 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; slightly acid; gradual smooth boundary.

Bw3—33 to 45 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; slightly acid; gradual smooth boundary.

BC—45 to 52 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium subangular blocky structure; friable; few fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

C—52 to 60 inches; yellowish brown (10YR 5/4), stratified silty clay loam, loam, sandy loam, and loamy sand; common medium faint yellowish brown (10YR 5/6) mottles; massive and single grained; friable and loose; few fine accumulations of iron and manganese oxide; few pebbles; slightly acid.

The thickness of the solum ranges from 35 to 52 inches. The Ap or A horizon has value and chroma of 2 or 3. The Bw horizon has chroma of 2 to 4. It is dominantly silty clay loam or silt loam. In some pedons, however, the lower part of this horizon is loam or sandy loam or is stratified with thin layers of loam or sandy loam. The C horizon is loam, sandy loam, silt loam, or sandy clay loam.

Brooklyn Series

The Brooklyn series consists of poorly drained, slowly permeable soils on outwash plains, till plains, and moraines. These soils formed in silty material and in the underlying loamy outwash or till. Slopes range from 0 to 2 percent.

The Brooklyn soils in this county are not characterized by an abrupt textural change, which is definitive for the series. This difference, however, does not significantly affect the use or behavior of the soils.

Brooklyn soils commonly are adjacent to Catlin, Elburn, Flanagan, Ipava, and Plano soils. The adjacent soils are better drained than the Brooklyn soils. They have a mollic epipedon and do not have an E horizon. They are on slight rises above the Brooklyn soils.

Typical pedon of Brooklyn silt loam, 1,960 feet north and 2,120 feet east of the southwest corner of sec. 24, T. 18 N., R. 5 E.

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

Eg—8 to 14 inches; gray (10YR 5/1) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak medium platy structure; friable; few fine roots; few distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; medium acid; clear smooth boundary.

BEg—14 to 18 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films and light gray (10YR 7/1 dry) silt coatings on faces of peds; few fine accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

Btg1—18 to 25 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many distinct very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) clay films on faces of peds; few fine irregular accumulations of iron and manganese oxide; medium acid; gradual smooth boundary.

Btg2—25 to 38 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; firm; few fine roots; many prominent dark gray (10YR 4/1) clay films on faces of peds; few fine rounded accumulations of iron and manganese oxide; neutral; gradual smooth boundary.

Btg3—38 to 46 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

2Btg4—46 to 60 inches; grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6), stratified silt loam and sandy clay loam; weak coarse subangular blocky structure; firm; few distinct very dark gray (10YR 3/1) channel fillings; few fine accumulations of iron and manganese oxide; few pebbles; mildly alkaline.

The thickness of the solum ranges from 40 to 65 inches. The thickness of the overlying silty material ranges from 30 to 54 inches.

The Ap horizon has value of 2 or 3 and chroma of 1 to 3. The Eg horizon has value of 4 to 6 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 loam or silty clay. The 2Btg horizon has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 8. The 2Btg horizon and the 2Cg horizon, if it occurs, are stratified loam, silt loam, silty clay loam, clay loam, sandy clay loam, or sandy loam.

Camden Series

The Camden series consists of well drained soils on outwash plains and stream terraces. These soils formed in loess and in stratified, loamy glacial outwash underlain by loamy sand. Permeability is moderate in the solum and rapid in the underlying sandy material. Slopes range from 1 to 5 percent.

Camden soils are similar to Russell, St. Charles, and Xenia soils and commonly are adjacent to Drummer and Kendall soils. Russell and Xenia soils formed in loess and in the underlying glacial till. St. Charles and Xenia soils are moderately well drained. St. Charles soils do not have glacial outwash within a depth of 40 inches. The poorly drained Drummer soils are in drainageways and depressions below the Camden soils. The somewhat poorly drained Kendall soils are lower on the landscape than the Camden soils.

Typical pedon of Camden silt loam, sandy substratum, 1 to 5 percent slopes, 474 feet north and 306 feet east of the southwest corner of sec. 32, T. 19 N., R. 6 E.

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium platy structure parting to moderate medium granular; friable; few fine roots; strongly acid; abrupt smooth boundary.

Bt1—8 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; common distinct dark brown (10YR 4/3) 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 medium and fine subangular blocky structure; friable; few fine roots; common distinct dark brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

Bt3—25 to 33 inches; dark yellowish brown (10YR 4/4) silty clay loam (estimated 10 percent sand); moderate medium subangular blocky structure; friable; few fine roots; common distinct dark brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; strongly acid; clear smooth boundary.

2Bt4—33 to 40 inches; yellowish brown (10YR 5/4) clay loam; moderate coarse subangular blocky structure; friable; few fine roots; few distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; medium acid; gradual smooth boundary.

2BC—40 to 53 inches; yellowish brown (10YR 5/4) sandy loam; weak coarse subangular blocky structure; very friable; few distinct dark yellowish brown (10YR 4/4) clay films and clay bridges on sand grains; medium acid; gradual smooth boundary.

2C—53 to 60 inches; yellowish brown (10YR 5/6) loamy sand that has a few thin strata of sandy loam; single grained; loose; medium acid.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the silty material ranges from 24 to 40 inches. The content of clay ranges from 27 to 35 percent in the control section.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. Some pedons have an E horizon. The Bt and 2Bt horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. The 2Bt horizon is clay loam, sandy loam, or silt loam. The 2C horizon is dominantly loamy sand, but it has a few thin strata of sandy loam to silt loam.

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 or silty glacial till. Slopes range from 2 to 5 percent.

Catlin soils are similar to Dana, Plano, Proctor, and Saybrook soils and commonly are adjacent to Drummer, Flanagan, Ipava, and Sable soils. Dana and Saybrook soils have glacial till within a depth of 40 inches. Plano soils and the well drained Proctor soils formed in loess and in the underlying glacial outwash. Saybrook soils are more sloping than the Catlin soils. The poorly drained Drummer and Sable soils are on upland flats and in shallow depressions and drainageways below the Catlin soils. The somewhat poorly drained Flanagan and Ipava soils are lower on the landscape than the Catlin soils.

Typical pedon of Catlin silt loam, 2 to 5 percent slopes, 1,010 feet west and 236 feet south of the northeast corner of sec. 28, T. 20 N., R. 6 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; weak medium granular structure; friable; few fine roots; few fine accumulations of iron and manganese oxide; neutral; abrupt smooth boundary.

A—8 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; few fine roots; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

BA—11 to 18 inches; dark brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure parting to moderate medium granular; friable; few fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Bt1—18 to 22 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Bt2—22 to 26 inches; yellowish brown (10YR 5/4) silty clay loam; strong fine subangular blocky structure; friable; few fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; gradual smooth boundary.

Bt3—26 to 35 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable; few fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; gradual smooth boundary.

Bt4—35 to 46 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and common fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

2BC—46 to 60 inches; brown (10YR 5/3) clay loam; common medium distinct yellowish brown (10YR 5/6) and few fine distinct light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; firm; few fine roots; few fine accumulations of iron and manganese oxide; common pebbles; mildly alkaline; clear smooth boundary.

2C—60 to 62 inches; brown (10YR 5/3) loam; common fine distinct yellowish brown (10YR 5/6) and few fine distinct light brownish gray (10YR 6/2) mottles; massive; firm; few fine accumulations of iron and manganese oxide; common pebbles; slight effervescence; mildly alkaline.

The thickness of the solum and the depth to free carbonates range from 45 to 60 inches. The mollic epipedon is 10 to 13 inches thick. The loess ranges from 40 to 60 inches in thickness. The content of clay ranges from 27 to 35 percent in the control section.

The Ap horizon has value and chroma of 2 or 3. The BA horizon and the AB horizon, if it occurs, have value and chroma of 3 or 4. The 2BC horizon is silt loam, clay loam, or silty clay loam.

Dana Series

The Dana series consists of moderately well drained soils on till plains and moraines. These soils formed in loess and in the underlying calcareous, loamy glacial till. They are moderately permeable in the upper part and moderately slowly permeable in the lower part. Slopes range from 2 to 5 percent.

Dana soils are similar to Catlin, Parr, Plano, Proctor, and Saybrook soils and commonly are adjacent to Drummer, Flanagan, and Saybrook soils. Catlin soils do not have glacial till within a depth of 40 inches. Parr soils formed in glacial till in areas where the loess is less than 20 inches thick. Plano soils and the well drained Proctor soils formed in loess and in the underlying outwash. Saybrook soils are on the more sloping side slopes below the Dana soils. The poorly drained Drummer soils are on upland flats and in shallow depressions and drainageways. The somewhat poorly drained Flanagan soils are lower on the landscape than the Dana soils.

Typical pedon of Dana silt loam, 2 to 5 percent slopes, 2,100 feet south and 200 feet west of the northeast corner of sec. 2, T. 18 N., R. 6 E.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

A—6 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium and fine granular structure; friable; common fine roots; slightly acid; clear smooth boundary.

BA—12 to 16 inches; dark brown (10YR 4/3) silt loam; moderate very fine subangular structure; friable; common fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt1—16 to 24 inches; dark brown (10YR 4/3) silty clay loam; few fine faint yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; common fine roots; many distinct dark brown (10YR 4/3) clay films on faces of peds and few very dark grayish brown (10YR 3/2) channel fillings; medium acid; clear smooth boundary.

Bt2—24 to 33 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint yellowish brown (10YR 5/6) and few fine faint pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable; common fine roots; common distinct dark brown (10YR 4/3) clay films on faces of peds; common fine accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

2Bt3—33 to 44 inches; dark brown (10YR 4/3) clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; few pebbles; neutral; gradual smooth boundary.

2BC—44 to 55 inches; yellowish brown (10YR 5/4) clay loam; few fine faint yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; few pebbles; neutral; gradual smooth boundary.

2C—55 to 60 inches; yellowish brown (10YR 5/4) loam; few fine faint yellowish brown (10YR 5/6) mottles; massive; firm; few pebbles; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 48 to 55 inches. The mollic epipedon is 10 to 14 inches thick. The thickness of the loess ranges from 22 to 40 inches. The depth to free carbonates ranges from 40 to 60 inches. The content of clay ranges from 27 to 35 percent in the control section. The 2Bt horizon has value of 4 or 5 and chroma of 3 or 4.

Drummer Series

The Drummer series consists of poorly drained, moderately permeable soils on outwash plains and till plains. These soils formed in silty material and in the underlying stratified, loamy material. Slopes range from 0 to 2 percent.

Drummer soils are similar to Hartsburg, Pella, and Sable soils and commonly are adjacent to Elburn, Flanagan, Hartsburg, and Ipava soils. Hartsburg and Pella soils have carbonates within a depth of 40 inches. Sable soils formed entirely in loess. The somewhat poorly drained Elburn, Flanagan, and Ipava soils are higher on the landscape than the Drummer soils. They have an argillic horizon.

Typical pedon of Drummer silty clay loam, 222 feet north and 216 feet west of the southeast corner of sec. 21, T. 18 N., R. 6 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate fine granular structure; friable; few fine roots; medium acid; abrupt smooth boundary.

A—8 to 16 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate fine subangular blocky structure; friable; few fine roots; few fine accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

Bg1—16 to 22 inches; olive gray (5Y 5/2) silty clay loam; few fine prominent yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; few fine roots; common faint very dark gray (10YR 3/1) organic coatings and common faint dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Bg2—22 to 29 inches; olive gray (5Y 5/2) silty clay loam; few medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; few faint very dark gray (10YR 3/1) organic coatings and many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Bg3—29 to 35 inches; olive gray (5Y 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/6) and few fine faint gray (5Y 5/1) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; mildly alkaline; clear smooth boundary.

Bg4—35 to 44 inches; olive gray (5Y 5/2) silty clay loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; few faint dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; mildly alkaline; clear smooth boundary.

2BCg—44 to 51 inches; gray (5Y 5/1) loam; common fine prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; few fine accumulations of iron and manganese oxide; mildly alkaline; clear smooth boundary.

2Cg—51 to 60 inches; gray (5Y 5/1), stratified sandy loam and loam; few fine prominent yellowish brown (10YR 5/6) mottles; single grained; loose; very slight effervescence; moderately alkaline.

The thickness of the solum ranges from 42 to 65 inches. The mollic epipedon is 11 to 19 inches thick. The thickness of the overlying silty material ranges from 40 to 60 inches. The depth to free carbonates ranges from 40 to 65 inches. The content of clay ranges from 27 to 35 percent in the control section.

The Ap and A horizons have value of 2 or 3. The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 to 3. The 2BCg horizon has hue of 10YR, 2.5Y, or 5Y, value of 5 or 6, and chroma of 1 or 2. It is loam, clay loam, or silt loam. The 2Cg horizon is stratified loam, sandy loam, or silty clay loam.

Elburn Series

The Elburn series consists of somewhat poorly drained soils on outwash plains. These soils formed in loess or other silty material and in the underlying stratified, loamy and silty outwash. Permeability is moderate in the upper part of the profile and moderately rapid in the lower part. Slopes range from 0 to 2 percent.

Elburn soils are similar to Flanagan and Ipava soils and commonly are adjacent to Drummer and Plano soils. Flanagan and Ipava soils have more clay in the subsoil than the Elburn soils. Flanagan soils formed in loess and in the underlying glacial till, and Ipava soils formed entirely in loess. The poorly drained Drummer soils are on upland flats and in shallow depressions and drainageways below the Elburn soils. The moderately well drained Plano soils are higher on the landscape than the Elburn soils.

Typical pedon of Elburn silt loam, 642 feet south and 1,070 feet west of the center of sec. 14, T. 17 N., R. 4 E.

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

A—8 to 12 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate fine granular structure; friable; few fine roots; neutral; clear smooth boundary.

BA—12 to 18 inches; dark brown (10YR 4/3) silty clay loam; common fine faint dark grayish brown (10YR 4/2) mottles; weak fine subangular blocky structure parting to moderate medium granular; friable; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt1—18 to 26 inches; brown (10YR 5/3) silty clay loam; few fine distinct yellowish brown (10YR 5/6) and common fine distinct light brownish gray (10YR 6/2) mottles; moderate fine subangular blocky structure; friable; few fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

Bt2—26 to 33 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint yellowish brown (10YR 5/6) and common fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; medium acid; gradual smooth boundary.

Bt3—33 to 41 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint yellowish brown (10YR 5/6) and common fine distinct light brownish gray (10YR 6/2) mottles; moderate medium angular blocky structure; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt4—41 to 45 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint yellowish brown (10YR 5/6) and distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few distinct brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; mildly alkaline; clear smooth boundary.

2BC—45 to 60 inches; yellowish brown (10YR 5/4), stratified sandy loam and silt loam; common medium faint yellowish brown (10YR 5/6) and common fine distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few faint brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; mildly alkaline.

The thickness of the solum ranges from 48 to 65 inches. The mollic epipedon is 10 to 15 inches thick. The thickness of the overlying silty material ranges from 40 to 60 inches. The depth to free carbonates ranges from 45 to 65 inches. The content of clay ranges from 27 to 35 percent in the control section.

The Ap and A horizons have value of 2 or 3. The Bt horizon has value of 4 or 5. The 2BC horizon has hue of 10YR or 2.5Y. It is silt loam, sandy loam, or stratified sandy loam and silt loam.

Flanagan Series

The Flanagan series consists of somewhat poorly drained soils on till plains and moraines. These soils formed in loess and in the underlying loamy or silty glacial till. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. Slopes range from 0 to 2 percent.

Flanagan soils are similar to Elburn, Ipava, and Sunbury soils and commonly are adjacent to Catlin, Dana, and Drummer soils. Elburn soils have less clay in the subsoil than the Flanagan soils and formed in loess and glacial outwash. Ipava soils formed entirely in loess. Sunbury soils have a dark surface soil that is thinner than that of the Flanagan soils. The moderately well drained Catlin and Dana soils are higher on the landscape than the Flanagan soils. The poorly drained Drummer soils are on upland flats and in shallow depressions and drainageways below the Flanagan soils.

Typical pedon of Flanagan silt loam, 582 feet south and 102 feet west of the northeast corner of sec. 4, T. 18 N., R. 6 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate medium granular structure; friable; few fine roots; few fine accumulations of iron and manganese oxide; strongly acid; abrupt smooth boundary.

AB—8 to 12 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak medium subangular blocky structure parting to moderate medium granular; friable; few fine roots; few fine accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

Bt1—12 to 17 inches; brown (10YR 5/3) silty clay loam; few fine distinct yellowish brown (10YR 5/6) and few fine faint light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; many distinct dark grayish brown (10YR 4/2) clay films and common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt2—17 to 26 inches; brown (10YR 5/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and many fine faint light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Bt3—26 to 38 inches; light olive brown (2.5Y 5/4) silty clay loam; common fine distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; gradual smooth boundary.

Bt4—38 to 42 inches; light olive brown (2.5Y 5/4) silty clay loam; common fine distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable;

few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

2BC—42 to 48 inches; light olive brown (2.5Y 5/4) clay loam; few medium distinct light brownish gray (10YR 6/2) and few coarse distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; few pebbles; mildly alkaline; clear smooth boundary.

2C—48 to 60 inches; light olive brown (2.5Y 5/4) loam; common medium distinct light brownish gray (10YR 6/2) and few medium distinct yellowish brown (10YR 5/6) mottles; massive; firm; few fine accumulations of iron and manganese oxide; few pebbles; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 44 to 60 inches. The mollic epipedon is 11 to 16 inches thick. The thickness of the loess ranges from 40 to 60 inches. The depth to carbonates ranges from 44 to 58 inches. The content of clay ranges from 35 to 42 percent in the control section.

The Ap or A 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 2 to 6. The 2BC horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. It is silt loam or clay loam. The 2C horizon is loam, clay loam, or silt loam.

Harpster Series

The Harpster series consists of poorly drained, moderately permeable soils in depressions on outwash plains and till plains. These soils formed in loess over loamy or silty material. Slopes range from 0 to 2 percent.

Harpster soils are similar to Hartsburg soils and commonly are adjacent to Drummer, Hartsburg, Flanagan, Ipava, and Sable soils. Drummer, Hartsburg, and Sable soils do not have carbonates within a depth of 20 inches. They are in landscape positions similar to those of the Harpster soils. The somewhat poorly drained Flanagan and Ipava soils are on slight rises above the Harpster soils.

Typical pedon of Harpster silty clay loam, 2,000 feet north and 580 feet west of the southeast corner of sec. 10, T. 18 N., R. 6 E.

Akp—0 to 9 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak coarse granular structure; friable; few fine roots; few snail shell fragments; violent effervescence; moderately alkaline; abrupt smooth boundary.

Ak—9 to 15 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate medium granular structure; friable; few medium roots; few snail shell fragments; violent effervescence; moderately alkaline; clear smooth boundary.

Bkg—15 to 23 inches; dark gray (10YR 4/1) silty clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; moderate fine subangular blocky structure; friable; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few snail shell fragments; violent effervescence; mildly alkaline; clear smooth boundary.

Bg1—23 to 29 inches; olive gray (5Y 4/2) silty clay loam; few fine prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; many distinct dark gray (5Y 3/1) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; few snail shell fragments; slight effervescence; mildly alkaline; clear smooth boundary.

Bg2—29 to 33 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; moderate coarse and medium subangular blocky structure; friable; few fine roots; common distinct grayish brown (2.5Y 3/2) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; strong effervescence; mildly alkaline; clear smooth boundary.

BCg—33 to 37 inches; light brownish gray (2.5Y 6/2) silt loam; many medium prominent yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; few fine roots; few fine accumulations of iron and manganese oxide; strong effervescence; mildly alkaline; gradual smooth boundary.

Cg—37 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; many medium prominent yellowish brown (10YR 5/8) mottles; massive; friable; few fine roots; few fine accumulations of iron and manganese oxide; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 25 to 45 inches. The mollic epipedon is 10 to 16 inches thick. The depth to free carbonates ranges from 0 to 8 inches.

The Akp and Ak horizons have value of 2 or 3. They are silty clay loam or silt loam. The Bkg and Bg horizons have hue of 10YR, 2.5Y, or 5Y and value of 4 to 6. They are silty clay loam in the upper part and silt loam, silty clay loam, or loam in the lower part. The Cg horizon is silt loam, loam, or clay loam.

Hartsburg Series

The Hartsburg series consists of poorly drained, moderately permeable soils on outwash plains and till plains. 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 Catlin, Ipava, and Sable soils. Drummer and Sable soils do not have carbonates within a depth of 40 inches. Sable soils are slightly higher on the landscape than the Hartsburg soils. Harpster soils have carbonates within a depth of 16 inches. Pella soils formed in loess and in the underlying outwash. Catlin and Ipava soils are in the higher or more sloping areas.

Typical pedon of Hartsburg silty clay loam, 384 feet east and 1,870 feet south of the northwest corner of sec. 14, T. 20 N., R. 5 E.

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine angular blocky structure; firm; few medium roots; neutral; abrupt smooth boundary.

A—7 to 17 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak fine subangular blocky structure parting to moderate fine granular; friable; few medium roots; neutral; clear smooth boundary.

Bg—17 to 24 inches; dark gray (10YR 4/1) silty clay loam; common medium distinct yellowish brown (10YR 5/8) and few fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; few medium roots; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; mildly alkaline; abrupt smooth boundary.

BCkg—24 to 30 inches; olive gray (5Y 5/2) silt loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few medium roots; many fine irregular concretions of calcium carbonate; violent effervescence; mildly alkaline; abrupt smooth boundary.

Cg—30 to 60 inches; light olive gray (5Y 6/2) silt loam; common medium prominent yellowish brown (10YR 5/8) and common fine prominent yellowish brown (10YR 5/6) mottles; massive; friable; common medium and fine irregular concretions of calcium carbonate; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 47 inches. The mollic epipedon is 14 to 20 inches thick. The depth to free carbonates ranges from 16 to 30 inches. The content of clay ranges from 25 to 35 percent in the control section. The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 to 5, and chroma of 1 or 2.

Ipava Series

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

Ipava soils are similar to Elburn and Flanagan soils and commonly are adjacent to Catlin and Sable soils. Elburn soils have less clay in the subsoil than the Ipava soils and formed in loess and glacial outwash. Catlin and Flanagan soils formed in loess and in the underlying glacial till. The moderately well drained Catlin soils are higher on the landscape than the Ipava soils. The poorly drained Sable soils are on upland flats and in shallow depressions and drainageways below the Ipava soils.

Typical pedon of Ipava silt loam, 468 feet north and 2,580 feet east of the southwest corner of sec. 24, T. 19 N., R. 5 E.

Ap—0 to 9 inches; black (10YR 2/1) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; few medium roots; medium acid; abrupt smooth boundary.

A—9 to 15 inches; black (10YR 2/1) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; few medium roots; medium acid; clear smooth boundary.

BA—15 to 20 inches; brown (10YR 4/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; friable; few medium roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; common medium rounded concretions of iron and manganese oxide; medium acid; clear smooth boundary.

Bt—20 to 27 inches; dark grayish brown (10YR 4/2) silty clay; common medium distinct yellowish brown (10YR 5/6) and few fine distinct light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; friable; few medium roots; many distinct very dark gray (10YR 3/1) clay films on faces of peds; common medium rounded concretions of iron and manganese oxide; slightly acid; clear smooth boundary.

Btg—27 to 34 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/8 and 5/6) mottles; moderate medium subangular blocky structure; friable; few medium roots; common distinct very dark gray (10YR 3/1) clay films on faces of peds; common medium rounded concretions of iron and manganese oxide; neutral; clear smooth boundary.

BCg—34 to 44 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium prominent light olive gray (5Y 6/2) and common medium prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; few medium roots; few distinct dark gray (10YR 4/1) clay films on faces of peds and few distinct very dark grayish brown (10YR 3/1) organic coatings lining channels; common medium rounded concretions of iron and manganese oxide; mildly alkaline; clear smooth boundary.

Cg—44 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; many coarse prominent yellowish brown (10YR 5/8) mottles; massive; friable; few medium roots; few distinct dark gray (10YR 4/1) clay films on vertical faces of channels; common medium rounded concretions of iron and manganese oxide; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 55 inches. The mollic epipedon is 10 to 16 inches thick. The depth to free carbonates ranges from 40 to 50 inches. The content of clay ranges from 35 to 42 percent in the control section.

The Ap and A horizons have value of 2 or 3 and chroma of 1 or 2. They are dominantly silt loam, but in some pedons the lower part is silty clay loam. The Bt and Btg horizons have value of 4 to 6 and chroma of 2 to 4.

Kendall Series

The Kendall series consists of somewhat poorly drained soils on outwash plains. These soils formed in loess and in loamy outwash underlain by loamy sand. Permeability is moderate in the solum and rapid in the underlying sandy material. Slopes range from 0 to 2 percent.

Kendall soils are similar to Sabina soils and commonly are adjacent to Camden, Drummer, and St. Charles soils. Sabina soils have more clay in the subsoil than the Kendall soils and formed in loess and in the underlying glacial till. The well drained Camden and St. Charles soils are higher on the landscape than the Kendall soils. The poorly drained Drummer soils are in drainageways and depressions below the Kendall soils.

Typical pedon of Kendall silt loam, sandy substratum, 1,820 feet north and 1,600 feet east of the southwest corner of sec. 32, T. 19 N., R. 6 E.

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

E—8 to 11 inches; brown (10YR 5/3) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable; common fine roots; few fine accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

BE—11 to 14 inches; brown (10YR 5/3) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium and fine subangular blocky structure; firm; common fine roots; few fine accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

Bt1—14 to 22 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct grayish brown (10YR 5/2) mottles; moderate fine prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

Bt2—22 to 33 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and common fine faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; many medium accumulations of iron and manganese oxide; slightly acid; gradual smooth boundary.

Bt3—33 to 44 inches; mottled yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) silty clay loam; moderate coarse subangular blocky structure; friable; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on vertical faces of peds; few fine rounded concretions of iron and manganese oxide; few pebbles; slightly acid; clear smooth boundary.

2BC—44 to 52 inches; mottled gray (10YR 5/1), brown (10YR 5/3), and yellowish brown (10YR 5/6) sandy clay loam; weak coarse subangular blocky structure; very friable; common pebbles; neutral; gradual smooth boundary.

2C—52 to 60 inches; mottled yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) loamy sand; few thin strata of sandy loam; single grained; loose; common pebbles and few cobbles; neutral.

The thickness of the solum ranges from 45 to 70 inches. The thickness of the loess ranges from 40 to 60 inches. The depth to free carbonates ranges from 50 to 65 inches. The content of clay ranges from 27 to 35 percent in the control section.

The Ap horizon has value of 4 or 5 and chroma of 1 or 2. The E horizon has value of 4 to 7 and chroma of 2 or 3. The BE horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. The Bt horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 to 6. The 2BC horizon is loam, clay loam, silt loam, sandy loam, or sandy clay loam. The 2C horizon is dominantly loamy sand, but it has a few thin strata of sandy loam, loam, or silt loam.

Miami Series

The Miami series consists of well drained soils on till plains. These soils formed in loamy glacial till. They are moderately permeable in the solum and moderately slowly permeable in the underlying material. Slopes range from 5 to 50 percent.

Miami soils are similar to Russell soils and commonly are adjacent to Drummer, Russell, Sawmill, and Xenia soils. Russell soils and the moderately well drained Xenia soils are higher on the landscape than the Miami soils. Also, they formed in a thicker layer of loess and in the underlying loamy glacial till. The poorly drained Drummer soils are in drainageways and depressions below the Miami soils. The poorly drained Sawmill soils are on the bottom land below the Miami soils.

Typical pedon of Miami loam, 5 to 10 percent slopes, eroded, 1,070 feet east and 610 feet north of the southwest corner of sec. 25, T. 16 N., R. 6 E.

Ap—0 to 5 inches; mixed dark brown (10YR 4/3) and yellowish brown (10YR 5/4) loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure parting to moderate medium granular; friable; few fine roots; few pebbles; slightly acid; abrupt smooth boundary.

Bt1—5 to 12 inches; yellowish brown (10YR 5/4) clay loam; many fine faint yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; firm; few fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; common fine accumulations of iron and manganese oxide; common pebbles; slightly acid; gradual smooth boundary.

Bt2—12 to 28 inches; yellowish brown (10YR 5/4) clay loam; common fine distinct pale brown (10YR 6/3) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few fine roots; few distinct brown (10YR 5/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; few pebbles; neutral; clear smooth boundary.

BC—28 to 36 inches; yellowish brown (10YR 5/4) clay loam; common fine faint brown (10YR 5/3) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few fine accumulations of iron and manganese oxide; few pebbles; slight effervescence; moderately alkaline; clear smooth boundary.

C—36 to 60 inches; yellowish brown (10YR 5/4) loam; few fine faint brown (10YR 5/3) and common fine faint yellowish brown (10YR 5/6) mottles; massive; very firm; few fine accumulations of iron and manganese oxide; common pebbles; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 42 inches. The content of clay ranges from 25 to 35 percent in the control section.

The Ap horizon has value of 4 or 5 and chroma of 1 to 3. It is dominantly loam, but it is silt loam in areas that have a mantle of loess. Some pedons have an E horizon. This horizon is silt loam or loam. The Bt horizon and the 2Bt horizon, if it occurs, have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. They are clay loam, loam, sandy clay loam, or silty clay loam. The C horizon is loam or clay loam.

Parr Series

The Parr series consists of well drained soils on moraines and till plains. These soils formed in a thin mantle of loess and in the underlying calcareous, loamy glacial till. They are moderately permeable in the upper part and moderately slowly permeable in the lower part. Slopes range from 5 to 10 percent.

The Parr soils in this county have a dark surface layer that is thinner than is definitive for the series and contain more clay in the lower part of the subsoil. These differences, however, do not significantly affect the use or behavior of the soils.

Parr soils are similar to Dana soils and commonly are adjacent to Dana, Drummer, and Flanagan soils. The moderately well drained Dana soils are higher on the landscape than the Parr soils. Also, they have less sand in the control section. The poorly drained Drummer soils are in drainageways and depressions below the Parr soils. The somewhat poorly drained Flanagan soils are on the broader ridges.

Typical pedon of Parr loam, 5 to 10 percent slopes, eroded, 1,100 feet north and 2,120 feet west of the southeast corner of sec. 10, T. 17 N., R. 5 E.

Ap—0 to 7 inches; mixed dark brown (10YR 3/3) and yellowish brown (10YR 5/4) loam, brown (10YR 5/3) dry; weak medium subangular blocky structure parting to moderate medium granular; friable; few fine roots; few pebbles; medium acid; abrupt smooth boundary.

Bt1—7 to 19 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable; few fine roots; few distinct dark brown (10YR 3/3) and common distinct brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; common pebbles; slightly acid; clear smooth boundary.

Bt2—19 to 24 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable; few fine roots; common distinct dark brown (10YR 3/3) and brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; common pebbles; slightly acid; clear smooth boundary.

BC—24 to 31 inches; yellowish brown (10YR 5/4) clay loam; weak coarse subangular blocky structure; firm; few fine roots; few distinct dark brown (10YR 3/3) channel fillings and few distinct brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; common pebbles; mildly alkaline; clear smooth boundary.

C—31 to 60 inches; yellowish brown (10YR 5/4) loam; massive; firm; few fine roots; few fine accumulations of iron and manganese oxide; common pebbles; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 35 inches. The dark surface layer is 5 to 10 inches thick. The overlying silty material is 0 to 8 inches thick. The depth to free carbonates ranges from 24 to 32 inches. The content of clay ranges from 20 to 30 percent in the control section.

The Ap horizon has chroma of 2 or 3. It is silt loam or loam. The Bt horizon and the 2Bt horizon, if it occurs, have value of 4 or 5.

Pella Series

The Pella series consists of poorly drained, moderately permeable soils on outwash plains and till plains. These soils formed in loess and in the underlying loamy sediments. Slopes range from 0 to 2 percent.

Pella soils are similar to Drummer, Hartsburg, and Sable soils and commonly are adjacent to Catlin, Drummer, Elburn, and Flanagan soils. Drummer and Sable soils do not have carbonates within a depth of 40 inches. Drummer soils are slightly higher on the landscape than the Pella soils. Hartsburg soils formed entirely in loess. Catlin, Elburn, and Flanagan soils have an argillic horizon. They are higher on the landscape than the Pella soils.

Typical pedon of Pella silty clay loam, 2,080 feet north and 600 feet west of the southeast corner of sec. 36, T. 18 N., R. 6 E.

Ap—0 to 10 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak medium granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

Bg1—10 to 16 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few fine distinct light olive brown (2.5Y 5/4) mottles; weak medium subangular blocky structure; friable; common fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; clear smooth boundary.

Bg2—16 to 26 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct light olive brown (2.5Y 5/4) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; few distinct dark grayish brown (2.5Y 4/2) clay films and common thin very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common pebbles; mildly alkaline; clear smooth boundary.

Bkg—26 to 54 inches; grayish brown (2.5Y 5/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few fine roots; few distinct dark grayish brown (2.5Y 4/2) clay films on vertical faces of peds; common medium accumulations of calcium carbonate; many pebbles; strong effervescence; moderately alkaline; gradual smooth boundary.

2Cg—54 to 60 inches; light brownish gray (2.5Y 6/2) loam; common medium prominent yellowish brown (10YR 5/6) mottles; massive; firm; few fine accumulations of calcium carbonate; many pebbles; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 30 to 54 inches. The thickness of the overlying silty material ranges from 48 to 58 inches. The depth to free carbonates ranges from 20 to 40 inches. The mollic epipedon ranges from 10 to 23 inches in thickness.

The Ap horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. It is typically silty clay loam but is silt loam in some pedons. The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. The Bkg horizon has hue of 5Y, 2.5Y, or 10YR, value of 5 or 6, and chroma of 1 to 8.

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 silty and clayey sediments derived from the surrounding areas. Slopes range from 0 to 2 percent.

Peotone soils commonly are adjacent to Catlin, Dana, Flanagan, and Ipava soils. The adjacent soils are better drained than the Peotone soils and are higher on the landscape.

Typical pedon of Peotone silty clay loam, 600 feet south and 2,380 feet west of the northeast corner of sec. 30, T. 17 N., R. 5 E.

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and medium granular structure; friable; few fine roots; medium acid; abrupt smooth boundary.

A—7 to 10 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; few fine roots; slightly acid; clear smooth boundary.

AB—10 to 18 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; firm; few fine roots; neutral; clear smooth boundary.

Bw—18 to 25 inches; very dark gray (10YR 3/1) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; many distinct black (10YR 2/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bg1—25 to 33 inches; very dark gray (10YR 3/1) silty clay loam; common fine prominent grayish brown (2.5Y 5/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; many distinct black (10YR 2/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bg2—33 to 40 inches; olive gray (5Y 5/2) silty clay loam; common fine distinct light brownish gray (2.5Y 6/2) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

BCg—40 to 53 inches; gray (5Y 5/1) silty clay loam; common fine distinct light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; firm; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Cg—53 to 60 inches; light gray (5Y 6/1) silty clay loam; many fine prominent yellowish brown (10YR 5/6) and common fine distinct dark gray (5Y 4/1) mottles; massive; firm; few fine roots; few fine accumulations of iron and manganese oxide; mildly alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 24 to 36 inches. The content of clay ranges from 35 to 42 percent in the control section.

The Ap and A horizons have value of 2 or 3. The Bg horizon has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 3 or 4 in the upper part and value of 4 to 6 in the lower part. It has chroma of 0 to 2 throughout. The BCg horizon has hue of 2.5Y or 5Y or is neutral in hue. It has value of 4 or 5 and chroma of 0 or 1.

Plano Series

The Plano series consists of moderately well drained, moderately permeable soils on outwash plains. These soils formed in loess and in the underlying loamy outwash. Slopes range from 1 to 5 percent.

Plano soils are similar to Catlin, Dana, Proctor, and Saybrook soils and commonly are adjacent to Drummer and Elburn soils. Catlin, Dana, and Saybrook soils formed in loess and glacial till. The well drained Proctor soils have outwash within a depth of 40 inches. The poorly drained Drummer soils are on upland flats and in shallow depressions and drainageways below the Plano soils. The somewhat poorly drained Elburn soils are lower on the landscape than the Plano soils.

Typical pedon of Plano silt loam, 1 to 5 percent slopes, 174 feet north and 1,120 feet west of the southeast corner of sec. 19, T. 21 N., R. 6 E.

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

BA—11 to 17 inches; brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; clear smooth boundary.

Bt1—17 to 22 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine subangular blocky structure parting to moderate medium granular; friable; few fine roots; many distinct dark brown

(10YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

Bt2—22 to 35 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; many distinct dark brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Bt3—35 to 48 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; friable; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

2Bt4—48 to 59 inches; yellowish brown (10YR 5/4) sandy clay loam; weak coarse subangular blocky structure; friable; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine accumulations of iron and manganese oxide; few pebbles; mildly alkaline; clear smooth boundary.

2C—59 to 63 inches; yellowish brown (10YR 5/4) sandy loam; single grained; loose; few fine accumulations of iron and manganese oxide; few pebbles; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 54 to 65 inches. The mollic epipedon is 10 to 16 inches thick. The loess ranges from 40 to 55 inches in thickness. The content of clay ranges from 27 to 35 percent in the control section.

The Bt horizon has chroma of 3 or 4. It is dominantly silty clay loam, but in some pedons the lower part is silt loam. The 2Bt horizon has value of 4 or 5. It is sandy clay loam, clay loam, or stratified sandy loam and loam. The 2C horizon is sandy loam or stratified sandy loam and silt loam.

Proctor Series

The Proctor series consists of well drained soils on outwash plains. These soils formed in loess and in the underlying loamy outwash. They are underlain by loamy sand. Permeability is moderate in the upper part of the solum, moderately rapid in the lower part, and rapid in the underlying material. Slopes range from 2 to 10 percent.

Proctor soils are similar to Dana and Plano soils and commonly are adjacent to Drummer and Elburn soils. The moderately well drained Dana soils formed in loess and in the underlying loamy glacial till. The moderately well drained Plano soils are in areas where the loess is more than 40 inches thick. The poorly drained Drummer soils are in drainageways and slight depressions below the Proctor soils. The somewhat poorly drained Elburn soils are lower on the landscape than the Proctor soils.

Typical pedon of Proctor silt loam, sandy substratum, 2 to 5 percent slopes, 1,520 feet west and 528 feet north of the center of sec. 14, T. 20 N., R. 6 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; few fine roots; neutral; abrupt smooth boundary.

A—8 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; few fine roots; neutral; clear smooth boundary.

Bt1—12 to 17 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings and common distinct dark brown (10YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

Bt2—17 to 28 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; neutral; clear smooth boundary.

2Bt3—28 to 34 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable; few fine roots; few distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few pebbles in the lower part; slightly acid; clear smooth boundary.

2BC—34 to 44 inches; yellowish brown (10YR 5/4) sandy loam; weak medium subangular blocky structure; friable; few fine roots; few distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few pebbles; neutral; clear smooth boundary.

2C—44 to 60 inches; yellowish brown (10YR 5/4) loamy sand; few thin strata of sandy loam; single grained; loose; neutral.

The thickness of the solum ranges from 40 to 60 inches. The mollic epipedon is 10 to 16 inches thick. The thickness of the loess ranges from 21 to 36 inches. The content of clay ranges from 25 to 35 percent in the control section.

The Ap and A horizons have chroma of 2 or 3. The Bt and 2Bt horizons have value of 4 or 5. The 2Bt horizon is sandy clay loam or clay loam. The 2BC horizon has value of 4 or 5 and chroma of 3 or 4. It is sandy loam, sandy clay loam, or stratified sandy loam and loamy sand. The 2C horizon is stratified loamy sand and sandy loam.

Proctor silt loam, sandy substratum, 5 to 10 percent slopes, eroded, has a dark surface layer that is thinner than is definitive for the series. This difference, however, does not significantly affect the use or behavior of the soil.

Radford Series

The Radford series consists of somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in silty recent alluvium over an older buried soil. Slopes range from 0 to 2 percent.

Radford soils commonly are adjacent to Sawmill soils. The poorly drained Sawmill soils are on bottom land below the Radford soils.

Typical pedon of Radford silt loam, 153 feet south and 770 feet east of the northwest corner of sec. 16, T. 19 N., R. 6 E.

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium platy structure parting to weak fine granular; friable; few fine roots; neutral; clear smooth boundary.

A2—6 to 17 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; gradual smooth boundary.

C—17 to 33 inches; very dark grayish brown (10YR 3/2) silt loam; few brown (10YR 4/2) and grayish brown (10YR 5/2) strata; moderate medium subangular blocky structure; friable; few fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Ab1—33 to 45 inches; black (10YR 2/1) silt loam; moderate medium subangular blocky structure; friable; few fine roots; few fine accumulations of iron and manganese oxide; few pebbles; neutral; gradual smooth boundary.

Ab2—45 to 60 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak coarse subangular blocky structure; firm; few fine roots; few pebbles; neutral.

The thickness of the recent alluvium ranges from 20 to 40 inches. The mollic epipedon is 10 to 20 inches thick.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The C horizon has value of 2 to 6 and chroma of 1 or 2. The Ab horizon has value of 2 or 3.

Russell Series

The Russell series consists of well drained, moderately permeable soils on till plains. These soils formed in loess and in the underlying loamy glacial till. Slopes range from 2 to 10 percent.

Russell soils are similar to Xenia soils and commonly are adjacent to Drummer, Miami, and Sabina soils. The moderately well drained Xenia soils have mottles in the upper part of the argillic horizon. The poorly drained Drummer soils are in drainageways and depressions below the Russell soils. They formed in loess and in the underlying stratified, loamy outwash. Miami soils are on side slopes below the Russell soils. The somewhat poorly drained Sabina soils are lower on the landscape than the Russell soils.

Typical pedon of Russell silt loam, 2 to 5 percent slopes, 1,880 feet north and 2,210 feet west of the southeast corner of sec. 36, T. 20 N., R. 6 E.

Ap—0 to 5 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

E—5 to 7 inches; dark brown (10YR 4/3) silt loam; moderate thin platy structure; friable; few fine roots; slightly acid; clear smooth boundary.

Bt1—7 to 15 inches; yellowish brown (10YR 5/4) silty clay loam; strong fine subangular blocky structure; friable; few fine roots; many distinct dark brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

Bt2—15 to 25 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine accumulations of iron and manganese oxide; strongly acid; gradual smooth boundary.

Bt3—25 to 34 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine accumulations of iron and manganese oxide; strongly acid; clear smooth boundary.

2Bt4—34 to 48 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable; few fine roots; few distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine accumulations of iron and manganese oxide; few pebbles; medium acid; gradual smooth boundary.

2BC—48 to 58 inches; yellowish brown (10YR 5/4) loam; weak coarse subangular blocky structure; friable; few fine roots; few fine accumulations of iron and manganese oxide; few pebbles; medium acid; clear smooth boundary.

2C—58 to 60 inches; yellowish brown (10YR 5/4) loam; few fine faint yellowish brown (10YR 5/6) and distinct pale brown (10YR 6/3) mottles; massive; firm; few fine accumulations of iron and manganese oxide; few pebbles; medium acid.

The thickness of the solum ranges from 47 to 65 inches. The thickness of the loess ranges from 25 to 34 inches. The content of clay ranges from 23 to 33 percent in the control section.

The Ap horizon has chroma of 3 or 4. The Bt horizon has value of 4 or 5. The 2C horizon is loam or clay loam.

Sabina Series

The Sabina series consists of somewhat poorly drained, moderately slowly permeable soils on till plains. These soils formed in loess and in the underlying loamy or silty glacial till. Slopes range from 0 to 2 percent.

Sabina soils are similar to Kendall soils and commonly are adjacent to Drummer, Sunbury, and Xenia soils. Kendall soils formed in loess and in the underlying sandy and loamy outwash. The poorly drained Drummer soils formed in loess and stratified, loamy outwash in depressions and drainageways below the Sabina soils. Sunbury soils have a surface layer that is darker than that of the Sabina soils. They are in positions on the landscape similar to those of the Sabina soils. The moderately well drained Xenia soils are higher on the landscape than the Sabina soils.

Typical pedon of Sabina silt loam, 66 feet north and 264 feet west of the southeast corner of sec. 3, T. 16 N., R. 6 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; few fine roots; few fine accumulations of iron and manganese oxide; slightly acid; abrupt smooth boundary.

E—8 to 13 inches; brown (10YR 5/3) silt loam, white (10YR 8/1) dry; weak thin platy structure parting to moderate fine subangular blocky; friable; few fine roots; few fine accumulations of iron and manganese oxide; strongly acid; abrupt smooth boundary.

Bt1—13 to 23 inches; brown (10YR 5/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and light brownish gray (2.5Y 6/2) mottles; moderate fine subangular blocky structure; friable; few fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

Bt2—23 to 36 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and common fine distinct light brownish gray (2.5YR 6/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Bt3—36 to 47 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct yellowish brown (10YR 5/6) and many medium distinct light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

2Bt4—47 to 55 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint yellowish brown (10YR 5/6) and many medium distinct light brownish gray (2.5Y 6/2) mottles; weak coarse subangular blocky structure; friable; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; gradual smooth boundary.

2BC—55 to 59 inches; yellowish brown (10YR 5/4) loam; few fine faint yellowish brown (10YR 5/6) and few fine distinct light brownish gray (2.5Y 6/2) mottles; weak coarse subangular blocky structure; friable; few fine accumulations of iron and manganese oxide; few pebbles; very slight effervescence; moderately alkaline; gradual smooth boundary.

2C—59 to 63 inches; yellowish brown (10YR 5/4) loam; few fine faint yellowish brown (10YR 5/6) and few fine distinct light brownish gray (2.5Y 6/2) mottles; massive; firm; few fine accumulations of iron and manganese oxide; common pebbles; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 39 to 60 inches. The thickness of the loess and the depth to free carbonates range from 39 to 55 inches. The content of clay ranges from 35 to 42 percent in the control section.

The Ap horizon has value of 4 or 5. Some pedons do not have an E horizon. The Bt horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 3 or 4. It is silty clay loam or silty clay. The 2Bt and 2BC horizons have hue of 2.5Y or 10YR. The 2C horizon is loam, silty clay loam, or clay loam.

Sable Series

The Sable series consists of poorly drained, moderately permeable soils on 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 Catlin, Elburn, Hartsburg, and Ipava soils. Drummer soils formed in loess and in the underlying stratified, loamy outwash. Hartsburg and Pella soils have carbonates within a depth of 35 inches. Hartsburg soils commonly are slightly lower on the landscape than the Sable soils. Catlin, Elburn, and Ipava soils have an argillic horizon. They are higher on the landscape than the Sable soils.

Typical pedon of Sable silty clay loam, 264 feet east and 2,262 feet south of the northwest corner of sec. 7, T. 19 N., R. 6 E.

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak medium and coarse granular structure; friable; few medium roots; medium acid; abrupt smooth boundary.

A—7 to 18 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate coarse granular structure; firm; few medium roots; slightly acid; clear smooth boundary.

AB—18 to 23 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; firm; many distinct very dark gray (10YR 3/2) organic coatings on faces of peds; few medium roots; few fine round concretions of iron and manganese oxide; neutral; clear smooth boundary.

Bg—23 to 29 inches; olive gray (5Y 5/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium and fine subangular blocky structure; firm; few medium roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; clear smooth boundary.

Btg1—29 to 40 inches; olive gray (5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to weak medium subangular blocky; firm; few medium roots; many distinct grayish brown (2.5Y 5/2) clay films on faces of peds; neutral; gradual smooth boundary.

Btg2—40 to 55 inches; light olive gray (5Y 6/2) silty clay loam; many fine prominent yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to weak coarse subangular blocky; firm; few medium roots; common distinct grayish brown (2.5Y 5/2) clay films on faces of peds; mildly alkaline; gradual smooth boundary.

BCg—55 to 60 inches; light olive gray (5Y 6/2) silt loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; friable; moderately alkaline.

The thickness of the solum ranges from 50 to 60 inches. The thickness of the mollic epipedon ranges from 14 to 23 inches. The content of clay ranges from 27 to 35 percent in the control section.

The Ap and A horizons have value of 2 or 3 and chroma of 1 or 2. The Bg horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 1 or 2. The BCg horizon has hue of 2.5Y or 5Y. It is silt loam or silty clay loam.

Sawmill Series

The Sawmill series consists of poorly drained, moderately permeable soils on bottom land. These soils formed in noncalcareous, silty and loamy alluvial sediments. Slopes range from 0 to 2 percent.

Sawmill soils commonly are adjacent to the well drained Miami and moderately well drained Armiesburg soils. Armiesburg soils are higher on the bottom land than the Sawmill soils. Miami soils are on side slopes in the uplands.

Typical pedon of Sawmill silty clay loam, 114 feet east and 1,900 feet south of the northwest corner of sec. 36, T. 19 N., R. 6 E.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, black (10YR 2/1) dry; moderate fine granular structure; friable; common medium roots; slightly acid; abrupt smooth boundary.

A—8 to 17 inches; black (10YR 2/1) silty clay loam, black (10YR 2/1) dry; weak fine subangular blocky structure parting to moderate fine granular; friable; few medium roots; slightly acid; clear smooth boundary.

BA—17 to 30 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; friable; few medium roots; few pebbles; neutral; clear smooth boundary.

Bg—30 to 34 inches; dark gray (10YR 4/1) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; common distinct very dark gray

(10YR 3/1) organic coatings on faces of peds; few pebbles; mildly alkaline; clear smooth boundary.

BCg—34 to 45 inches; dark gray (10YR 4/1) silty clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few pebbles; mildly alkaline; gradual smooth boundary.

Cg—45 to 60 inches; gray (10YR 5/1) silty clay loam; few fine faint gray (10YR 6/1) and common fine prominent yellowish brown (10YR 5/8 and 5/6) mottles; massive; friable; few fine accumulations of iron and manganese oxide; few pebbles; mildly alkaline.

The thickness of the solum ranges from 40 to 60 inches. The mollic epipedon ranges from 24 to 36 inches in thickness. The content of clay ranges from 27 to 35 percent in the control section.

The Ap and A horizons have value of 2 or 3 and chroma of 1 or 2. The Bg horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2.

Saybrook Series

The Saybrook 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 5 to 8 percent.

The Saybrook soils in this county have a dark surface layer that is thinner than is definitive for the series and have a thicker solum. These differences, however, do not significantly affect the use or behavior of the soils.

Saybrook soils are similar to Catlin, Dana, Plano, and Proctor soils and commonly are adjacent to Dana, Drummer, and Flanagan soils. Catlin soils do not have glacial till within a depth of 40 inches. The moderately well drained Dana soils are on the less sloping ridges above the Saybrook soils. Plano soils and the well drained Proctor soils formed in loess and in the underlying outwash. The poorly drained Drummer soils are on upland flats and in shallow depressions and drainageways below the Saybrook soils. The somewhat poorly drained Flanagan soils are lower on the landscape than the Saybrook soils.

Typical pedon of Saybrook silt loam, 5 to 8 percent slopes, eroded, 2,015 feet south and 795 feet east of the northwest corner of sec. 9, T. 18 N., R. 6 E.

Ap—0 to 8 inches; mixed very dark grayish brown (10YR 3/2) and dark brown (10YR 4/3) silt loam, dark grayish brown (10YR 4/2) and brown (10YR 5/3) dry; weak fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

BA—8 to 12 inches; dark brown (10YR 4/3) silty clay loam; moderate fine granular structure; friable; few fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; clear smooth boundary.

Bt1—12 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; many distinct dark brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Bt2—18 to 29 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint brown (10YR 5/3) and common fine faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; common distinct dark brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

2Bt3—29 to 41 inches; brown (10YR 5/3) clay loam; few fine distinct yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct dark brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; common pebbles; neutral; gradual smooth boundary.

2BC—41 to 57 inches; brown (10YR 5/3) clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; common pebbles; very weak effervescence; mildly alkaline; gradual smooth boundary.

2C—57 to 60 inches; brown (10YR 5/3) loam; massive; firm; common fine accumulations of iron and manganese oxide; common pebbles; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 36 to 57 inches. The dark surface layer is 6 to 10 inches thick. The thickness of the loess ranges from 23 to 36 inches. The depth to free carbonates ranges from 36 to 50 inches. The content of clay ranges from 27 to 35 percent in the control section. The 2BC horizon has chroma of 3 or 4. It is loam or clay loam.

St. Charles Series

The St. Charles series consists of well drained soils on outwash plains. These soils formed in loess and in the underlying loamy outwash. They are underlain by sandy material. Permeability is moderate in the solum and rapid in the underlying material. Slopes range from 1 to 5 percent.

St. Charles soils are similar to Camden, Russell, and Xenia soils and commonly are adjacent to Drummer and Kendall soils. Camden soils have glacial outwash within a depth of 40 inches. Russell soils and the moderately well drained Xenia soils formed in 20 to 40 inches of loess and in the underlying glacial till. The poorly drained Drummer soils are in drainageways and depressions below the St. Charles soils. The somewhat poorly drained Kendall soils are lower on the landscape than the St. Charles soils.

Typical pedon of St. Charles silt loam, sandy substratum, 1 to 5 percent slopes, 760 feet north and 114 feet east of the southwest corner of sec. 15, T. 18 N., R. 5 E.

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; few fine roots; few fine rounded accumulations of iron and manganese oxide; neutral; abrupt smooth boundary.

Bt1—10 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine rounded concretions of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt2—16 to 32 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine rounded concretions of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt3—32 to 40 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine accumulations of iron and manganese oxide; strongly acid; clear smooth boundary.

Bt4—40 to 50 inches; yellowish brown (10YR 5/4) silt loam; moderate coarse subangular blocky structure; friable; few fine roots; few distinct light gray (10YR 7/2 dry) silt coatings and few distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine accumulations of iron and manganese oxide; very strongly acid; clear smooth boundary.

2BC—50 to 56 inches; dark yellowish brown (10YR 4/4) sandy clay loam; few thin strata of sandy loam; weak medium subangular blocky structure; friable; few fine accumulations of iron and manganese oxide; strongly acid; abrupt smooth boundary.

2C—56 to 66 inches; yellowish brown (10YR 5/6) loamy sand; few thin strata of sandy loam; single grained; very friable; strongly acid.

The thickness of the solum ranges from 50 to 65 inches. The thickness of the overlying silty material ranges from 40 to 60 inches. The content of clay ranges from 27 to 35 percent in the control section.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. Some pedons have an E horizon. The Bt horizon has value of 4 or 5 and chroma of 3 or 4. The 2BC horizon has value of 4 to 6 and chroma of 3 to 6. It is stratified sandy clay loam, loam, clay loam, or sandy loam.

Sunbury Series

The Sunbury series consists of somewhat poorly drained soils on till plains. These soils formed in loess and in the underlying calcareous, loamy glacial till. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. Slopes range from 0 to 2 percent.

Sunbury soils are similar to Flanagan soils and commonly are adjacent to Drummer, Flanagan, and Xenia soils. Drummer and Flanagan soils have a mollic epipedon. Flanagan soils are in landscape positions similar to those of the Sunbury soils. Xenia soils have less clay in the control section than the Sunbury soils. They are in gently sloping areas that are nearer to the drainageways than the Sunbury soils.

Typical pedon of Sunbury silt loam, 1,690 feet south and 240 feet west of the northeast corner of sec. 14, T. 16 N., R. 6 E.

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

Bt1—8 to 16 inches; brown (10YR 4/3) silty clay loam; few fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) mottles; moderate fine and medium subangular blocky structure; friable; common fine roots; many distinct dark brown (10YR 3/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

Bt2—16 to 28 inches; brown (10YR 5/3) silty clay loam; common fine distinct light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; common fine roots; many distinct dark grayish brown (10YR

4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

Bt3—28 to 38 inches; brown (10YR 5/3) silty clay loam; common medium distinct light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct dark brown (10YR 4/3) and dark grayish brown (10YR 4/2) clay films on faces of peds; common fine accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

Bt4—38 to 47 inches; brown (10YR 5/3) silty clay loam; many medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; friable; few fine roots; few distinct dark brown (10YR 4/3) clay films on faces of peds; common fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

2BC—47 to 55 inches; yellowish brown (10YR 5/4) clay loam; many medium faint yellowish brown (10YR 5/6) and common fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; few distinct dark brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; common pebbles; neutral; clear smooth boundary.

2C—55 to 62 inches; yellowish brown (10YR 5/4) loam; common medium distinct light brownish gray (10YR 6/2) mottles; massive; firm; few fine accumulations of iron and manganese oxide; common pebbles; slight effervescence; mildly alkaline.

The thickness of the solum and the depth to free carbonates range from 45 to 60 inches. The thickness of the loess ranges from 40 to 60 inches. The content of clay ranges from 35 to 40 percent in the control section.

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

Tice Series

The Tice series consists of somewhat poorly drained, moderately permeable soils on bottom land. These soils formed in silty and loamy alluvium. Slopes range from 0 to 2 percent.

Tice soils commonly are adjacent to the poorly drained Sawmill soils, which are in the lower areas on bottom land.

Typical pedon of Tice silty clay loam, 2,440 feet south and 1,845 feet east of the northwest corner of sec. 11, T. 19 N., R. 6 E.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate medium granular structure; friable; few fine roots; few fine accumulations of iron and manganese oxide; mildly alkaline; abrupt smooth boundary.

A—6 to 16 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak very fine subangular blocky structure; friable; few fine roots; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

AB—16 to 21 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; friable; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Bw1—21 to 26 inches; brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Bw2—26 to 43 inches; brown (10YR 4/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and common fine distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

BC—43 to 53 inches; brown (10YR 5/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and common fine distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few distinct grayish brown (10YR 5/2) channel fillings; few fine accumulations of iron and manganese oxide; neutral; clear smooth boundary.

C—53 to 60 inches; brown (10YR 5/3) loam that has a few strata of sandy loam; common fine distinct yellowish brown (10YR 5/6) and common fine distinct light brownish gray (10YR 6/2) mottles; massive; friable; few fine accumulations of iron and manganese oxide; neutral.

The thickness of the solum ranges from 30 to 60 inches. The thickness of the mollic epipedon ranges from 10 to 24 inches.

The Ap and A horizons have value of 2 or 3 and chroma of 1 or 2. They are silt loam or silty clay loam.

The Bw horizon has value of 4 or 5 and chroma of 2 to 4. It is silty clay loam or silt loam. The C horizon is stratified loam, sandy loam, or silt loam.

Varna Series

The Varna series consists of well drained, moderately slowly permeable soils on moraines. These soils formed in a thin layer of loess and in the underlying calcareous glacial till. Slopes range from 2 to 6 percent.

The Varna soils in this county have a dark surface layer that is thinner than is definitive for the series. This difference, however, does not significantly affect the use or behavior of the soils.

Varna soils commonly are adjacent to Drummer and Flanagan soils. The poorly drained Drummer soils are in drainageways and depressions below the Varna soils. The somewhat poorly drained Flanagan soils are in areas below the Varna soils.

Typical pedon of Varna silty clay loam, 2 to 6 percent slopes, eroded, 1,980 feet south and 800 feet east of the northwest corner of sec. 14, T. 21 N., R. 6 E.

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

Bt1—7 to 11 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; common distinct dark brown (10YR 3/3) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; few pebbles; medium acid; clear smooth boundary.

Bt2—11 to 19 inches; light olive brown (2.5Y 5/4) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; few distinct very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) organic coatings on faces of peds; few fine accumulations of iron and manganese oxide; few pebbles; medium acid; clear smooth boundary.

Bt3—19 to 27 inches; light olive brown (2.5Y 5/4) silty clay loam; moderate coarse subangular blocky structure; firm; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; few pebbles; neutral; clear smooth boundary.

C—27 to 60 inches; light olive brown (2.5Y 5/4) clay loam; common fine distinct light brownish gray (2.5Y 6/2) mottles; massive; very firm; few fine roots; few fine accumulations of iron and manganese oxide; common pebbles; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches. The dark surface layer is 7 to 10 inches thick. The loess is less than 8 inches thick. The depth to free carbonates ranges from 10 to 30 inches. The content of clay ranges from 35 to 45 percent in the control section.

The Ap horizon has chroma of 1 or 2. The Bt horizon has chroma of 3 or 4. It is silty clay loam or silty clay.

Xenia Series

The Xenia series consists of moderately well drained, moderately slowly permeable soils on till plains. These soils formed in loess and in the underlying calcareous, loamy till. Slopes range from 1 to 5 percent.

Xenia soils are similar to Russell soils and commonly are adjacent to Drummer, Miami, Sabina, and Sunbury soils. Russell soils are well drained. The poorly drained Drummer soils are in drainageways and depressions below the Xenia soils. They have a mollic epipedon and formed in loess and loamy outwash. The well drained Miami soils formed mainly in glacial till on side slopes below the Xenia soils. The somewhat poorly drained Sabina and Sunbury soils are in nearly level areas.

Typical pedon of Xenia silt loam, 1 to 5 percent slopes, 2,300 feet north and 1,000 feet east of the southwest corner of sec. 24, T. 16 N., R. 6 E.

Ap—0 to 6 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; few fine roots; few fine accumulations of iron and manganese oxide; slightly acid; abrupt smooth boundary.

E—6 to 9 inches; brown (10YR 5/3) silt loam; weak fine subangular blocky structure parting to weak medium granular; friable; few fine roots; many distinct white (10YR 8/1 dry) silt coatings on faces of peds; few fine accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt1—9 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and light yellowish brown (2.5Y 6/4) mottles; strong fine subangular blocky structure; friable; few fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; strongly acid; clear smooth boundary.

Bt2—18 to 32 inches; yellowish brown (10YR 5/4) silty clay loam; common fine faint yellowish brown (10YR 5/6) and distinct light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; strongly acid; clear smooth boundary.

2Bt3—32 to 43 inches; yellowish brown (10YR 5/4) clay loam; common fine faint yellowish brown (10YR 5/6) and few fine distinct light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; few distinct brown (10YR 5/3) clay films on faces of peds; few fine accumulations of iron and manganese oxide; few pebbles; strongly acid; gradual smooth boundary.

2BC—43 to 55 inches; yellowish brown (10YR 5/4) clay loam; common medium faint yellowish brown (10YR 5/6) and few fine distinct light brownish gray (2.5Y 6/2) mottles; weak coarse subangular blocky structure; firm; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine accumulations of iron and manganese oxide; common pebbles; very slight effervescence; mildly alkaline; clear smooth boundary.

2C—55 to 60 inches; yellowish brown (10YR 5/4) loam; common medium faint yellowish brown (10YR 5/6) and common fine distinct light brownish gray (2.5YR 6/2) mottles; massive; firm; few fine accumulations of iron and manganese oxide; common pebbles; violent effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the loess ranges from 28 to 40 inches. The depth to free carbonates ranges from 36 to 65 inches. The content of clay ranges from 27 to 35 percent in the control section.

The Ap horizon has chroma of 2 or 3. The Bt horizon has hue of 2.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. The 2Bt horizon has hue of 2.5YR or 10YR.

Formation of the Soils

Loraine M. Rhode and Randall G. Timmons, soil scientists, Piatt County, helped prepare this section.

Soil-forming processes act on parent material deposited by geologic agents, such as wind, water, and glacial ice. The characteristics of the soil are determined by the physical and mineralogical composition of the parent material; the climate, especially rainfall and temperature; the kind of plant and animal life on or in the soil, especially the native vegetation; the topography; and the length of time that the processes have acted on the soil material *(7)*. The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one unless conditions are specified for the other four.

Parent Material

Parent material is the unconsolidated mass in which soils form. It determines the mineralogical and chemical composition of the soils. The soils in Piatt County formed in loess, glacial till, glacial outwash, and alluvium.

The glacial till and glacial outwash were deposited during the last period of glaciation. The landscape features that are evidence of glaciation are moraines, till plains, and outwash plains. A moraine is formed when a glacier is melting as fast as it is advancing. At the point where the glacier is melting, large quantities of the material carried within the ice are deposited, forming glacial moraines. A glacial till plain is formed when a glacier is retreating. An outwash plain is formed in front of the moraine where glacial meltwater has sorted the different particles of the rock material carried by the ice.

Both moraines and till plains are made up of glacial till. The till in the Cerro Gordo Moraine is mainly loam or clay loam. This moraine is south of and roughly parallel to the Sangamon River. The till is dominantly silty clay loam and clay loam in the Blue Ridge Moraine, in the northeast corner of the county *(22)*.

After the glaciers receded and the flood plains along the Mississippi and Illinois Rivers dried, the westerly winds carried glacial "rock flour," or loess, across Illinois. The thickness of the loess on the moraines varies. For example, Parr soils formed in less than 20 inches of loess and in the underlying glacial till, Dana soils formed in 20 to 40 inches of loess and in the underlying till, and Catlin soils formed in 40 to 60 inches of loess and in the underlying till. On the till plain north of the Sangamon River, the loess generally is more than 60 inches thick. Sable and Ipava are examples of soils that formed in this thick layer of loess *(23)*.

The outwash plains in the county also are covered by loess. In Piatt County the outwash is loamy in the upper part and sandy in the lower part. Drummer, Elburn, and Plano soils formed in 40 to 60 inches of loess and in the underlying outwash in areas that do not have sandy outwash or that have sandy outwash below a depth of 60 inches. Camden, Kendall, Proctor, and St. Charles soils formed in loess and outwash in areas where the sandy material is within a depth of 60 inches.

Alluvium is the material carried by streams and deposited on flood plains by floodwater. Alluvial soils are in drainageways and on flood plains. Sawmill and Tice soils formed in alluvium.

Plant and Animal Life

Plants, animals, bacteria, and fungi affect soil formation. The activities of these living organisms are interrelated in complex ways.

The native vegetation has greatly influenced the kinds of soil that have formed. Soils that formed under prairie vegetation have a higher organic matter content, have higher base saturation, and are leached of carbonates and clay less extensively than soils that formed under forest vegetation. The fibrous root system of prairie grasses is responsible for the higher organic matter content in prairie soils. Flanagan, Sunbury, and Sabina soils form a biosequence of soils. Flanagan soils formed under prairie vegetation, Sabina soils formed under forest vegetation, and Sunbury soils formed under both prairie and forest vegetation.

Animals that live in the soil add organic matter to the soil as they digest plants. Earthworms have a great effect on the soil. They annually excrete as much as 15 tons of dry matter per acre *(3)*. Many other burrowing animals help to make the soil more porous. Bacteria and fungi recycle organic material.

Human activities influence soil formation. In Piatt County they have replaced the native prairie grasses with crops and have converted woodland to cropland or pasture. In many areas these activities have increased the erosion rate. Cutting and filling have modified some soils, such as Orthents, loamy, undulating.

Climate

Piatt County has a temperate, humid, continental climate. The climate is essentially uniform throughout the county. As a result, it has not caused major differences among the soils in the county.

Climate influences the types of plants that grow on the soil and the rate of weathering in the soil. The climate in Piatt County has favored rapid weathering and the formation of clay. Water has translocated clay from the surface layer to the subsoil. Most of the upland soils in the county contain more clay in the subsoil than in the surface layer. Percolating water has also resulted in the leaching of carbonates from the upper part of the soil in most areas.

Topography

Variations in the steepness, shape, and aspect of slopes greatly affect runoff and infiltration rates, the degree of erosion, and the natural drainage of the soil. The poorly drained, nearly level Drummer soils formed in the same kind of parent material as the gently sloping, moderately well drained Plano soils. The Drummer soils have a seasonal high water table near the surface. Water fills the soil pores and thus restricts air circulation. Because of a lack of oxygen in the soils, the iron compounds have been reduced and are grayish. In contrast, runoff is more rapid on the more sloping Plano soils. Therefore, less water penetrates the surface than in the nearly level areas and the seasonal high water table is at a greater depth. More air circulates through the soil pores. As a result, the iron compounds remain oxidized and the soils are brownish.

Time

Time can greatly affect the degree of profile development in a soil. The influence of time, however, can be modified by erosion, the deposition of material, the topography, and the type of parent material. Relatively "youthful" or slightly weathered soils, such as Sawmill soils on flood plains, and relatively "old" or highly weathered soils, such as Brooklyn soils in depressions on outwash plains and till plains, can form in the same period of time if the other factors of soil formation are different. If the other factors are similar, however, the extent of horizon differentiation increases over time.

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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.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

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

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.

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.

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.

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.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

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

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

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.

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.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

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

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

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.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

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).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

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

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

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

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

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

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

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are—

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

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.

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.

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.

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.

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, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

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.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

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

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-80 at Decatur, Illinois)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	33.3	17.0	25.2	61	-12	1	2.00	0.94	2.96	4.6	7.0
February----	38.6	21.4	30.0	65	-6	3	1.95	1.03	2.81	4.7	5.5
March-------	49.1	30.3	39.7	76	7	34	3.38	2.02	4.46	7.3	4.3
April-------	63.8	42.1	53.0	85	24	169	3.99	2.52	5.46	7.6	.5
May---------	74.6	52.0	63.3	93	33	418	3.85	1.96	5.03	7.0	.0
June--------	83.8	60.9	72.3	97	44	669	4.20	2.12	6.53	6.3	.0
July--------	85.3	65.0	75.9	98	50	801	4.21	2.34	5.49	6.1	.0
August------	84.7	63.0	73.9	95	48	739	3.71	1.86	5.52	5.7	.0
September---	79.6	55.8	67.7	95	38	530	3.13	1.38	5.07	5.1	.0
October-----	67.5	44.4	55.9	90	25	230	2.54	1.26	3.59	4.7	.0
November----	51.2	33.3	42.3	77	10	46	2.53	1.54	3.47	5.1	2.3
December----	38.8	23.3	31.0	65	-6	4	2.55	1.18	3.52	5.5	4.4
Yearly:											
Average---	62.8	42.5	52.6	---	---	---	38.04	---	---	69.5	23.9
Extreme---	---	---	---	---	---	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,644	---	20.15	53.91	---	---

* 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. 10	Apr. 21	May 8
2 years in 10 later than--	Apr. 9	Apr. 14	May 3
5 years in 10 later than--	Apr. 2	Apr. 7	Apr. 21
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 26	Oct. 13	Oct. 4
2 years in 10 earlier than--	Oct. 31	Oct. 19	Oct. 9
5 years in 10 earlier than--	Nov. 9	Oct. 30	Oct. 21

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-80 at Decatur, Illinois)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	205	189	161
8 years in 10	215	193	167
5 years in 10	220	207	180
2 years in 10	240	218	196
1 year in 10	249	225	201

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
27C2	Miami loam, 5 to 10 percent slopes, eroded	1,710	0.6
27D2	Miami loam, 10 to 15 percent slopes, eroded	1,110	0.4
27E	Miami loam, 15 to 25 percent slopes	585	0.2
27G	Miami loam, 25 to 50 percent slopes	375	0.1
43	Ipava silt loam	29,540	10.6
56B	Dana silt loam, 2 to 5 percent slopes	10,190	3.6
67	Harpster silty clay loam	5,335	1.9
68	Sable silty clay loam	35,180	12.6
74	Radford silt loam	755	0.3
107	Sawmill silty clay loam	7,310	2.6
136	Brooklyn silt loam	325	0.1
145C2	Saybrook silt loam, 5 to 8 percent slopes, eroded	1,930	0.7
152	Drummer silty clay loam	70,510	25.2
153	Pella silty clay loam	7,730	2.8
154	Flanagan silt loam	59,015	21.1
171B	Catlin silt loam, 2 to 5 percent slopes	11,695	4.2
198	Elburn silt loam	9,400	3.4
199B	Plano silt loam, 1 to 5 percent slopes	3,040	1.1
221C2	Parr loam, 5 to 10 percent slopes, eroded	1,075	0.4
223B2	Varna silty clay loam, 2 to 6 percent slopes, eroded	405	0.1
234	Sunbury silt loam	1,815	0.6
236	Sabina silt loam	2,740	1.0
244	Hartsburg silty clay loam	4,455	1.6
284	Tice silty clay loam	1,115	0.4
291B	Xenia silt loam, 1 to 5 percent slopes	1,645	0.6
322B	Russell silt loam, 2 to 5 percent slopes	2,830	1.0
322C2	Russell silt loam, 5 to 10 percent slopes, eroded	2,245	0.8
330	Peotone silty clay loam	505	0.2
371B	St. Charles silt loam, sandy substratum, 1 to 5 percent slopes	590	0.2
372	Kendall silt loam, sandy substratum	325	0.1
373B	Camden silt loam, sandy substratum, 1 to 5 percent slopes	1,060	0.4
374B	Proctor silt loam, sandy substratum, 2 to 5 percent slopes	1,600	0.6
374C2	Proctor silt loam, sandy substratum, 5 to 10 percent slopes, eroded	450	0.2
597	Armiesburg silt loam	220	0.1
802B	Orthents, loamy, undulating	365	0.1
865	Pits, gravel	95	*
	Water	410	0.1
	Total	279,680	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
43	Ipava silt loam
56B	Dana silt loam, 2 to 5 percent slopes
67	Harpster silty clay loam (where drained)
68	Sable silty clay loam (where drained)
74	Radford silt loam (where protected from flooding or not frequently flooded during the growing season)
107	Sawmill silty clay loam (where drained and either protected from flooding or not frequently flooded during the growing season)
136	Brooklyn silt loam (where drained)
152	Drummer silty clay loam (where drained)
153	Pella silty clay loam (where drained)
154	Flanagan silt loam
171B	Catlin silt loam, 2 to 5 percent slopes
198	Elburn silt loam
199B	Plano silt loam, 1 to 5 percent slopes
223B2	Varna silty clay loam, 2 to 6 percent slopes, eroded
234	Sunbury silt loam
236	Sabina silt loam (where drained)
244	Hartsburg silty clay loam (where drained)
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
322B	Russell silt loam, 2 to 5 percent slopes
330	Peotone silty clay loam (where drained)
371B	St. Charles silt loam, sandy substratum, 1 to 5 percent slopes
372	Kendall silt loam, sandy substratum (where drained)
373B	Camden silt loam, sandy substratum, 1 to 5 percent slopes
374B	Proctor silt loam, sandy substratum, 2 to 5 percent slopes
597	Armiesburg silt loam

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*
27C2------------ Miami	IIIe	114	38	48	4.5	7.5
27D2------------ Miami	IVe	109	36	45	4.3	7.2
27E------------- Miami	VIe	---	---	---	---	6.9
27G------------- Miami	VIIe	---	---	---	---	---
43-------------- Ipava	I	163	52	66	6.1	10.2
56B------------- Dana	IIe	141	44	59	5.4	9.1
67-------------- Harpster	IIw	136	44	52	---	---
68-------------- Sable	IIw	156	51	61	---	---
74-------------- Radford	IIIw	100	32	---	3.9	6.5
107------------- Sawmill	IIIw	132	42	---	---	---
136------------- Brooklyn	IIw	108	35	44	---	---
145C2----------- Saybrook	IIIe	131	43	56	5.3	8.7
152------------- Drummer	IIw	154	51	61	---	---
153------------- Pella	IIw	140	48	56	---	---
154------------- Flanagan	I	162	52	67	6.1	10.2
171B------------ Catlin	IIe	149	46	60	5.7	9.6
198------------- Elburn	I	161	50	63	6.1	10.2
199B------------ Plano	IIe	150	45	59	5.7	9.6
221C2----------- Parr	IIIe	121	41	53	4.9	8.2

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Bromegrass-alfalfa
		Bu	Bu	Bu	Tons	AUM*
223B2----------- Varna	IIe	122	41	52	4.8	7.9
234------------- Sunbury	I	149	45	62	5.6	8.1
236------------- Sabina	IIw	133	42	56	5.2	8.7
244------------- Hartsburg	IIw	145	47	56	---	---
284------------- Tice	IIw	130	40	---	4.8	8.0
291B------------ Xenia	IIe	124	40	54	4.7	7.9
322B------------ Russell	IIe	124	40	54	4.7	7.9
322C2----------- Russell	IIIe	117	37	51	4.5	7.5
330------------- Peotone	IIw	123	42	43	---	---
371B------------ St. Charles	IIe	126	39	55	5.0	8.1
372------------- Kendall	IIw	135	41	55	5.2	8.7
373B------------ Camden	IIe	124	39	54	5.0	8.2
374B------------ Proctor	IIe	143	44	58	5.4	9.1
374C2----------- Proctor	IIIe	135	41	55	5.2	8.6
597------------- Armiesburg	IIw	147	46	60	5.5	9.2
802B. Orthents						
865**. Pits						

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
27E------------- Miami	5R	Moderate	Moderate	Slight	Slight	White oak-----------	90	72	Eastern white pine, red pine, white ash, yellow poplar, black walnut.
						Yellow poplar-------	98	104	
						Sweetgum------------	76	70	
27G------------- Miami	5R	Severe	Severe	Slight	Slight	White oak-----------	90	72	Eastern white pine, red pine, white ash, yellow poplar, black walnut.
						Yellow poplar-------	98	104	
						Sweetgum------------	76	70	
107------------- Sawmill	5W	Slight	Moderate	Moderate	Moderate	Pin oak-------------	90	72	American sycamore, black spruce, hackberry, European larch, green ash, pin oak, red maple, swamp white oak.
						Eastern cottonwood--	---	---	
						Sweetgum------------	---	---	
						Cherrybark oak------	---	---	
						American sycamore---	---	---	
284------------- Tice	5A	Slight	Slight	Slight	Slight	Pin oak-------------	96	78	American sycamore, eastern cottonwood, green ash, yellow poplar, red maple, cherrybark oak.
						Sweetgum------------	86	95	
						Yellow poplar-------	90	90	
						Virginia pine-------	90	135	
						Eastern cottonwood--	---	---	
						White ash-----------	---	---	
291B------------ Xenia	5A	Slight	Slight	Slight	Slight	White oak-----------	90	72	Eastern white pine, red pine, black walnut, black locust, white ash, yellow poplar.
						Yellow poplar-------	98	104	
						Sweetgum------------	76	70	
322C2----------- Russell	5A	Slight	Slight	Slight	Slight	White oak-----------	90	72	Eastern white pine, red pine, white ash, yellow poplar, black walnut, black locust, white oak, northern red oak, green ash, black cherry.
						Northern red oak----	90	72	
						Yellow poplar-------	98	104	
						Sweetgum------------	76	70	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
371B----------- St. Charles	7A	Slight	Slight	Slight	Slight	Yellow poplar------- White oak---------- Northern red oak---- Sweetgum----------- Green ash----------	95 85 85 --- ---	98 67 67 --- ---	White oak, black walnut, sugar maple, eastern white pine, red pine.
373B----------- Camden	7A	Slight	Slight	Slight	Slight	Yellow poplar------- White oak---------- Northern red oak---- Sweetgum----------- Green ash----------	95 85 85 80 76	98 67 67 79 75	White oak, black walnut, green ash, eastern white pine, red pine, yellow poplar, black locust, white ash.
597------------ Armiesburg	8A	Slight	Slight	Slight	Slight	Yellow poplar------- White oak---------- Black walnut--------	100 90 70	107 72 ---	Eastern white pine, black walnut, yellow poplar, black locust.

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
27C2, 27D2, 27E, 27G-------------- Miami	---	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
43---------------- Ipava	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce---------	Eastern white pine, pin oak.
56B--------------- Dana	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
67---------------- Harpster	---	Tatarian honeysuckle, nannyberry viburnum, Washington hawthorn.	White spruce, northern whitecedar, eastern redcedar, green ash, Osageorange.	Black willow----------	---
68---------------- Sable	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine----	Pin oak.
74---------------- Radford	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce---------	Eastern white pine, pin oak.
107--------------- Sawmill	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
136--------------- Brooklyn	Pin oak----------	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	---

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
145C2. Saybrook					
152 Drummer	---	American cranberrybush, Amur honeysuckle, silky dogwood, Amur privet.	Norway spruce, Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine.	Eastern white pine	Pin oak.
153 Pella	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
154 Flanagan	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
171B Catlin	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
198 Elburn	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Austrian pine, white fir, northern whitecedar, Washington hawthorn, blue spruce.	Norway spruce	Eastern white pine, pin oak.
199B Plano	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
221C2 Parr	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
223B2: Varna	---	Eastern redcedar, Washington hawthorn, Amur honeysuckle, Amur privet, arrowwood, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, Osageorange.	Eastern white pine, pin oak.	---
234: Sunbury	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
236: Sabina	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Austrian pine, white fir, blue spruce, northern whitecedar, 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 whitecedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
284: Tice	---	Silky dogwood, Amur privet, American cranberrybush, Amur honeysuckle.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
291B: Xenia	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
322B, 322C2: Russell	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern whitecedar, 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 whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
371B: St. Charles	---	American cranberrybush, silky dogwood.	White fir, blue spruce, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
372: Kendall	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
373B: Camden	---	Amur honeysuckle, Amur privet, silky dogwood, American cranberrybush.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
374B, 374C2: Proctor	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
597: Armiesburg	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
802B. Orthents					
865*. Pits					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
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.
27E Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
27G Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
43 Ipava	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
56B 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.
74 Radford	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
107 Sawmill	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
136 Brooklyn	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
145C2 Saybrook	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.
154 Flanagan	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
171B Catlin	Slight	Slight	Moderate: slope.	Slight	Slight.
198 Elburn	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
199B Plano	Slight	Slight	Moderate: slope.	Slight	Slight.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
221C2----------------- Parr	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight----------	Slight.
223B2----------------- Varna	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Moderate: large stones.
234------------------- Sunbury	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
236------------------- 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.
284------------------- Tice	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
291B------------------ Xenia	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Slight.
322B------------------ Russell	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
322C2----------------- Russell	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
330------------------- Peotone	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
371B------------------ St. Charles	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
372------------------- Kendall	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
373B------------------ Camden	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
374B------------------ Proctor	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
374C2----------------- Proctor	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
597------------------- Armiesburg	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
802B. Orthents					
865*. Pits					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	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, 27E 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.
43 Ipava	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
56B 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.
74 Radford	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
107 Sawmill	Good	Good	Good	Fair	Good	Fair	Good	Fair	Fair.
136 Brooklyn	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
145C2 Saybrook	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
152 Drummer	Fair	Good	Good	Fair	Good	Good	Good	Fair	Good.
153 Pella	Good	Good	Good	Fair	Good	Good	Good	Fair	Good.
154 Flanagan	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
171B Catlin	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
198 Elburn	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
199B Plano	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.
223B2 Varna	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
234 Sunbury	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
236 Sabina	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
244 Hartsburg	Fair	Fair	Good	Fair	Good	Good	Fair	Fair	Good.
284 Tice	Poor	Fair	Fair	Good	Fair	Fair	Fair	Good	Fair.
291B Xenia	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
322B Russell	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very 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.
371B St. Charles	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
372 Kendall	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
373B Camden	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
374B, 374C2 Proctor	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
597 Armiesburg	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
802B. Orthents									
865*. Pits									

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
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.
27E, 27G: Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
43: Ipava	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
56B: Dana	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	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.
74: Radford	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Severe: flooding.
107: Sawmill	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
136: Brooklyn	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
145C2: Saybrook	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: 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.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
153 Pella	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
154 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.
198 Elburn	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
199B Plano	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
221C2 Parr	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Slight.
223B2 Varna	Moderate: too clayey.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Moderate: large stones.
234 Sunbury	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, frost action, shrink-swell.	Moderate: wetness.
236 Sabina	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
244 Hartsburg	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
284 Tice	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
291B Xenia	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
322B Russell	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
322C2 Russell	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
330. Peotone	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
371B. St. Charles	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
372. Kendall	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
373B. Camden	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
374B. Proctor	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
374C2. Proctor	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
597. Armiesburg	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: flooding.
802B. Orthents						
865*. Pits						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
27C2---------------- Miami	Severe: percs slowly.	Severe: slope.	Slight----------	Slight----------	Good.
27D2---------------- Miami	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
27E, 27G----------- Miami	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
43------------------ Ipava	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
56B----------------- 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.
74------------------ Radford	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
107----------------- Sawmill	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
136----------------- Brooklyn	Severe: ponding, percs slowly.	Slight----------	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
145C2--------------- Saybrook	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
152----------------- Drummer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
153----------------- Pella	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
154----------------- Flanagan	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
171B---------------- Catlin	Severe: wetness.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
198---------------- Elburn	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
199B---------------- Plano	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
221C2--------------- Parr	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight-----------	Fair, too clayey.
223B2--------------- Varna	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
234---------------- Sunbury	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
236---------------- 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.
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.
322B---------------- Russell	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
322C2--------------- Russell	Moderate: 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.
371B---------------- St. Charles	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight-----------	Fair: too clayey, thin layer.
372---------------- Kendall	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
373B---------------- Camden	Slight-----------	Moderate: seepage, slope.	Severe: seepage.	Slight-----------	Fair: too clayey.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
374B-----------------Proctor	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey, thin layer.
374C2----------------Proctor	Moderate: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too clayey, thin layer.
597------------------Armiesburg	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: hard to pack.
802B. Orthents					
865*. Pits					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
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.
27E 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.
43 Ipava	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
56B 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.
74 Radford	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
107 Sawmill	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
136 Brooklyn	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
145C2 Saybrook	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
152 Drummer	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
153 Pella	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
154 Flanagan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
171B Catlin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
198 Elburn	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
199B Plano	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
221C2 Parr	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
223B2 Varna	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
234 Sunbury	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
236 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.
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.
322B, 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.
371B St. Charles	Good	Probable	Improbable: too sandy.	Fair: too clayey.
372 Kendall	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too clayey.
373B Camden	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
374B, 374C2 Proctor	Good	Probable	Improbable: too sandy.	Fair: area reclaim.
597 Armiesburg	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
802B. Orthents				
865*. Pits				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
27C2 Miami	Moderate: seepage, slope.	Severe: no water.	Deep to water	Slope, rooting depth.	Erodes easily	Erodes easily, rooting depth.
27D2, 27E, 27G Miami	Severe: slope.	Severe: no water.	Deep to water	Slope, rooting depth.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
43 Ipava	Slight	Severe: slow refill.	Frost action	Wetness	Erodes easily, wetness.	Wetness, erodes easily.
56B Dana	Moderate: seepage, slope.	Severe: no water.	Deep to water	Slope	Erodes easily	Erodes easily.
67 Harpster	Moderate: seepage.	Moderate: slow refill.	Ponding, frost action.	Ponding	Ponding	Wetness.
68 Sable	Moderate: seepage.	Moderate: slow refill.	Ponding, frost action.	Ponding	Ponding	Wetness.
74 Radford	Moderate: seepage.	Moderate: slow refill.	Flooding, frost action.	Wetness, flooding.	Wetness	Wetness.
107 Sawmill	Moderate: seepage.	Moderate: slow refill.	Flooding, frost action.	Wetness, flooding.	Wetness	Wetness.
136 Brooklyn	Slight	Severe: slow refill.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
145C2 Saybrook	Moderate: seepage, slope.	Moderate: deep to water, slow refill.	Deep to water	Slope	Erodes easily	Erodes easily.
152 Drummer	Moderate: seepage.	Moderate: slow refill.	Ponding, frost action.	Ponding	Ponding	Wetness.
153 Pella	Moderate: seepage.	Severe: slow refill.	Ponding, frost action.	Ponding	Ponding	Wetness.
154 Flanagan	Moderate: seepage.	Severe: slow refill.	Frost action	Wetness	Erodes easily, wetness.	Erodes easily.
171B Catlin	Moderate: seepage, slope.	Moderate: deep to water, slow refill.	Deep to water	Slope	Erodes easily	Erodes easily.
198 Elburn	Moderate: seepage.	Moderate: slow refill.	Frost action	Wetness	Erodes easily, wetness.	Wetness, erodes easily.
199B Plano	Moderate: seepage, slope.	Moderate: deep to water, slow refill. wetness.	Deep to water	Slope	Erodes easily	Erodes easily.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
221C2: Parr	Moderate: seepage, slope.	Severe: no water.	Deep to water	Slope: rooting depth.	Favorable	Rooting depth.
223B2: Varna	Moderate: slope.	Severe: no water.	Deep to water	Percs slowly, slope.	Percs slowly	Percs slowly.
234: Sunbury	Moderate: seepage.	Severe: no water.	Frost action	Wetness	Erodes easily, wetness.	Erodes easily.
236: Sabina	Slight	Severe: slow refill.	Frost action	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
244: Hartsburg	Moderate: seepage.	Moderate: slow refill.	Ponding, frost action.	Ponding	Ponding	Wetness.
284: Tice	Moderate: seepage.	Moderate: slow refill.	Flooding, frost action.	Wetness	Wetness	Favorable.
291B: Xenia	Moderate: seepage, slope.	Severe: slow refill.	Frost action, slope.	Slope, wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
322B, 322C2: Russell	Moderate: seepage, slope.	Severe: no water.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
330: Peotone	Slight	Severe: slow refill.	Ponding, frost action.	Ponding	Ponding	Wetness.
371B: St. Charles	Severe: seepage.	Severe: no water.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
372: Kendall	Severe: seepage.	Severe: cutbanks cave.	Frost action	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.
373B: Camden	Moderate: seepage, slope.	Severe: no water.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
374B, 374C2: Proctor	Severe: seepage.	Severe: no water.	Deep to water	Slope	Erodes easily	Erodes easily.
597: Armiesburg	Moderate: seepage.	Severe: no water.	Deep to water	Flooding	Favorable	Favorable.
802B. Orthents						
865*. Pits						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
27C2, 27D2, 27E, 27G----- Miami	0-5	Loam, silt loam.	CL, CL-ML, ML	A-4	0	100	95-100	80-100	50-90	15-30	3-10
	5-36	Clay loam, loam, silty clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	40-95	30-40	15-25
	36-60	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
43------------ Ipava	0-15	Silt loam, silty clay loam.	ML, CL	A-6, A-7	0	100	100	95-100	90-100	30-45	10-20
	15-44	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	95-100	90-100	45-70	25-40
	44-60	Silt loam-----	CL	A-6	0	100	100	95-100	90-100	30-40	10-20
56B----------- Dana	0-16	Silt loam-----	CL	A-6, A-4	0	100	100	95-100	85-95	30-35	8-12
	16-33	Silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-98	38-50	20-32
	33-55	Clay loam-----	CL	A-6, A-7	0	90-100	90-95	80-90	65-75	37-50	17-30
	55-60	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	0-15	Silty clay loam.	CL, CH	A-7	0	100	95-100	95-100	90-100	45-60	20-35
	15-33	Silty clay loam.	CL, CH	A-7	0	100	95-100	95-100	85-100	40-60	20-35
	33-60	Silty clay loam, silt loam, loam.	CL, CH	A-6, A-7	0	100	95-100	95-100	70-100	35-55	20-35
68------------ Sable	0-18	Silty clay loam.	CL, CH, ML, MH	A-7	0	100	100	95-100	95-100	41-65	15-35
	18-55	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	95-100	40-55	20-35
	55-60	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	95-100	30-40	10-20
74------------ Radford	0-17	Silt loam-----	ML, CL	A-4, A-6	0	100	100	95-100	80-100	30-40	5-15
	17-33	Silt loam-----	CL, ML	A-4, A-6	0	100	100	95-100	80-100	25-35	5-15
	33-60	Silt loam, silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	80-95	35-50	15-25
107----------- Sawmill	0-17	Silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-100	30-50	15-30
	17-30	Silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-100	30-50	15-30
	30-45	Silty clay loam, clay loam, loam.	CL	A-6, A-7, A-4	0	100	100	85-100	70-95	25-50	8-25
	45-60	Silty clay loam, clay loam, silt loam.	CL	A-4, A-6, A-7	0	100	100	75-100	65-95	20-50	8-30

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
136----------- Brooklyn	0-8	Silt loam-----	CL, CL-ML	A-6, A-4	0	100	100	95-100	90-100	25-35	5-15
	8-14	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-35	5-15
	14-46	Silty clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	95-100	45-60	25-40
	46-60	Stratified sandy loam to silty 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
145C2--------- Saybrook	0-8	Silt loam-----	CL, CL-ML	A-6, A-4	0	100	100	95-100	90-100	25-40	5-15
	8-29	Silty clay loam, silt loam.	CL, CH	A-7, A-6	0	95-100	95-100	90-100	85-100	35-55	15-30
	29-60	Loam, silt loam, clay loam.	CL	A-6, A-4	0	95-100	85-100	80-95	60-85	20-40	8-25
152----------- Drummer	0-16	Silty clay loam.	CL	A-6, A-7	0	100	95-100	95-100	85-95	30-50	15-30
	16-44	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	95-100	95-100	85-95	30-50	15-30
	44-51	Loam, silt loam, clay loam.	CL	A-6, A-7	0-5	95-100	90-100	75-95	60-85	30-50	15-30
	51-60	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	0-10	Silty clay loam.	CL	A-7	0	100	95-100	90-100	85-95	40-50	15-25
	10-26	Silty clay loam, silty clay, clay loam.	CL	A-6, A-7	0	100	95-100	90-100	85-95	30-50	15-30
	26-54	Stratified silty clay loam to sandy loam.	CL	A-6, A-7	0-5	95-100	90-100	85-95	60-90	25-45	10-25
	54-60	Stratified sandy loam to silty 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
154----------- Flanagan	0-12	Silt loam-----	CL	A-7, A-6	0	100	100	95-100	85-100	35-50	15-30
	12-42	Silty clay loam.	CL, CH	A-7	0	100	100	95-100	85-100	40-60	15-30
	42-60	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	0-11	Silt loam-----	ML, CL	A-6, A-7	0	100	100	95-100	85-100	30-50	11-20
	11-46	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	90-100	80-100	35-50	20-30
	46-62	Loam, clay loam, silty clay loam.	CL	A-6, A-7	0	90-100	90-100	85-100	60-100	25-45	11-20

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
198----------- Elburn	0-12	Silt loam-----	CL	A-6	0	100	100	95-100	90-100	25-40	10-25
	12-45	Silty clay loam.	CL	A-6, A-7	0	100	100	100	75-90	30-50	15-35
	45-60	Stratified sandy loam to silt 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
199B---------- Plano	0-11	Silt loam-----	CL-ML, CL, ML	A-4, A-6	0	100	100	95-100	95-100	20-30	5-15
	11-48	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	95-100	25-45	10-25
	48-63	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
221C2--------- Parr	0-7	Loam----------	CL, CL-ML	A-4, A-6	0	95-100	95-100	80-100	50-90	15-30	4-15
	7-24	Clay loam, loam, silty clay loam.	CL	A-6, A-4	0	90-100	90-100	75-100	50-95	25-35	9-15
	24-31	Clay loam-----	CL	A-6, A-4	0	90-100	90-100	75-85	50-65	25-35	8-15
	31-60	Loam----------	CL, ML, CL-ML	A-4	0-3	85-95	85-95	75-85	50-65	<25	3-8
223B2--------- Varna	0-7	Silty clay loam.	CL	A-6, A-7	0-10	95-100	85-100	85-98	80-95	30-50	12-25
	7-27	Silty clay, silty clay loam, clay.	CL, CH	A-7, A-6	0-10	95-100	85-100	85-98	80-98	35-56	15-29
	27-60	Silty clay loam, clay loam, loam.	CL	A-7, A-6	0-10	95-100	85-100	85-98	80-95	30-45	13-26
234----------- Sunbury	0-8	Silt loam-----	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	8-15
	8-47	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0	100	100	95-100	85-100	35-60	20-35
	47-62	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6, A-7	0	98-100	95-100	90-100	50-95	20-45	5-30
236----------- Sabina	0-13	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	13-55	Silty clay loam.	CL, CH	A-7, A-6	0	100	100	95-100	85-100	40-60	20-40
	55-63	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
244----------- Hartsburg	0-17	Silty clay loam.	CL, ML	A-7, A-6	0	100	100	100	95-100	35-50	10-25
	17-24	Silty clay loam.	CL, CH	A-7	0	100	100	95-100	95-100	40-55	20-30
	24-60	Silt loam, loam.	CL	A-6	0	95-100	90-100	90-100	70-100	25-40	11-20

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
284----------- Tice	0-16	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	90-100	80-95	30-45	10-20
	16-53	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-55	15-30
	53-60	Stratified silty clay loam to sandy loam.	CL-ML, CL	A-4, A-6, A-7	0	100	100	60-95	55-80	25-45	5-20
291B---------- Xenia	0-9	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	20-35	5-15
	9-32	Silty clay loam.	CL	A-6, A-7	0	100	100	90-100	80-95	35-50	15-30
	32-55	Clay loam-----	CL	A-6, A-7	0-5	92-100	90-95	75-95	65-75	30-50	15-30
	55-60	Loam----------	CL, ML, SC, SM	A-4, A-6	0-5	85-95	80-90	75-90	40-65	15-30	NP-15
322B, 322C2--- Russell	0-7	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	20-35	5-15
	7-34	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	85-95	35-45	15-25
	34-48	Clay loam, loam, silty clay loam.	CL	A-6, A-7	0	95-100	90-95	80-90	60-80	35-45	15-25
	48-60	Loam, clay loam.	CL, CL-ML	A-4, A-6	0-3	85-95	80-90	75-85	50-65	20-30	5-12
330----------- Peotone	0-18	Silty clay loam.	CH, CL	A-7	0	100	95-100	95-100	80-100	40-65	15-35
	18-53	Silty clay loam, silty clay.	CH, CL	A-7	0-5	100	95-100	90-100	85-100	41-70	17-39
	53-60	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
371B---------- St. Charles	0-10	Silt loam-----	CL	A-4, A-6	0	100	100	95-100	95-100	22-35	7-15
	10-50	Silty clay loam, silt loam.	CL	A-6	0	100	100	95-100	90-100	30-40	10-20
	50-56	Stratified sandy loam to sandy clay loam.	SC	A-6	0	95-100	95-100	80-90	35-50	20-40	10-25
	56-66	Stratified loamy sand to sandy loam.	SP-SM, SM	A-2, A-1-b	0-5	75-95	50-75	20-50	5-30	---	NP
372----------- Kendall	0-11	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	20-35	5-15
	11-44	Silty clay loam.	CL	A-6, A-7	0	100	100	95-100	90-100	30-45	10-20
	44-52	Sandy clay loam, sandy loam, clay loam.	SC, SM-SC	A-6, A-4	0	95-100	95-100	80-90	35-50	20-40	5-15
	52-60	Stratified loamy sand to silt loam.	SM, SP-SM	A-2, A-1-b	0-5	75-95	50-75	20-50	5-30	---	NP

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
373B---------- Camden	0-8	Silt loam-----	CL, ML, CL-ML	A-4, A-6	0	100	100	95-100	90-100	20-35	3-15
	8-33	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	90-100	25-40	15-25
	33-53	Clay loam, sandy loam, silt loam.	ML, SC, SM, CL	A-2, A-4 A-6	0-5	90-100	85-100	60-100	30-70	20-40	3-15
	53-64	Stratified loamy sand to silt loam.	SM, SC, ML, CL	A-2, A-4	0-5	90-100	80-100	50-80	20-60	<25	3-10
374B, 374C2--- Proctor	0-12	Silt loam-----	CL	A-6	0	100	100	95-100	85-100	25-40	10-22
	12-28	Silty clay loam.	CL	A-6	0	100	100	95-100	85-100	30-40	10-20
	28-44	Clay loam, sandy loam.	SC, SM-SC, SM	A-4, A-6	0	95-100	95-100	80-90	35-50	20-40	3-15
	44-60	Stratified loamy sand to sandy loam.	SM, SP-SM	A-2, A-1-b	0-5	75-95	50-75	20-50	5-30	---	NP
597----------- Armiesburg	0-14	Silt loam-----	CL, CH	A-6, A-7	0	100	100	95-100	85-95	35-55	20-35
	14-52	Silty clay loam.	CL, CH	A-6, A-7	0	100	100	95-100	85-95	35-55	20-35
	52-60	Stratified silty clay loam to loamy sand.	CL, SM-SC	A-4, A-2	0	95-100	95-100	80-90	30-70	<25	NP-15
802B. Orthents											
865*. Pits											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(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, 27D2, 27E, 27G-------------	0-5	11-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.37	5	5	1-3
Miami	5-36	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.6-8.4	Moderate------	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			
43---------------	0-15	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
Ipava	15-44	35-43	1.25-1.50	0.2-0.6	0.11-0.20	5.6-7.8	High----------	0.43			
	44-60	20-27	1.30-1.55	0.2-0.6	0.20-0.22	6.1-8.4	Moderate------	0.43			
56B--------------	0-16	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
Dana	16-33	27-35	1.45-1.65	0.6-2.0	0.18-0.20	5.1-6.0	Moderate------	0.43			
	33-55	27-35	1.45-1.65	0.6-2.0	0.15-0.19	6.1-7.3	Moderate------	0.43			
	55-60	15-27	1.55-1.90	0.2-0.6	0.05-0.19	6.6-8.4	Low-----------	0.43			
67---------------	0-15	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
Harpster	15-33	27-35	1.20-1.50	0.6-2.0	0.18-0.22	7.4-8.4	Moderate------	0.28			
	33-60	22-35	1.25-1.55	0.6-2.0	0.17-0.22	7.4-8.4	Moderate------	0.28			
68---------------	0-18	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
Sable	18-55	24-35	1.30-1.50	0.6-2.0	0.18-0.20	5.6-7.8	Moderate------	0.28			
	55-60	20-28	1.30-1.50	0.6-2.0	0.20-0.22	6.6-8.4	Low-----------	0.28			
74---------------	0-17	18-27	1.40-1.60	0.6-2.0	0.22-0.24	6.1-7.8	Low-----------	0.28	5	6	2-4
Radford	17-33	18-27	1.40-1.60	0.6-2.0	0.20-0.22	6.1-7.8	Low-----------	0.28			
	33-60	24-35	1.35-1.55	0.6-2.0	0.18-0.20	6.6-7.8	Moderate------	0.28			
107--------------	0-17	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
Sawmill	17-30	27-35	1.20-1.40	0.6-2.0	0.21-0.23	6.1-7.8	Moderate------	0.28			
	30-45	25-35	1.30-1.45	0.6-2.0	0.17-0.20	6.1-7.8	Moderate------	0.28			
	45-60	18-35	1.35-1.50	0.6-2.0	0.15-0.19	6.1-8.4	Moderate------	0.28			
136--------------	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
Brooklyn	8-14	20-27	1.25-1.40	0.2-0.6	0.20-0.22	5.1-7.3	Low-----------	0.37			
	14-46	35-45	1.35-1.55	0.06-0.2	0.11-0.20	5.1-7.3	High----------	0.37			
	46-60	10-30	1.40-1.70	0.2-0.6	0.11-0.19	7.4-8.4	Low-----------	0.37			
145C2------------	0-8	20-26	1.10-1.30	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.32	5	6	3-4
Saybrook	8-29	27-35	1.20-1.40	0.6-2.0	0.18-0.20	5.6-7.3	Moderate------	0.43			
	29-60	24-35	1.50-1.70	0.6-2.0	0.15-0.21	5.6-8.4	Low-----------	0.43			
152--------------	0-16	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
Drummer	16-44	20-35	1.20-1.45	0.6-2.0	0.21-0.24	5.6-7.8	Moderate------	0.28			
	44-51	22-33	1.30-1.55	0.6-2.0	0.17-0.20	6.1-8.4	Moderate------	0.28			
	51-60	15-32	1.40-1.70	0.6-2.0	0.11-0.19	6.6-8.4	Low-----------	0.28			
153--------------	0-10	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
Pella	10-26	27-35	1.20-1.45	0.6-2.0	0.21-0.24	6.6-7.8	Moderate------	0.28			
	26-54	15-30	1.35-1.60	0.6-2.0	0.15-0.20	7.4-8.4	Moderate------	0.28			
	54-60	15-30	1.40-1.70	0.6-2.0	0.10-0.22	7.4-8.4	Low-----------	0.28			
154--------------	0-12	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
Flanagan	12-42	35-42	1.25-1.45	0.6-2.0	0.15-0.22	5.6-7.3	High----------	0.43			
	42-60	20-30	1.45-1.70	0.2-0.6	0.15-0.22	6.1-8.4	Low-----------	0.43			
171B-------------	0-11	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
Catlin	11-46	27-35	1.25-1.55	0.6-2.0	0.18-0.20	5.1-7.3	Moderate------	0.43			
	46-62	20-30	1.40-1.70	0.6-2.0	0.07-0.11	6.1-8.4	Low-----------	0.43			

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
198-------------- Elburn	0-12	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
	12-45	27-35	1.20-1.40	0.6-2.0	0.18-0.20	5.6-7.8	Moderate-----	0.43			
	45-60	15-25	1.50-1.70	2.0-6.0	0.12-0.18	6.1-8.4	Low----------	0.43			
199B------------- Plano	0-11	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
	11-48	25-35	1.20-1.40	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.43			
	48-63	10-20	1.50-1.70	0.6-2.0	0.11-0.22	5.6-8.4	Low----------	0.43			
221C2------------ Parr	0-7	12-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.32	5	5	2-4
	7-24	22-32	1.40-1.55	0.6-2.0	0.15-0.19	5.6-7.3	Moderate-----	0.32			
	24-31	20-25	1.55-1.65	0.6-2.0	0.15-0.17	6.6-8.4	Moderate-----	0.32			
	31-60	10-20	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Low----------	0.32			
223B2------------ Varna	0-7	27-35	1.20-1.40	0.6-2.0	0.20-0.22	5.6-7.3	Moderate-----	0.32	3	7	2-3
	7-27	35-48	1.30-1.60	0.2-0.6	0.09-0.19	5.6-7.3	Moderate-----	0.32			
	27-60	25-35	1.50-1.70	0.2-0.6	0.14-0.20	6.6-8.4	Low----------	0.32			
234-------------- Sunbury	0-8	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
	8-47	35-45	1.35-1.55	0.6-2.0	0.18-0.20	5.6-7.8	High---------	0.43			
	47-62	20-30	1.40-1.60	0.2-0.6	0.07-0.11	6.6-8.4	Low----------	0.43			
236-------------- Sabina	0-13	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
	13-55	35-42	1.35-1.55	0.2-0.6	0.18-0.20	5.6-7.3	High---------	0.37			
	55-63	20-35	1.50-1.80	0.2-0.6	0.07-0.11	7.4-8.4	Low----------	0.37			
244-------------- Hartsburg	0-17	27-33	1.15-1.35	0.6-2.0	0.21-0.24	6.1-7.8	Moderate-----	0.28	5	4	3-5
	17-24	27-35	1.20-1.50	0.6-2.0	0.18-0.20	6.6-8.4	Moderate-----	0.28			
	24-60	20-27	1.30-1.55	0.6-2.0	0.20-0.22	7.4-8.4	Low----------	0.28			
284-------------- Tice	0-16	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
	16-53	22-35	1.30-1.50	0.6-2.0	0.18-0.20	5.6-7.8	Moderate-----	0.32			
	53-60	15-30	1.40-1.60	0.6-2.0	0.11-0.18	5.6-7.8	Moderate-----	0.32			
291B------------- Xenia	0-9	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
	9-32	27-35	1.45-1.65	0.2-0.6	0.18-0.20	5.1-6.0	Moderate-----	0.37			
	32-55	27-35	1.45-1.65	0.2-0.6	0.15-0.19	5.1-7.3	Moderate-----	0.37			
	55-60	20-27	1.55-1.90	0.2-0.6	0.05-0.19	7.9-8.4	Low----------	0.37			
322B, 322C2------ Russell	0-7	11-25	1.30-1.45	0.6-2.0	0.21-0.24	5.1-7.3	Low----------	0.37	5	5	.5-2
	7-34	25-33	1.40-1.60	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-----	0.37			
	34-48	23-33	1.40-1.60	0.6-2.0	0.15-0.19	5.1-7.3	Moderate-----	0.37			
	48-60	14-29	1.60-1.80	0.6-2.0	0.05-0.19	7.4-8.4	Low----------	0.37			
330-------------- Peotone	0-18	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
	18-53	35-45	1.30-1.60	0.2-0.6	0.11-0.20	6.1-7.8	High---------	0.28			
	53-60	25-42	1.40-1.65	0.2-0.6	0.18-0.20	6.6-8.4	High---------	0.28			
371B------------- St. Charles	0-10	20-27	1.20-1.40	0.6-2.0	0.22-0.24	6.6-7.3	Low----------	0.37	5	6	1-3
	10-50	25-35	1.30-1.50	0.6-2.0	0.18-0.20	4.5-6.5	Moderate-----	0.37			
	50-56	20-27	1.35-1.55	0.6-2.0	0.16-0.18	5.1-6.5	Moderate-----	0.37			
	56-66	1-5	1.55-1.80	6.0-20	0.05-0.07	5.1-7.3	Low----------	0.15			
372-------------- Kendall	0-11	20-27	1.15-1.30	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	6	1-3
	11-44	27-35	1.30-1.50	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37			
	44-52	20-27	1.35-1.55	0.6-2.0	0.16-0.18	5.6-7.3	Low----------	0.37			
	52-60	1-5	1.55-1.80	6.0-20	0.05-0.07	6.1-8.4	Low----------	0.17			
373B------------- 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
	8-33	22-35	1.35-1.55	0.6-2.0	0.16-0.20	5.1-7.3	Moderate-----	0.37			
	33-53	18-30	1.45-1.65	0.6-2.0	0.11-0.22	5.6-7.3	Low----------	0.37			
	53-64	5-20	1.55-1.75	0.6-6.0	0.11-0.22	5.6-8.4	Low----------	0.37			

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
374B, 374C2------	0-12	18-27	1.10-1.30	0.6-2.0	0.22-0.24	5.1-7.8	Low----------	0.32	5	6	3-4
Proctor	12-28	27-35	1.35-1.55	0.6-2.0	0.15-0.20	5.6-7.3	Moderate-----	0.43			
	28-44	18-30	1.45-1.65	2.0-6.0	0.11-0.18	5.6-7.8	Low----------	0.43			
	44-60	1-5	1.55-1.80	6.0-20	0.05-0.07	5.6-7.8	Low----------	0.17			
597--------------	0-14	25-35	1.30-1.45	0.6-2.0	0.21-0.23	6.1-7.3	Moderate-----	0.28	5	6	2-4
Armiesburg	14-52	30-35	1.30-1.45	0.6-2.0	0.18-0.20	6.1-6.5	Moderate-----	0.28			
	52-60	10-30	1.45-1.65	0.6-2.0	0.10-0.18	6.1-6.5	Low----------	0.37			
802B. Orthents											
865*. Pits											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "frequent," "brief," and "apparent," 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	Hydro-logic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
27C2, 27D2, 27E, 27G Miami	B	None	---	---	>6.0	---	---	Moderate	Moderate	Moderate.
43 Ipava	B	None	---	---	1.0-3.0	Apparent	Mar-Jun	High	High	Moderate.
56B 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.
74 Radford	B	Frequent	Brief	Mar-Jun	1.0-3.0	Apparent	Mar-Jun	High	High	Low.
107 Sawmill	B/D	Frequent	Brief	Mar-Jun	0-2.0	Apparent	Mar-Jun	High	High	Low.
136 Brooklyn	C/D	None	---	---	+.5-2.0	Apparent	Mar-Jun	High	High	Moderate.
145C2 Saybrook	B	None	---	---	4.0-6.0	Apparent	Mar-Jun	High	High	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.
154 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.
198 Elburn	B	None	---	---	1.0-3.0	Apparent	Jan-May	High	High	Moderate.
199B Plano	B	None	---	---	3.0-6.0	Apparent	Mar-May	High	Moderate	Low.
221C2 Parr	B	None	---	---	>6.0	---	---	Moderate	High	Moderate.
223B2 Varna	C	None	---	---	>6.0	---	---	High	Moderate	Moderate.
234 Sunbury	B	None	---	---	1.5-3.5	Apparent	Mar-Jun	High	High	Moderate.
236 Sabina	C	None	---	---	1.5-3.5	Apparent	Mar-Jun	High	High	Moderate.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
244------------- Hartsburg	B/D	None--------	---	---	+.5-2.0	Apparent	Mar-Jun	High-----	High-----	Low.
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.
322B, 322C2----- Russell	B	None--------	---	---	>6.0	---	---	High-----	Moderate	Moderate.
330------------- Peotone	B/D	None--------	---	---	+.5-1.0	Apparent	Feb-Jul	High-----	High-----	Moderate.
371B------------ St. Charles	B	None--------	---	---	>6.0	---	---	High-----	Moderate	Low.
372------------- Kendall	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
373B------------ Camden	B	None--------	---	---	>6.0	---	---	High-----	Low------	Moderate.
374B, 374C2----- Proctor	B	None--------	---	---	>6.0	---	---	High-----	Moderate	Moderate.
597------------- Armiesburg	B	Occasional--	Brief-----	Oct-Jun	>6.0	---	---	High-----	Moderate	Low.
802B. Orthents										
865*. Pits										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--ENGINEERING INDEX TEST DATA

(MAX means maximum dry density; OPT, optimum moisture; LL, liquid limit; PI, plasticity index; and UN, Unified)

Soil name and location	Sample number 83-IL-147-	Horizon	Depth	Moisture density		Percentage passing sieve--				LL	PI	Classification	
				MAX	OPT	No. 4	No. 10	No. 40	No. 200			AASHTO	UN
			In	Lb/ cu ft	Pct					Pct			
Sunbury silt loam:	25-1	Ap	0-8	106	18.8	100	100	98	94	32	12	A-4(11)	CL
1,690 feet south and	25-2	Bt	8-47	102	20.6	100	100	100	98	42	21	A-7-6(22)	CL
240 feet west of the	25-3												
northeast corner of	25-4												
sec. 14, T. 16 N.,	25-5												
R. 6 E.	25-6	2BC, 2C	47-62	122	11.8	95	92	90	84	21	8	A-4(4)	CL
	25-7												
Xenia silt loam:	35-1	Ap, E	0-9	109	16.9	100	100	98	94	29	8	A-4(7)	CL
2,300 feet north and	35-2												
1,000 feet east of	35-3	Bt1, Bt2	9-32	110	16.4	100	100	100	98	44	26	A-7-6(27)	CL
the southwest corner	35-4												
of sec. 24, T. 16	35-5	2Bt, 2BC	32-55	116	14.6	97	94	86	65	28	15	A-6(7)	CL
N., R. 6 E.	35-6												
	35-7	2C	55-60	124	11.3	95	91	83	61	21	8	A-4(2)	CL

TABLE 19.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Armiesburg	Fine-silty, mixed, mesic Fluventic Hapludolls
*Brooklyn	Fine, montmorillonitic, mesic Mollic Albaqualfs
Camden	Fine-silty, mixed, mesic Typic Hapludalfs
Catlin	Fine-silty, mixed, mesic Typic Argiudolls
Dana	Fine-silty, mixed, mesic Typic Argiudolls
Drummer	Fine-silty, mixed, mesic Typic Haplaquolls
Elburn	Fine-silty, mixed, mesic Aquic Argiudolls
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
Kendall	Fine-silty, mixed, mesic Aeric Ochraqualfs
Miami	Fine-loamy, mixed, mesic Typic Hapludalfs
Orthents	Loamy, mixed, nonacid, mesic Udorthents
*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
Radford	Fine-silty, mixed, mesic Fluvaquentic Hapludolls
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
*Saybrook	Fine-silty, mixed, mesic Typic Argiudolls
St. Charles	Fine-silty, mixed, mesic Typic Hapludalfs
Sunbury	Fine, montmorillonitic, mesic Aquollic Hapludalfs
Tice	Fine-silty, mixed, mesic Fluvaquentic Hapludolls
*Varna	Fine, illitic, mesic Typic Argiudolls
Xenia	Fine-silty, mixed, mesic Aquic Hapludalfs

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