Issued March 1971

Soil Survey
CHAMPAIGN COUNTY
Ohio

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
OHIO DEPARTMENT OF NATURAL RESOURCES
Division of Lands and Soil
and
OHIO AGRICULTURAL RESEARCH AND
DEVELOPMENT CENTER

Major fieldwork for this soil survey was done in the period 1957–62. Soil names and descriptions were approved in 1966. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1962. This survey was made cooperatively by the Soil Conservation Service, the Division of Lands and Soil, Ohio Department of Natural Resources, and the Ohio Agricultural Research and Development Center. It is part of the technical assistance furnished to the Champaign Soil Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased, on individual order, from the Cartographic Division, Soil Conservation Service, USDA, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

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

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

Finding and Using Information

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

Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitations for a particular use. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

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

Foresters and others can refer to the section "Use of the Soils as Woodland."

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

Community planners and others concerned with nonfarm development can read about soil properties that affect the choice of homesites, industrial sites, and recreational sites in the section "Soils and Land Use Planning."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that describe soil features that affect engineering practices and show the relative suitability of the soils for specified engineering purposes.

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

Newcomers in Champaign County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the County."

Cover picture: **Stripcropping on a sloping Miami silt loam.**

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SOIL SURVEY OF CHAMPAIGN COUNTY, OHIO

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH OHIO DEPARTMENT OF NATURAL RESOURCES, DIVISION OF LANDS AND SOIL, AND OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER

CHAMPAIGN COUNTY, in the west-central part of Ohio (fig. 1), has a total land area of about 433 square miles. Urbana, the county seat, is about 40 miles west and 9 miles north of Columbus, the State capital.

Farming is the leading occupation. A large part of the farm income in 1964 was derived from the sale of livestock and livestock products, mainly dairy products, beef cattle, and swine.[1] Corn, oats, wheat, soybeans, and hay are grown extensively on many farms and are a main source of income on some farms. Wood products contribute only a small part of the farm income.

Most of the soils are deep or moderately deep. All have formed in glacial till or glacial outwash of Wisconsin age, or from recent alluvium.

[1] From statistics of the U.S. Census of Agriculture.

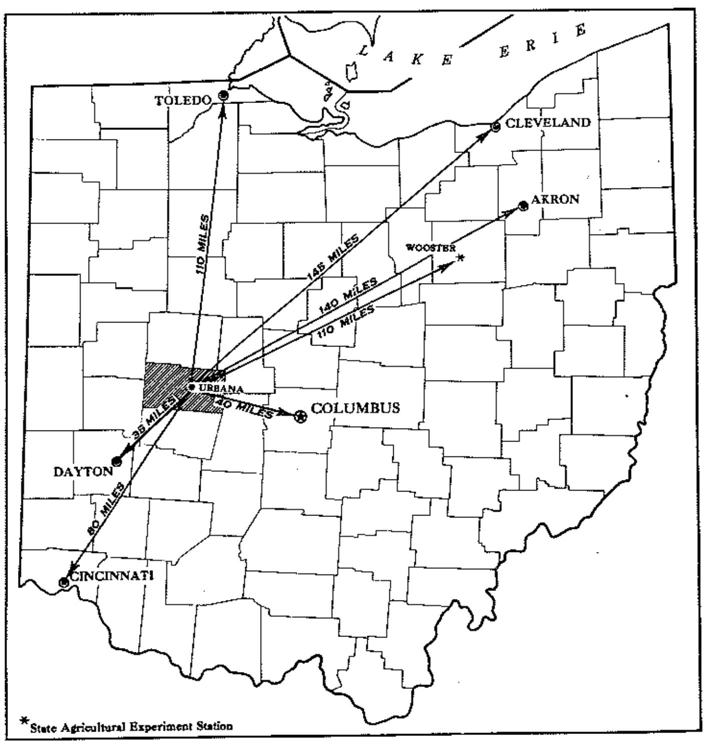

Figure 1.—Location of Champaign County in Ohio.

How This Survey Was Made

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

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. To use this publication efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

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

Many soil series contain soils that differ in the texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Fox sandy loam and Fox silt loam are two soil types in the Fox series. The difference in the texture of their surface layers is apparent from their names.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into soil phases. The name of a soil phase indicates a feature that affects management. For example, Fox silt loam, 2 to 6 percent slopes, is one of several phases of Fox silt loam, a soil type that has a slope range of 0 to 12 percent.

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

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

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed or occur in such small individual tracts that it is not practical to show them separately on the map. They show such a mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soils in it, for example, Miami-Casco-Rodman complex, 18 to 25 percent slopes, moderately eroded.

Another kind of mapping unit is the undifferentiated group, which consists of two or more soils that may occur together without regularity in pattern or relative proportion. The individual tracts of the component soils could be shown separately on the map, but the differences between the soils are so slight that the separation is not important for the objectives of the soil survey. An example is Miami and Lewisburg silt loams, 25 to 50 percent slopes, moderately eroded.

Most surveys include areas where the soil material is so rocky, so shallow, or so frequently worked by wind and water that it cannot be classified by soil series. Such an area is shown on the map like other mapping units, but it is given a descriptive name, such as Made land or Gravel pit, and is called a land type.

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

But only part of a soil survey is done when the soils have been named, described, and delineated on the map and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way that it is readily useful to different groups of readers, among them farmers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in soil surveys. The soil scientists set up trial groups based on the yield and practice tables and other data. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others; then they adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

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

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

The general soil map for Champaign County also shows the glacial boulder belt—an area where melting glaciers left numerous boulders on the surface and in the soils during the Wisconsin age. The eight soil associations in Champaign County are described in the following pages.

1. Brookston-Crosby Association

Nearly level and undulating, very poorly drained and somewhat poorly drained, moderately fine textured and medium-textured soils on uplands

This association is mainly along the eastern boundary and in the northwestern corner of the county, but a small area is southeast of Saint Paris. The association occupies about 7 percent of the county.

Brookston soils make up about 53 percent of the acreage, and Crosby soils make up about 27 percent. These soils have formed in calcareous, medium-textured glacial till. The Brookston soils occur in nearly level areas or in depressions, and they are dark colored and very poorly drained. The Crosby soils, on rises, are nearly level or gently undulating, light colored, and somewhat poorly drained. Areas of these light-colored Crosby and dark-colored Brookston soils form a distinct pattern in many plowed fields.

Minor areas of very poorly drained Lippincott and Sloan soils make up the rest of the association. The Lippincott soils are on stream terraces, and the Sloan soils are on flood plains.

The soils of this association are farmed intensively. Under good management they are well suited to most of the commonly grown crops, and they are highly important to farming in this county. Restricted natural drainage is their major limitation. Much of the acreage, however, has been artificially drained for farming. A seasonal high water table is a limitation to many nonfarm uses of the soils.

2. Crosby-Brookston-Celina Association

Nearly level and undulating, moderately well drained to very poorly drained, medium-textured and moderately fine textured soils on uplands

This association is in the western part of the county. It consists of nearly level and undulating areas interspersed with drainageways and shallow depressions. The association occupies about 25 percent of the county.

Crosby soils make up about 50 percent of the acreage, Brookston soils make up about 20 percent, and Celina soils make up about 15 percent. All of these soils have formed in medium-textured, calcareous glacial till. The Crosby soils are light-colored, somewhat poorly drained, and nearly level or gently undulating. The Brookston soils are dark colored, very poorly drained, and nearly level or gently sloping, but only a small acreage is gently sloping. The Celina soils are light colored, moderately well drained, and undulating. The Brookston soils are in upland depressions. Generally, the Celina soils occupy higher areas than the Crosby and Brookston soils. Other soils make up the remaining 15 percent of the association.

Most of this association is cultivated. The soils are well suited to most of the locally grown crops if they are adequately drained and are otherwise well managed. Restricted natural drainage is a limitation to use of the Crosby and Brookston soils for crops, and erosion is a hazard in sloping areas of Celina soils. Slope and a seasonal high water table are limitations to many nonfarm uses of the soils.

3. Miami-Celina-Brookston Association

Undulating to steep, well drained and moderately well drained, medium-textured soils on uplands; and nearly level or depressed, very poorly drained, moderately fine textured soils on uplands

This association is in the central, northern, and eastern parts of the county. It occupies about 39 percent of the county.

Miami soils make up about 50 percent of the acreage, Celina soils make up about 12 percent, and Brookston soils make up about 10 percent. These soils have formed in calcareous, medium-textured glacial till. The Miami soils are light colored, well drained, and sloping to steep. The Celina soils, also light colored, are moderately well drained and undulating. The Brookston soils are dark colored and very poorly drained. They occur in depressions and drainageways.

Other soils in this association are the well-drained Kendallville and Casco soils. Somewhat poorly drained Crosby soils also occupy a minor acreage.

Much of the association is cultivated, but part of it is in pasture or trees. Moderate or strong slopes and susceptibility to erosion make some of the Miami soils and some Celina soils poorly suited to crops. The less sloping areas of Miami and Celina soils can be cultivated if practices are used that help to control erosion. The Brookston soils can be cultivated intensively if they are adequately drained. Slope is the dominant limitation to many nonfarm uses in this association. Other limitations to many uses are moderately slow permeability of the soils and a seasonal high water table in the Brookston soils.

4. Miami Association

Nearly level to undulating, well-drained, medium-textured soils on uplands

This association is on side slopes of the Springfield moraine in the east-central part of the county. It occupies about 2 percent of the county.

Miami soils, which make up about 70 percent of the association, are nearly level to undulating, light colored, and well drained. They have formed in medium-textured, calcareous till that is underlain by gravel and sand at depths between 5 and 25 feet. Among the minor soils are moderately well drained Celina soils, which occupy low areas. These and other minor soils make up the remaining 30 percent of the association.

Most of this association is used for cultivated crops. In general, the soils are well suited to corn, soybeans, and hay, and they are not difficult to manage. Practices that control erosion are needed. Slope and moderately slow permeability are limitations to many nonfarm uses of the soils.

5. Miami (Steep) Association

Sloping to steep, well-drained, medium-textured soils on uplands

This association is along Nettle, Storms, and Chapman Creeks in the western part of the county. It occupies about 5 percent of the county.

Light-colored, well-drained Miami soils make up about 80 percent of the acreage. They have formed in medium-textured, calcareous glacial till. Other soils occupy the remaining 20 percent of the association.

The soils of this association are mainly used as woodland or for permanent pastures. The pastures generally have low carrying capacity. Erosion is a hazard unless good management is used. Steep slopes are the dominant limitation to most nonfarm uses.

6. Fox-Lippincott Association

Nearly level to sloping, well-drained, medium-textured soils on stream terraces, and nearly level or depressed, moderately fine textured soils on stream terraces

This soil association is mainly in the central part of the county. It occupies about 20 percent of the county.

Fox soils make up about 50 percent of the acreage, and Lippincott soils, about 20 percent. These soils have formed in loamy material over calcareous gravel and sand. The Fox soils are nearly level to sloping, and they occupy the higher terraces and also the highest parts of the lower terraces. The Lippincott soils are in nearly level areas or in depressions on the lower terraces.

Other soils in this association are the well-drained Warsaw, the moderately well drained Ionia, the somewhat poorly drained Homer, the very poorly drained

Algiers, and the very poorly drained, organic Linwood and Carlisle soils. The Warsaw, Linwood, and Carlisle soils are dark colored, and the Ionia, Homer, and Algiers soils are light colored. These other soils occupy about 30 percent of the association.

During dry periods the Fox soils tend to be droughty because they have only limited available moisture capacity. Normally, however, enough moisture is available for crops. Suitability of the Lippincott soils for crops is limited by the very poor natural drainage, but if these soils are adequately drained, crops grown on them produce well.

Most of this association is used intensively for crops, mainly corn, soybeans, small grains, and hay. If properly managed, all of the soils are well suited to the locally grown crops. Some of the soils in this association are among the best in the county for the commonly grown crops.

7. Miami-Fox-Casco Association

Gently sloping to steep, well-drained, medium-textured soils on moraines and kames

This association is in the middle part of the county. It occupies only about 1 percent of the county.

Miami soils make up about 35 percent of the acreage, Fox soils, about 20 percent, and Casco soils, about 10 percent. The Miami soils are gently sloping to steep and have formed in medium-textured, calcareous till. The Fox soils are nearly level to gently rolling and have formed in loamy material underlain by calcareous, stratified gravel and sand. The Casco soils are gently sloping to steep and are also underlain by calcareous gravel and sand. Both the Fox and Casco soils tend to be droughty in dry periods. The remaining 35 percent of the association is occupied by minor soils.

Under good management the less sloping areas of Fox and Miami soils are suited to most of the locally grown crops. The areas of Miami and Casco soils that have stronger slopes are in pasture or trees. Unless they are well managed, the pastures have low carrying capacity. Slope is the dominant limitation to many nonfarm uses of these soils.

8. Patton Association

Level or depressed, very poorly drained, moderately fine textured soils on old glacial lakebeds

This association is in the east-central part of the county. It occupies less than 1 percent of the county.

Dark-colored, very poorly drained Patton soils in nearly level areas or depressions make up about 95 percent of the acreage. These soils have formed in silty material deposited in old glacial lakes.

This association is farmed intensively. The soils are well suited to corn and soybeans if they are well managed. Very poor natural drainage is the major limitation to use of the soils for crops, but much of the association has been improved by installing ditches and tile drains. Very poor natural drainage and a seasonal high water table are limitations to many nonfarm uses.

Use and Management of the Soils

This section contains information about use and management of the soils for crops and pasture and gives estimated yields of the principal crops. It also gives facts about use of the soils as woodland, about suitability of the soils for wildlife habitat, and about properties and limitations of the soils for engineering construction and land use planning.

Management for Crops and Pasture

Field crops commonly grown in Champaign County are corn, soybeans, wheat, and oats. Pasture and hay plants are mainly alfalfa, alsike clover, Ladino clover, red clover, timothy, orchardgrass, and bromegrass. Specialty crops include popcorn, potatoes, sweet corn, strawberries, and other crops adapted to the climate. In the following pages are discussed general practices for managing the soils where these crops are grown. Also discussed is the system of capability classification. In addition, management of individual groups of soils, the capability units, is described and estimated yields of the main crops are given.

General practices of management [2]

The soils of Champaign County vary in their suitability for specific crops, and they require widely different management. Some basic, or general, management practices are needed on practically all of the soils. The following paragraphs discuss the basic practices of maintaining fertility, utilizing crop residue, improving drainage, controlling erosion, and irrigating the soils. Management of specified groups of soils is discussed in the subsection "Capability Groups of Soils," but more specific information can be obtained by consulting a representative of the Soil Conservation Service or the Ohio Agricultural Extension Service.

Maintaining an adequate level of fertility.—Because many of the soils in this county, especially the light-colored ones, are naturally acid and low in content of plant nutrients, additions of lime and fertilizer are needed. Such additions should be based on the results of soil tests, on the needs of the crop to be grown, and on the level of yields desired. For assistance in determining the kinds and amounts of fertilizer and lime to apply, farmers should consult a representative of the Ohio Agricultural Extension Service.

Utilizing crop residue.—Many of the soils in this county, particularly such light-colored ones as the Celina and Miami, are low in content of organic matter. To offset this deficiency, all crop residue should be returned to the soils. If soybeans or other crops that produce little residue are grown, cover crops or sod crops should be included in the cropping system.

Draining the soils.—In this county wetness is a limitation to use of the soils for crops in about 49 percent of the acreage suitable for cultivation. Crops grow well, however, on the Crosby and other somewhat poorly drained soils and on the Brookston and other very poorly drained soils where excess water has been removed by surface drains, tile drains, or both. Land

[2] By GLEN E. BERNATH, State resource conservationist, and RICHARD L. GOOGINS, assistant State soil scientist.

smoothing is also beneficial in many areas. Few or no practices are needed for improving drainage of the moderately well drained soils.

Controlling erosion.—Erosion is a hazard on gently sloping to very steep soils. About 40 percent of the acreage of soils suitable for cultivation, including some areas of Celina and Miami soils, is susceptible to erosion. Commonly used practices that control erosion in this county are contour stripcropping, tilling on the contour, keeping tillage to a minimum, utilizing crop residue, planting close-growing crops, and constructing terraces, waterways, and diversions.

Irrigation.—Irrigation is a specialized practice that requires very intensive management. Many soils in this county that are suited to crops are also suitable for irrigation. Generally, soils well suited to irrigation absorb water readily, have adequate available moisture capacity, and drain readily. Among those considered suitable for irrigation are the nearly level and gently sloping Eel, Fox, Genesee, Ionia, Warsaw, and Wea soils. Erosion is a hazard on gently sloping soils that are irrigated.

Industries that need to dispose of waste water may be able to dispose of it through irrigation. Industrial wastes diverted to a natural stream can pollute the stream. Where no outlet for industrial wastes is available except through a stream, the pollutants should be eliminated before waste water is delivered to the stream. *Industries that irrigate with water containing waste products need carefully to select the site for disposing of this waste to prevent contamination of the underground water supply.* Some soils are not deep enough to assure adequate filtration.

Capability groups of soils

Capability classification is the grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on the limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The classification does not apply to most horticultural crops or to other crops that have special requirements. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive alterations in the slope, depth, or other characteristics of the soils; and without consideration of possible but unlikely major reclamation projects.

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

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, 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 require moderate conservation practices.

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

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

Class V. Soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover. (No class V soils in Champaign County.)

Class VI. Soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Class VII. Soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII. Soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes. (No class VIII soils in Champaign County.)

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry. (Subclass *c* is not used in Ohio.)

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

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding Arabic numerals to the subclass symbol, for example, IIIe-2. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit.

In the following pages, each of the capability units in Champaign County is described, and suggestions for use and management are given. The names of soil series represented are mentioned in the description of each unit, but this does not mean that all the soils of a given series are in the unit. The capability unit designation for each soil in the county can be found in the "Guide to Mapping Units" at the back of this survey.

CAPABILITY UNIT I-1

This capability unit consists of light-colored, well drained or moderately well drained, nearly level Celina, Kendallville, Miami, and Ockley soils. These soils are on uplands or stream terraces high enough to escape flooding. Their root zone is moderately deep or deep, permeability is moderate or moderately slow, and available moisture capacity is medium to high. The root zone of these soils normally is medium acid or strongly acid.

These soils have no features that limit their use for field crops and pasture. Erosion is not a hazard or is only a slight hazard where management is good. Deterioration of the soil structure can be prevented by growing crops that supply a large amount of residue.

All the field crops and hay or pasture plants commonly grown in the county can be grown on these soils. In addition, the soils are suited to some specialty crops. Under intensive management they can be used for cultivated crops grown year after year. The Ockley soil is well suited to irrigation. The other soils are less well suited than the Ockley soil, but they can be irrigated.

CAPABILITY UNIT I-2

Only Wea silt loam, 0 to 3 percent slopes, is in this capability unit. This soil is on stream terraces that are high enough to escape flooding. It is well drained and has a deep root zone, moderate permeability, and high available moisture capacity.

This soil has no features that limit its use for field crops or pasture. Erosion is not a hazard or is only a slight hazard where management is good.

This soil is suited to all of the field crops and hay or pasture plants commonly grown in the county. It is also well suited to specialty crops and is suited to irrigation. Under intensive management cultivated crops can be grown year after year.

CAPABILITY UNIT IIe-1

This capability unit consists of gently sloping Celina, Kendallville, and Miami soils that are light colored and well drained or moderately well drained. These soils are on uplands. They have a moderately deep or deep root zone, moderately slow permeability, and medium available moisture capacity. In most places the root zone is medium acid or strongly acid.

Some of these soils are already moderately eroded, and the hazard of further erosion is moderate. Therefore, practices that help to control erosion and that maintain a good supply of plant nutrients and favorable soil tilth are needed. Some areas of the Celina soils are bouldery, and the boulders must be removed before those areas can be used for crops.

Soils of this unit are suited to all the field crops, specialty crops, and hay or pasture plants commonly grown in the county. Under intensive management they can be used for cultivated crops grown year after year. If less than intensive management is used, practices that control erosion should be stressed to prevent excessive losses of soil material. Keeping an adequate cover of plants on pastures and hayfields at all times is necessary to protect these soils from erosion.

CAPABILITY UNIT IIe-2

This capability unit consists of gently sloping Fox, Ionia, and Warsaw soils on stream terraces that are normally above flood stage. These soils are well drained or moderately well drained. The Fox and Ionia soils are light colored, and the Warsaw soil is dark colored. Some of these soils are moderately eroded, but all are moderately deep over sandy and gravelly material. The root zone is mostly moderately deep, permeability is moderate, and the available moisture capacity is medium to low. Reaction of the root zone normally is slightly acid to medium acid.

The principal limitation to use of these soils for row crops is a moderate hazard of erosion. The soils also tend to be droughty in dry periods because of the limited available moisture capacity. They are well suited to irrigation if erosion is controlled. Good tilth is difficult to maintain unless a large amount of crop residue is returned to the soils, especially where the surface layer is silt loam or is eroded. The Warsaw soil, however, already has a high content of organic matter and is easier to keep in good tilth than the other soils.

Soils of this unit are suited to all of the field crops, hay and pasture plants, and specialty crops commonly grown in the county. Their tendency to droughtiness makes them better suited to early maturing crops than to crops that mature late in summer. Where management is intensive, row crops can be grown year after year. Where management is less than intensive, practices that help to control erosion should be stressed to prevent excessive losses of soil material. Practices that control erosion and that maintain good tilth generally also result in satisfactory crop returns for the farm operator. Keeping an adequate cover of plants on pastures and hayfields at all times is necessary to protect these soils from erosion.

CAPABILITY UNIT IIe-3

In this capability unit are deep, light-colored, well drained or moderately well drained Ockley and Uniontown soils. These soils are gently sloping and are on stream terraces high enough that they escape flooding. The root zone is deep, permeability is moderate or moderately slow, and the available moisture capacity is high. Reaction is slightly acid or medium acid.

A moderate hazard of erosion is the major limitation to use of these soils for crops. Maintaining a good supply of plant nutrients and favorable soil tilth is a major concern where the soils are intensively farmed.

These soils are suited to all of the field crops, specialty crops, and hay and pasture plants commonly grown in the county. Under intensive management they can be used for cultivated crops grown year after year. If less than intensive management is used, the cropping sequence should include a small grain or other close-growing crop and sod as a pasture crop, for these crops help to keep the soils in good tilth and protect them from erosion. Erosion is not a hazard or is only a slight hazard where these soils are in pasture or hay and are protected by an adequate cover of plants.

CAPABILITY UNIT IIw-1

This capability unit consists of Algiers, Shoals, and Wallkill soils that are somewhat poorly drained or very poorly drained. These soils are in low-lying areas. The Algiers and Shoals soils are subject to stream flooding. The Wallkill soil is high enough that it escapes stream flooding, but it is subject to surface ponding. All of the soils have a higher water table during winter and spring, and they remain wet until late in spring unless they are artificially drained. The root zone ranges from shallow to deep, depending upon the level of the water table. In summer the root zone of the Algiers and Shoals soils is generally deep. The Wallkill soil, however, is generally saturated with water at depths below 2 feet because it is mucky below a depth of 2 to 3½ feet. In all of the soils, the available moisture capacity is high. In some of the soils, permeability is moderately slow, but it ranges to moderately rapid in the organic material underlying the Wallkill soil. All of these soils are normally neutral in reaction.

Soil wetness and the hazard of flooding are the major limitations to use of these soils for crops. Good tilth is difficult to maintain because the soils are frequently worked when wet. Clods form and these soils are likely to puddle if tilled when wet.

Under intensive management these soils can be used for cultivated crops grown year after year. Erosion is not a hazard or is only a slight hazard where less than intensive management is used.

If these soils are adequately drained, they are suited to most of the commonly grown field crops and hay or pasture plants that are tolerant of some soil wetness. In some areas, where flooding is frequent, these soils should be protected by a permanent cover of grass or trees.

CAPABILITY UNIT IIw-2

Light-colored, somewhat poorly drained Crosby, Henshaw, and Homer soils that are nearly level or gently sloping are in this capability unit. Some of these soils are on uplands, and others are on stream terraces. The Crosby and Homer soils have a moderately deep root zone, but the root zone of the Henshaw soils is deep. All of the soils have either medium or high available moisture capacity. They are saturated with water for long periods in winter or spring. Reaction is normally medium acid or strongly acid.

Poor natural drainage and soil wetness are the major limitations to use of these soils for crops. The soils are susceptible to surface crusting if they are cultivated. In some places the Crosby soils contain boulders that must be removed before the areas can be used for crops.

Soils of this unit can be artificially drained. Where they are adequately drained, they are suited to most of the field crops, hay crops, and pasture plants commonly grown in this county. Under intensive management cultivated crops can be grown frequently, or even year after year. Crops that supply a large amount of residue are needed to keep the soils in good tilth. Where less than intensive management is used, practices that help to control erosion should be emphasized in the gently sloping areas. Undrained areas are suited to most of the commonly grown field crops, but planting is generally delayed in spring. Hay and pasture plants that are tolerant of soil wetness should be seeded in undrained areas. Erosion is not a hazard or is only a slight hazard where these soils are in pasture or hay and are protected by an adequate cover of plants.

CAPABILITY UNIT IIw-3

This capability unit consists of deep, dark-colored, very poorly drained Brookston and Patton soils. These soils are on uplands and are nearly level or gently sloping. The Brookston soils are underlain by compact, limy glacial till, and the Patton soil, by silty material deposited in old glacial lakes. These soils have a seasonal high water table. They dry out slowly in spring unless they are adequately drained. In summer the root zone is normally deep. The available moisture capacity is high, and permeability is moderately slow. Reaction is normally medium acid to neutral.

Poor natural drainage and the resulting soil wetness are the major limitations to use of these soils for crops. The soils can be tilled satisfactorily only within a narrow range of moisture content; they are easily compacted and become cloddy if tilled or pastured when wet. Because of their high content of organic matter, these soils are not especially susceptible to surface crusting.

If adequate drainage is provided, and if other intensive management practices are used, cultivated crops can be grown frequently, or even year after year. Unless adequate drainage is provided, these soils are too wet for cultivated crops in most years.

Drained areas of these soils are suited to most of the commonly grown pasture and hay crops, including alfalfa. Undrained areas are suited only to pasture and hay crops that can tolerate soil wetness for long periods of time.

CAPABILITY UNIT IIw-4

Linwood muck is the only soil in this capability unit. It consists of muck that is 12 to 40 inches thick over loamy mineral material. This soil is in depressions and has a high water table much of the time. Depth of the water table determines depth of the root zone. Normally, reaction is neutral. The available moisture capacity is high.

The high water table is the major limitation to use of this soil for crops. Drainage can be provided, but the level of the water table should be controlled so that subsidence of the muck will be kept to a minimum. When dry, the muck burns readily, and it is also subject to blowing. It should be protected from fire and from blowing.

Adequately drained areas of this soil are well suited to field crops commonly grown in the county. This soil is also suited to potatoes, sweet corn, and other truck crops, but small grains tend to lodge because of the high content of nitrogen in the soil. Under intensive management row crops can be grown year after year.

Undrained areas of this soil are generally unsuitable for field crops and are poorly suited to pasture. Properly drained areas are well suited to pasture, but grasses and legumes that can tolerate soil wetness should be used for seeding.

CAPABILITY UNIT IIw-5

This capability unit consists of nearly level Eel, Genesee, and Ross soils that are well drained or moderately well drained. These soils are on flood plains and are subject to flooding that generally occurs in winter and spring. All of them are deep, and they have a deep root zone. Permeability is moderate, and the available moisture capacity is high. These soils are mostly neutral in reaction.

Flooding is the main limitation to use of these soils for crops, but it is a greater hazard to winter cover crops and to crops grown in spring than to those grown in summer. During flooding, more soil material is generally deposited than is lost through erosion. The Eel and Genesee soils, which are light colored, are susceptible to surface crusting. A crust is less likely to form on the Ross

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soil than on the other soils because the Ross soil has a higher content of organic matter.

These soils are well suited to specialty crops and to row crops grown in summer. Under intensive management they can be used for cultivated crops grown year after year. These soils are well suited to irrigation.

Soils of this unit are well suited to adapted grasses and legumes grown for hay or pasture. Low areas subject to frequent flooding are better suited to permanent grass or trees than to cultivated crops.

CAPABILITY UNIT IIw-6

In this capability unit are dark-colored, somewhat poorly drained and very poorly drained Kane and Lippincott soils that are moderately deep over gravelly and sandy material. These soils have a seasonal high water table during winter and spring. The root zone is moderately deep, and permeability is moderately slow. Reaction is normally medium acid.

The major limitation to use of these soils for crops is a seasonal high water table. The soils can be easily drained (fig. 2), however, and they are not especially susceptible to surface crusting, because they have a high content of organic matter. If tilled when wet, these soils, especially the Lippincott soil, are likely to become compacted and cloddy.

Where they are adequately drained, the soils of this unit are suited to the field crops, specialty crops, and hay or pasture plants commonly grown in the county. Under intensive management they can be used for cultivated crops grown year after year. Erosion is not a hazard or is only a slight hazard. Areas that are not drained are too wet in some years for crops to do well.

These soils are suitable for pasture, even where they are not drained. Pasture plants used for seeding should be ones that can tolerate some soil wetness. Compaction results if the pastures are grazed when wet. Then, the carrying capacity of the pasture decreases.

CAPABILITY UNIT IIs-1

This capability unit consists of nearly level, well drained or moderately well drained Fox, Ionia, and Warsaw soils that are moderately deep over sandy and gravelly material. These soils are on stream terraces, above the normal level reached by floodwaters. They are moderately permeable, have a moderately deep root zone, and have medium to low available moisture capacity. Reaction is mostly medium acid or strongly acid.

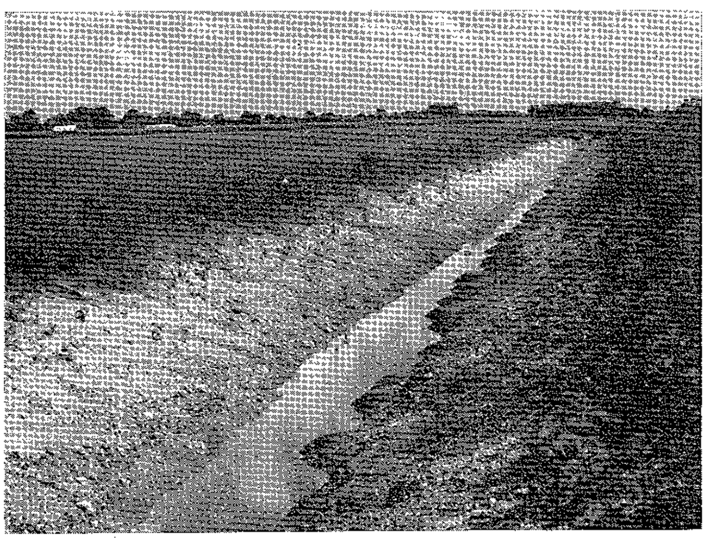

Figure 2.—**Open ditch used to drain an area of Lippincott silty clay loam.**

The major limitation to use of these soils for crops is the medium to low available moisture capacity. In addition, the Fox and Ionia soils, which are light colored, are susceptible to surface crusting if they are cultivated.

Soils of this unit are well suited to field crops, specialty crops, and hay or pasture plants commonly grown in this county. Because they are droughty late in summer, they are better suited to early maturing crops than to crops that mature late in summer. These soils are well suited to irrigation, however, and this practice can counteract the effects of the limited available moisture capacity. Crops that supply a large amount of crop residue help to keep the soils in good tilth, and they also help to conserve moisture by increasing the content of organic matter. Erosion is not a hazard or is only a slight hazard.

Generally, these soils are not used for pasture. Nevertheless, they are suited to pasture that is seeded to drought-resistant pasture plants.

CAPABILITY UNIT IIIe-1

This capability unit consists of sloping, well drained or moderately well drained, light-colored Celina, Kendallville, and Miami soils that are mostly moderately eroded. These soils are on uplands of the glacial till plain. They are underlain by compact, limy till that restricts the movement of air and water and the growth of roots. The root zone is moderately deep, and the available moisture capacity is medium. Reaction is normally medium acid to strongly acid, and the content of organic matter is generally low.

The major limitation to use of these soils for crops is a hazard of further erosion. Therefore, the control of erosion is the major management requirement, though the maintenance of a good supply of plant nutrients and a high content of organic matter are also important. All of these soils are subject to surface crusting if they are cultivated. Some areas of the Celina soil contain seepage spots.

The soils of this unit are suited to the field crops commonly grown in the county. Cultivated crops can be grown frequently if erosion is controlled. Erosion is difficult to control, however, where these soils are cultivated frequently. Under intensive management a cropping system is used in which close-growing crops and sod or pasture plants are grown some of the time. Where less than intensive management is used, soil losses are generally excessive and the favorable tilth deteriorates.

These soils are well suited to grasses and legumes grown for hay or pasture. An adequate cover of plants is needed in the hayfields or pastures at all times to provide protection from erosion.

CAPABILITY UNIT IIIe-2

Sloping, well-drained, moderately eroded soils of the Fox and Miami series are in this capability unit. The Fox soils are moderately deep over sandy and gravelly material, and the Miami soil is moderately deep over compact glacial till. The soils mostly have moderate permeability and medium to low available moisture capacity. They are easy to cultivate. Normally, they are medium acid to strongly acid in reaction.

The major limitation to use of these soils for cultivated crops is a severe hazard of further erosion. Also, the soils tend to be droughty during dry periods. Because the content of organic matter is generally low, maintaining favorable soil structure is difficult. Some areas of the Miami soil contain boulders, and removal of these boulders is necessary before this soil can be cultivated.

Soils of this unit are suited to the field crops, specialty crops, and hay or pasture plants commonly grown in this county. Because they are droughty, they are better suited to early maturing than to late-maturing crops. Returning a large amount of crop residue to the soils is essential so that water will enter the soils readily and good soil structure will be maintained. Row crops can be grown frequently, but the cropping system should include crops other than those that are clean tilled. Close-growing crops and grasses or legumes are needed to control erosion and to supply a large amount of crop residue. These soils can be irrigated, but controlling erosion is difficult because of the slopes.

CAPABILITY UNIT IIIw-1

Dark-colored, very poorly drained Sloan soils that are subject to flooding are in this capability unit. Flooding normally occurs in winter and spring. Therefore, crops that grow in summer are seldom damaged. These soils have a seasonal high water table, and they dry out slowly in spring. Permeability is moderately slow, and the available moisture capacity is high. Where the water table has been lowered, the root zone is deep.

Very poor natural drainage and the hazard of flooding are limitations to use of these soils for crops. Drainage can be installed, however, if suitable outlets are available. The favorable tilth deteriorates rapidly if these soils are cultivated and are not well managed, especially if they are cultivated when wet.

Unless these soils are artificially drained, they are generally too wet for cultivated crops. Where adequately drained, they are suited to summer-grown row crops, but they are less well suited to winter small grains because of the hazard of flooding. Under intensive management cultivated crops can be grown year after year.

These soils are generally well suited to pasture grasses and legumes that can tolerate wetness. Areas that are not readily drainable or that are frequently flooded should be kept in permanent grass or trees.

CAPABILITY UNIT IIIw-2

Carlisle muck, the only soil in this capability unit, is a deep muck in nearly level areas or in areas that resemble basins. It is normally saturated with water most of the time. Where the water table has been lowered, the root zone is moderately deep and the available moisture capacity is high. Reaction is generally neutral.

Very poor natural drainage is the major limitation to use of this soil for crops. Drainage can be installed, however, if adequate drainage outlets are available. Where this soil is drained, it is subject to subsidence, but this limitation can be overcome by controlling the level of the water table. During dry periods soil blowing is a hazard. Weed control and the risk of frost damage are major concerns. Fire is a hazard when the muck is dry.

Where this soil is adequately drained, it is well suited to adapted specialty crops and to the field crops commonly grown in the county. Under intensive management cultivated crops can be grown year after year. Irrigation should be considered because truck crops of high value generally are grown on this organic soil. Irrigation helps to control blowing during dry periods and provides moisture for the germination of seeds. Both surface and subsurface irrigation are feasible. Unless this swampy soil is drained, it is not suited to crops that require cultivation.

Areas of this soil that are drained are suited to adapted grasses grown for hay or pasture. In areas that are not drained, grasses that can tolerate a wet soil are suitable for permanent pasture.

CAPABILITY UNIT IIIs-1

Only Casco loam, 2 to 6 percent slopes, is in this capability unit. It is a light-colored soil that is underlain by sand and gravel at a depth of 10 to 24 inches. Permeability is moderate, the root zone is shallow, and the available moisture capacity is low. Reaction is normally medium acid to slightly acid, but the underlying gravel and sand are limy.

The major limitation to use of this soil for crops is the low available moisture capacity. Erosion is also a hazard in areas that are cultivated. This soil is suited to irrigation, but erosion must be controlled in the irrigated areas.

This soil is suited to field crops commonly grown in the county, but it is better suited to small grains or deep-rooted grasses and legumes than to other crops. Unless irrigation can be provided, this soil is poorly suited to specialty crops or field crops that mature in summer.

Drought-resistant grasses and legumes are suitable for seeding areas to be used for pasture or hay. In normal years forage suitable for livestock is produced in the pastures and hayfields.

CAPABILITY UNIT IVe-1

This capability unit consists of sloping to moderately steep Casco, Miami, Fox, and Kendallville soils that are light colored and well drained. These soils are on uplands. Most are underlain by limy glacial till, but the Casco and Fox soils are underlain by limy gravel and sand. All of the soils but the Casco have a moderately deep root zone, moderate or moderately slow permeability, and medium available moisture capacity. The Casco soils have a shallow root zone and low available moisture capacity. All of the soils are medium acid or strongly acid.

Most of the soils are either moderately eroded or severely eroded, and the hazard of further erosion is severe. Therefore, the control of erosion is the major management requirement, though maintaining favorable soil tilth and a good supply of plant nutrients are also important. All of the soils are low in content of organic matter. As a result, they are subject to surface crusting, and clods form if the soils are tilled when too wet or too dry. On the severely eroded Miami soil, germination of seeds is poorer than on the other soils of this unit.

These soils are suited to the commonly grown grasses and legumes. They are also suited to other commonly grown crops, but extreme care is needed to control erosion. Accordingly, cultivated crops should be grown only infrequently. Intensive management is necessary. It should include use of a cropping sequence consisting mostly of grasses or legumes grown for pasture or hay.

CAPABILITY UNIT IVe-2

The only soil in this capability unit is Casco loam, 6 to 12 percent slopes, moderately eroded. This soil is light colored and well drained, and it is underlain by gravel and sand that are near the surface. The root zone is shallow, permeability is moderate, and the available moisture capacity is low. Typically, this soil is slightly acid, but the underlying sand and gravel are limy.

This soil is droughty, but a hazard of erosion is the major soil limitation to use for crops. Droughtiness can be overcome by irrigation, but controlling erosion is difficult.

This soil is suited to early maturing field crops commonly grown in the county. Because of the limited available moisture, it is poorly suited to row crops that mature in summer. Intensive management is needed, and the cropping sequence should include grasses and legumes. This soil is suited to drought-resistant grasses and legumes grown for hay or pasture.

CAPABILITY UNIT IVw-1

Highly organic, very poorly drained Edwards and Warners soils are in this capability unit. These soils are either shallow or moderately deep over marl. The Edwards soil is a mixture of muck and peat over marl. The Warners soil is a mixture of muck and mineral material over marl. Both of these soils are in low, swampy areas on stream terraces and uplands. Their root zone is limited by a high water table, and they have high available moisture capacity. Both soils are calcareous.

Very poor natural drainage is the major limitation to use of these soils for crops. Also, the content of lime is high enough that it is detrimental to some crops. These soils can be drained, but the level of the water table should be controlled so that danger of subsidence of the muck will be minimized. When dry, these soils are subject to blowing.

Where these soils are artificially drained, they can be cultivated and are suited to the field crops commonly grown in the county. Providing drainage and controlling the level of the water table are more difficult, however, than for other muck soils. Areas that have not been drained are generally swampy and are too wet for cultivation.

CAPABILITY UNIT VIe-1

This capability unit consists of soils of the Miami, Casco, and Rodman series. These soils are moderately steep or steep, and most of them are moderately or severely eroded. In most of them, limy glacial till is exposed at the surface in some places. Mostly, these soils have a moderately deep or shallow root zone and medium to low available moisture capacity. Except where they are severely eroded, they are generally acid.

Steep slopes and a severe hazard of erosion are the principal limitations to use of these soils for crops. Runoff is rapid, making the hazard of erosion even more serious. The content of organic matter is low, except in the Rodman soils.

These soils are too steep and too eroded to be used for cultivated crops. They are well suited to pasture or hay crops, but the carrying capacity of pasture is generally low during dry periods.

CAPABILITY UNIT VIe-2

Casco gravelly loam, 12 to 18 percent slopes, moderately eroded, is the only soil in this capability unit. It is light colored and is shallow over gravel and sand. The available moisture capacity is low. Normally, reaction is medium acid or slightly acid.

A hazard of erosion is the principal limitation to use of this soil for crops. This soil is too steep and droughty to be suitable for cultivated crops, but it is suited to drought-resistant varieties of grasses and legumes grown for hay or pasture. Pastures have low carrying capacity in summer. An adequate cover of plants is necessary in the pastures to help to control erosion.

CAPABILITY UNIT VIs-1

Only one soil, Rodman gravelly loam, 12 to 18 percent slopes, moderately eroded, is in this capability unit. It is a dark-colored, very droughty, calcareous soil that is shallow over gravel and sand, and it consists mostly of gravel.

This soil is not suited to cultivated crops, and it is only poorly suited to grasses and legumes grown for pasture or hay. An adequate cover of drought-resistant grasses is necessary to control erosion.

CAPABILITY UNIT VIIe-1

This capability unit consists of very steep, well-drained Miami, Lewisburg, and Rodman soils that, for the most part, have moderately slow permeability. The Rodman soils are gravelly and have rapid permeability.

These soils are much too steep for growing cultivated crops or hay crops; the use of farm equipment needed for cultivation is dangerous on these slopes. The soils do have limited usefulness for permanent pastures, but the pastures generally have low carrying capacity. The hazard of erosion is very severe if the cover of plants is removed. These soils are suited to trees (fig. 3). They can be used as woodland, and the trees will provide protection for the watershed.

CAPABILITY UNIT VIIs-1

Rodman gravelly loam, 18 to 50 percent slopes, moderately eroded, is the only soil in this capability unit. It is steep or very steep, very droughty, and shallow over gravel. The available moisture capacity is very low.

This soil is too steep and droughty to be suitable for cultivated crops or hay crops. It has limited use for permanent pasture, but the carrying capacity of pasture is generally very low. Further erosion is a very severe hazard if an adequate cover of plants is not maintained.

Estimated yields

Table 1 shows, for most soils in the county, the estimated average acre yields of the principal crops that can be expected under two levels of management. These yields

Figure 3.—**Steep break near Kiser Lake. The soils are Miami and Lewisburg silt loams, 25 to 50 percent slopes, moderately eroded.**

are averages of those expected over a period of several years. They do not apply to a specific field for any particular year, because soils vary from place to place, management varies from farm to farm, and weather varies from year to year. Irrigation was not considered in these estimates.

The yield values in table 1 are intended only as a guide that shows relative productivity of the soils, response of the soils to management, and relationship of the soils to each other. The general level of crop yields may change as new methods and new crop varieties are developed, but the relationship of the soils to each other is not likely to change.

Yields for the following soils and miscellaneous land types are not shown in table 1, because these soils and land types generally are not suited to field crops or hay:

Gravel pit.
Made land.
Miami silt loam, 18 to 25 percent slopes.
Miami silt loam, 18 to 25 percent slopes, moderately eroded.
Miami bouldery silt loam, 2 to 12 percent slopes.
Miami and Lewisburg silt loams, 25 to 50 percent slopes, moderately eroded.
Miami-Rodman complex, 25 to 50 percent slopes, moderately eroded.
Quarry.
Rodman gravelly loam, 12 to 18 percent slopes, moderately eroded.
Rodman gravelly loam, 18 to 50 percent slopes, moderately eroded.

The estimated yields in columns A are obtained under prevailing, or improved, management; those in columns B are obtained under intensive management. Farmers can obtain the yields in columns B by applying the best information now available in managing their soils. The

TABLE 1.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Corn		Oats		Wheat		Soybeans		Alfalfa [1]		Mixed hay [2]	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*
Ockley silt loam, 2 to 6 percent slopes	80	105	45	85	32	42	25	35	3. 0	5. 0	3. 0	4. 5
Patton silty clay loam	80	120	45	80	23	45	30	40	3. 0	5. 0	3. 0	4. 5
Ross silt loam	65	125	45	80	30	45	30	40	3. 0	5. 0	3. 0	4. 5
Shoals silt loam	70	105	45	70	20	35	22	37	2. 5	4. 5	2. 5	4. 0
Shoals silt loam, till subsoil variant	60	100	38	70	25	35	25	37	2. 0	4. 0	2. 0	3. 5
Sloan silt loam	65	120	40	75	25	40	25	40	2. 0	5. 0	2. 0	4. 5
Sloan silt loam, gravelly subsoil variant	60	110	38	70	25	40	23	35	2. 0	5. 0	2. 0	4. 0
Uniontown silt loam, 2 to 6 percent slopes	70	105	40	80	30	42	23	35	2. 0	4. 5	2. 0	4. 0
Wallkill silt loam	75	110	38	75	24	40	25	42	2. 0	4. 0	2. 0	3. 5
Warners silt loam	40	90	----	----	----	----	----	----	----	----	----	----
Warsaw silt loam, 0 to 2 percent slopes	70	105	40	75	32	42	23	35	3. 0	5. 0	3. 0	4. 5
Warsaw silt loam, 2 to 6 percent slopes	70	100	38	70	30	40	22	34	3. 0	4. 5	2. 0	4. 0
Wea silt loam, 0 to 3 percent slopes	85	120	45	85	35	50	27	40	3. 0	5. 0	3. 0	4. 5

[1] Alfalfa means a meadow mixture that is not less than 75 percent alfalfa and the rest grass.

[2] Mixed hay means a meadow mixture that is less than 75 percent alfalfa.

[3] If the boulders are removed, the yields on this soil are like those on Celina silt loam, 2 to 6 percent slopes.

[4] If boulders are removed, the yields on this soil are like those on Crosby silt loam, 2 to 6 percent slopes.

intensive management needed to obtain the yields in columns B consists of—

1. Practices that increase the intake of water and the available moisture capacity of the soils. Excess water is disposed of by safe and appropriate means.
2. Practices that reduce or control erosion (fig. 4) in areas subject to erosion.
3. Suitable methods of plowing, preparing the seedbed, and cultivating the crop.
4. Controlling weeds, diseases, and insects.
5. Maintaining fertility at the highest practical level. Lime and fertilizer are applied according to the needs of the crop. The fertilizer contains trace elements (zinc, cobalt, manganese, copper, and the like) if they are needed.

Figure 4.—**A gullied, moderately steep Miami silt loam. The cover of grass protects this soil from further erosion.**

6. Performing farming operations at the proper time and in the proper way.
7. Planting varieties of crops that are suited to the soils and that produce high yields.

At an improved level of management, the farmer uses some, but not all, of the practices listed under intensive management, or the practices used are not adequate for the needs of the crop.

The estimates of yields given in table 1 are based primarily on information obtained from farmers and on observations and field trials made by the county agent and district conservationists of the Soil Conservation Service. They are also based on experiments made by the Ohio Agricultural Research and Development Center and on field observations made by members of the soil survey party.

Use of the Soils as Woodland

In 1964, woodland occupied about 21,000 acres in Champaign County, or nearly 8 percent of the total acreage, according to the U.S. Census of Agriculture. Compared to the returns from the sale of other farm products, income from the sale of wood products is small. Good-quality logs of red oak, white oak, and black walnut are still being cut from the better managed woodland, however, and these bring a good return when sold. Also, farm woodlots are still a source of wood for the fireplace, rough construction lumber, edible nuts, and maple syrup. Production of maple syrup has declined, but the demand for fireplace wood and for clear, high-quality logs has increased. Consequently, there is need for improving the care and quality of stands of sugar maple, white and red oaks, and black walnut trees through planting and through management of existing woodland.

Besides adding to farm income, woodland provides esthetic benefits that cannot be measured in monetary terms. Trees add natural beauty to the landscape, and they provide a more desirable environment for humans.

These benefits contribute to the well-being and enjoyment of the people in the county.

Woodland is becoming increasingly more important for its recreational value. As the population increases, the need increases for more areas of woodlands to provide space for camping, hiking, and hunting.

Because the soils are too valuable for crops to be used extensively for trees, information about potential productivity of the soils in terms of board feet per acre is limited. Studies of site index (*5*, *6*, *12*)[3] and of potential yield in board feet per acre have been made on a few soils, however, to determine the value of these soils for growing trees (table 2). The site index is the average height, in feet, of the dominant trees in a stand at 50 years of age and is used to measure the potential of a soil for producing forest trees.

TABLE 2.—*Representative woodland yields*

Soil series	Species	Site index[1]	Sample	Yield
			Number	*Bd. ft. per acre per year*
Brookston.	Swamp white oak	77	2	290
Celina.	Upland oaks	90	2	420
	Tulip-poplar	110	1	800
Crosby.	Upland oaks	72	3	250
	Tulip-poplar	92	1	550
Fox.	Upland oaks	81	3	330
Miami.	Upland oaks	79	7	310
	Tulip-poplar	94	4	565
	White pine	83	1	880

[1] An expression of site quality based on the height of the stated dominant trees at the age of 50 years.

SPECIES OF TREES TO FAVOR AND PLANT.—Suitable kinds of trees to plant and to favor in existing woodland depend, to a great extent, on drainage of the soils. Some trees grow well only on well drained or moderately well drained soils. Others grow best in moist areas. Following are examples of soils in this county, grouped according to drainage, and the trees that grow best on the soils of each group.

Well drained and moderately well drained soils.—Examples of these soils are the Miami, Celina, and Fox. Trees to favor in existing stands on these soils are red oak, white oak, tulip-poplar, and black walnut. Species suitable for interplanting in wooded areas are black walnut, white pine, tulip-poplar (fig. 5), red pine, and black locust. All of these soils, except the shallow ones, are suited to black walnut.

Somewhat poorly drained soils.—Examples of these soils are the Crosby and Henshaw. Trees to favor in existing stands on these soils are bur oak, white ash, and soft maple (fig. 6). Species suitable for planting in woodland openings are white pine, soft maple, and white ash.

Poorly drained soils of bottom lands.—The Sloan soils are examples of these soils. Trees to favor in existing stands on these soils are sweetgum, pin oak, bur oak, and soft maple. Species suitable for planting in woodland openings are white pine, soft maple, and white ash.

[3] Italic numbers in parentheses refer to Literature Cited, p. 79.

Figure 5.—**An 8-year-old stand of tulip-poplar on a sloping Miami silt loam.**

Very poorly drained soils.—Examples of these wet soils are the Brookston, Patton, and Lippincott. Trees to favor in existing stands on these soils are sweetgum, pin oak, soft maple, and white ash. Trees are not generally planted on these soils, nor are they generally planted on Edwards muck, Linwood muck, or Carlisle muck.

WINDBREAKS.—On a few farms in this county, windbreaks have been planted, mainly to protect the farmstead from winds in winter and early in spring. These windbreaks also add beauty to the landscape. If planted in the proper places, they prevent drifting snow from blocking the roads. By reducing the velocity of the wind near the ground, and holding snow where it falls, windbreaks conserve soil and moisture to a limited extent.

Evergreens are suitable for planting in windbreaks, and they are more effective in winter than deciduous trees. Norway spruce, Austrian pine, white pine, and arborvitæ grow well on most of the soils in this county.

Use of the Soils for Wildlife

Wildlife is an important natural resource in Champaign County, and the development of wildlife habitat fits in well with other agricultural uses of the soils. Since the early days of settlement, and the clearing of the land, the wildlife in the county has changed in species, distribution, and numbers. Because of these changes in land use, and the resulting changes in distribution of wildlife, it is difficult to correlate the species and numbers of wildlife with specific soils.

Kinds of wildlife now inhabiting the county are cottontail rabbit, ringneck pheasant, bobwhite quail, fox squirrel, raccoon, mink, muskrat, fox, skunk, opossum, woodchuck, and deer, as well as ducks, gallinule, rail, geese, coots, and other migratory waterfowl. Fish in the streams are largemouth bass, smallmouth bass, catfish, crappie, and bluegill. Many kinds of songbirds and other birds are present throughout the county.

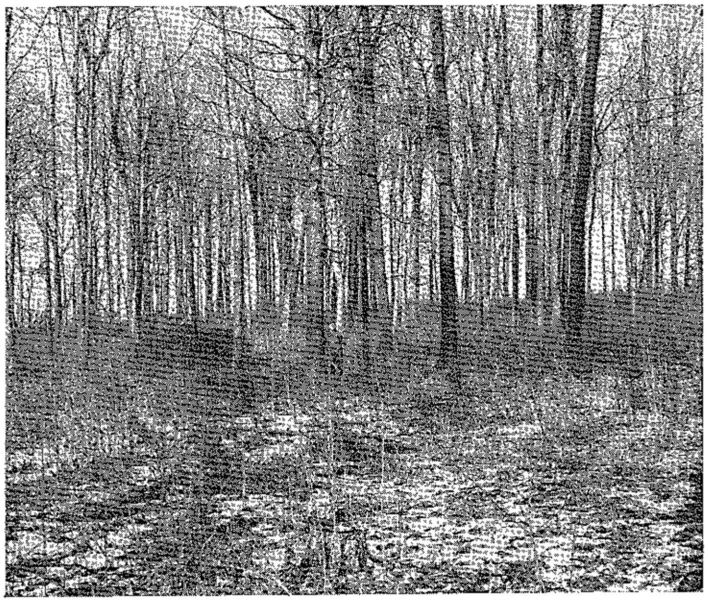

Figure 6.—**Stand of oaks and maples on a Crosby silt loam and Miami silt loam. This stand has been protected from grazing for about 10 years.**

Generally, each species of wildlife is most numerous in areas that provide enough of the kind of food and cover necessary for survival. The gently sloping to hilly uplands west of the valley of the Mad River provide suitable habitat for cottontail rabbit, fox squirrel in open woods, fox, raccoon, bobwhite quail, and ringneck pheasant. Most of these kinds of wildlife, except ringneck pheasant, are numerous in that part of the county. Predominant in that area are the Miami, Crosby, and Brookston soils.

In the uplands east of the valley of the Mad River are cottontail rabbit, fox squirrel, raccoon, fox, bobwhite quail, and a few ringneck pheasants. Deer are also more likely to frequent this area because the terrain is slightly more rugged than that west of the river and wooded tracts are more extensive. Miami and Celina soils and some areas of Brookston soils are in this area.

The best areas for farming are those that are level or nearly level. They are mainly along the Mad River and its tributaries, on the high terraces near the Ohio Caverns and southward through Pretty Prairie, and on the Darby Plains along the eastern boundary of the county. Here, food is plentiful and the environment is generally favorable for cottontail rabbit and bobwhite quail, both of which are abundant. Fox and Lippincott soils are along the Mad River and its tributaries; Fox, Warsaw, Casco, and Miami soils are on the high terraces; and Crosby and Brookston soils are on the Darby Plains.

Many swamps and old lakebeds in depressions throughout the uplands and in the nearly level parts of the county are undrained and contain water all the time. Even where such areas are drained, open ditches have water in them much of the time. Muskrat and mink, as well as duck, geese, gallinule, rail, and other migratory waterfowl, inhabit these wet areas. Patton, Carlisle, Edwards, and Linwood soils are in these places.

The Brush, Baker, Sayres, and other natural ponds and lakes; artificial lakes, such as the Kiser; and the numerous farm ponds are the habitat of muskrat, mink, migratory waterfowl, and bass, bluegill, and crappie. Streams are also the habitat of animals that prefer wet areas. The cold waters of the Mad River contain brook trout, rainbow trout, and other game fish.

The abundant wildlife in the county provides a satisfactory outlet for many recreational needs of an expanding population. Creating, improving, and maintaining a suitable habitat is the first step toward increasing the amount of wildlife in an area. Most wildlife habitats are managed by planting suitable vegetation, by manipulating the existing vegetation, or by a combination of these. Knowledge of the soils is helpful in carrying out these practices.

Suitability of soils for wildlife

In table 3 the soils and land types in the county, except Gravel pit, Made land, and Quarry, are rated according to their suitability for elements of wildlife habitat (*1*) and for kinds of wildlife. The natural drainage of the soils was one criterion used for the ratings given in table 3. The information given in table 3 is useful in planning the development of wildlife habitat on private or public lands.

Additional information about managing wildlife areas can be obtained by requesting it from the local office of the Soil Conservation Service or the Division of Wildlife, Ohio Department of Natural Resources.

In table 3 numbers indicate ratings as follows: 1, well suited; 2, suited; 3, poorly suited; and 4, not suited. A rating of *well suited* means that the soil has few or no limitations to use for the particular element of wildlife habitat. A rating of *suited* indicates that the habitat element can be created, improved, or maintained, but that there are moderate limitations that affect management. *Poorly suited* means that the habitat element can be created, improved, or maintained, but that limitations are severe. A rating of *not suited* indicates that the habitat cannot be created, improved, or maintained, or that it is impractical to do so under the prevailing conditions.

The following lists important plants or describes each of the elements of wildlife habitat given in table 3.

Grain and seed crops. Corn, sorghum, oats, barley, rye, and wheat.

Grasses and legumes. Alfalfa, Ladino clover, fescue, red clover, bromegrass, bluegrass, and timothy.

Wild herbaceous upland plants. Foxtail, ragweed, panicgrass, wild oats, and native lespedeza and other herbs.

Hardwood woody plants. Sumac, wild grape, dogwood, persimmon, multiflora rose, blackhaw, sweetgum, wild cherry, oak, hickory, and walnut. In table 3 the soils are rated on the basis of their capacity for supporting plants that grow vigorously and produce a good crop of fruit or seeds.

Coniferous woody plants. Eastern redcedar, Virginia pine, Scotch pine, and Austrian pine. In table 3 the soils are rated on the basis of slow growth and delayed closure of the canopy.

Wetland food and cover plants. Cattails, sedges, reeds, barnyard grass, duckweed, and various willows.

TABLE 3.—*Suitability of soils for elements of wildlife habitat and for kinds of wildlife*—Continued

Soils and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Woody plants		Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland	Woodland	Wetland
				Hardwoods	Conifers						
Lewisburg (Mapped only in an undifferentiated unit with Miami soils.)	4	3	2	2	3	4	4	4	3	3	4
Linwood (Ln)	4	4	4	4	4	2	1	1	4	4	2
Lippincott (Lp)	4	3	3	1	1	1	1	1	3	1	1
Miami:											
(MbC, MlA, MlB, MlB2, MlC, MlC2)	1	1	1	1	3	4	4	4	1	1	4
(MlD, MlD2, MmC3)	2	2	2	1	3	4	4	4	2	2	4
(MlE, MlE2, MmD3, MmE3, MoF2, MrF2, MsE2) (For suitability ratings of the Lewisburg soil in mapping unit MoF2, refer to the Lewisburg series; for suitability ratings of the Rodman soils in mapping units MrF2 and MsE2, refer to the Rodman series; and for suitability ratings of the Casco soil in mapping unit MsE2, refer to the third grouping under the Casco series.)	4	3	2–3	2	3	4	4	4	3	3	4
Ockley (OcA, OcB)	1	1	1	1	3	4	4	4	1	1	4
Patton (Pa)	4	3	3	1	1	1	1	1	3	1	1
Rodman (RgD2, RgF2)	4	3	3	3	1	4	4	4	4	3	4
Ross (Rn)	1	1	1	1	3	4	4	4	1	1	4
Shoals (Sh, Sm)	2	2	1	1	3	2	2	3	1	2	2
Sloan (So, Sv)	4	3	3	1	1	2	2	4	3	1	3
Uniontown (UnB)	1	1	1	1	3	4	4	4	1	1	4
Wallkill (Wa)	4	4	4	4	4	1	1	1	4	4	1
Warners (Wn)	4	4	4	4	4	1	1	1	4	4	1
Warsaw (WrA, WrB)	2	1	1	1	3	4	4	4	1	1	4
Wea (WsA)	1	1	1	1	3	4	4	4	1	1	4

Shallow water developments. These are areas that have been made by impounding water, by digging excavations, or by using devices to control water. In table 3 the soils are rated on the basis of their suitability for water developments that are more than 5 feet deep.

Excavated ponds. These are excavations that hold enough water of suitable quality to support fish or wildlife. The ponds should have an average depth of at least 6 feet in at least one-fourth of the area.

The following lists important animals and birds in each of the three categories of wildlife shown in table 3.

Openland wildlife. Quail, pheasant, meadowlark, cottontail rabbit, red fox, and woodchuck.

Woodland wildlife. Birds and mammals commonly found in wooded areas. Examples are red, gray, and fox squirrels, gray fox, whitetail deer, raccoon, and various kinds of songbirds.

Wetland wildlife. Muskrat, beaver, and ducks, geese, rail, heron, and other waterfowl.

Engineering Uses of the Soils[4]

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, facilities

[4] Reviewed by LLOYD E. GILLOGLY, construction engineer, State Office of Soil Conservation Service, Columbus, Ohio.

for storing water, erosion control structures, drainage systems, and sewage disposal systems. Among the soil properties most important to the engineer are permeability, compaction and shrink-swell characteristics, drainage, grain size, plasticity, and pH. Depth to the water table, depth to bedrock, and topography also are important.

Information in this publication can be used to—

1. Make studies that will aid in selecting and developing sites for industries, businesses, residences, and recreation.
2. Make preliminary estimates of the engineering properties of soils that help in planning agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations that will aid in selecting locations for highways, airports, pipelines, and cables and in planning detailed investigations at the selected locations.
4. Locate probable sources of gravel and other material suitable for construction.
5. Correlate performance with soil mapping units, and thus develop information that will be useful in designing and maintaining engineering structures.
6. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
7. Supplement other published information, such as maps, reports, and aerial photographs, that are used in preparing engineering reports for a specific area.

With the soil map for identification of soil areas, the engineering interpretations reported in tables 4, 5, and 6 can be useful for many purposes. It should be emphasized, however, that these interpretations do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and excavations deeper than the depth of layers here reported. Even in these situations, however, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Some of the terms used by soil scientists may not be familiar to the engineer, and some terms may have a special meaning in soil science. These terms are defined in the Glossary at the back of this survey.

Engineering classification systems

Two systems of classifying soils are in general use among engineers. Both are used in this soil survey.

Many highway engineers classify soil material according to the system approved by the American Association of State Highway Officials (*2*). In this system soil material is classified in seven principal groups. The groups range from A–1, consisting of gravelly soils of high bearing capacity, to A–7, consisting of clayey soils having low strength when wet.

Some engineers prefer to use the Unified soil classification system (*19*). In this system soil material is identified as coarse grained (eight classes), fine grained (six classes), or highly organic (one class). An approximate classification of soils can be made in the field. The classification of the tested soils according to the Unified system is given in table 4, and the estimated classification of all the soils is given in table 5.

Soil test data

Samples from seven soil types in the county were tested according to standard procedures to help evaluate the soils for engineering purposes. Data resulting from these tests are shown in table 4. Additional test data for the Brookston, Fox, Shoals, Sloan, and Warsaw soils, from samples obtained in other survey areas, are on file at the Division of Lands and Soil, Ohio Department of Natural Resources, and in the Ohio office of the Soil Conservation Service, Columbus, Ohio.

The engineering soil classifications given in table 4 are based on data obtained by mechanical analyses and by tests to determine liquid limits and plastic limits. Mechanical analyses were made by combined sieve and hydrometer methods.

The tests for liquid limit and plastic limit measure the effect of water on the consistence of soil material. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

Table 4 also gives the results of moisture-density tests for the soils in accordance with standard tests of the American Association of State Highway Officials.

Engineering properties of soils

Table 5 shows some estimated soil properties that are important in engineering, and it gives estimated AASHO and Unified classifications for the soils. Textural terms used to describe the soil material in the main horizons are those used by the U.S. Department of Agriculture. The data in table 5 are based on the results of soil tests shown in table 4, on information in other parts of the survey, and on experience with the same kinds of soils in other counties.

Depth to bedrock has been omitted from the table because, in most of the county, the layer of glacial drift is thick enough that bedrock has had little direct influence on the development of the soils. Dolomite or shale bedrock is within 5 feet of the surface in less than 100 acres of Miami soils.

In table 5, depth to a seasonal high water table refers to the shallowest depth to which the water table rises in winter and early in spring. This water table can be a perched one or an ordinary ground water table.

Permeability refers to the ability of a soil to transmit water and air. In table 5 the estimates of permeability are the ranges in rates of downward movement of water in major soil horizons when the soil is saturated and the water is allowed to drain freely. They are based on soil texture and structure of an undisturbed soil, on the results of permeability and infiltration tests, and on observations of drainage. For a given soil type, percolation through the surface layer varies considerably because of differences in past land use and management, and because of differences in initial moisture content of the soil. In the permeability tests that were used partly as a basis for making estimates of permeability shown in table 5, surface permeability rate was determined by the use of a double-ring infiltrometer using a constant head of water.

For the soils tested, rates of permeability were observed after a 5-hour test period, when a constant intake rate had been established. The subsoil permeability was tested after removal of the surface layer.

The available moisture capacity, estimated in inches per inch of soil depth, is the approximate amount of capillary water in a soil that is wet to field capacity. For medium-textured and fine-textured soils, the estimated values are based on the the difference in percentage of moisture retained at 1/3 atmosphere and 15 atmospheres of tension. For sandy soils the estimated values are based on the difference between 1/10 atmosphere and 15 atmospheres of tension. For compact glacial till, and for a fragipan, the estimated values shown in table 5 are lower than normal for a given texture; the increased bulk density reduces the penetration of roots, and therefore, not all of the stored moisture is available to plants.

In table 5 reaction is given in pH values, which indicate the degree of acidity or alkalinity of the soil material. Higher values indicate alkaline material, and lower values, acid material, as shown in the Glossary.

Shrink-swell potential is an indication of the change in volume of the soil material to be expected when the moisture content changes. Soils that have a high shrink-swell potential are normally undesirable for some engineering uses.

Corrosion potential is important because it indicates the effect that solvents in a soil have on the corrosion of utility pipelines. In table 5 estimates are for steel and concrete pipes. The ratings for concrete apply to standard concrete mix.

Engineering interpretations of soils

In table 6 the soils of the county are rated according to their suitability for winter grading, susceptibility to frost action, and suitability as a source of topsoil, sand and gravel, and road fill. In addition, this table gives soil features that affect suitability of the soils for the location of highways and for engineering structures and practices. The ratings given in table 6 are based on data in tables 4 and 5, on mechanical analysis of the same kinds of soils in other counties, and on field experience. Following are explanations of the data given in table 6.

Because of wetness, plasticity, or susceptibility to frost action, many of the soils in the county are not suitable for grading during some periods in winter. Such soils are given a rating of *poor* or *not suitable* for winter grading.

The thickness, texture, and natural fertility of the surface layer determine suitability of a soil as a source of topsoil. The amount, quality, and accessibility of coarse-grained materials are the most important features that affect suitability of a soil as a source of sand and gravel. Well-graded, coarse-grained material, or a mixture of clay and coarse-grained material, is suitable as a source of road fill. Highly plastic clays, poorly graded silts, and soil material that has a high content of organic matter are difficult to compact, are low in stability, and consequently are undesirable for road fill.

Soil features that affect the location of highways are depth to rock, depth to a high water table, steepness of slopes, stability of the soil material, and susceptibility to flooding.

In considering features affecting use of the soils for farm ponds, features given in the column titled "Reservoir area" are those of the undisturbed soil in the reservoir area, though depth to pervious material and susceptibility to flooding are also indicated. Stability and permeability of the soil material affect construction and maintenance of embankments of farm ponds. The ratings for permeability given in the column titled "Embankment" are for soil material that is compacted at optimum moisture content. Information in this column is also applicable to dikes and levees.

In the column titled "Agricultural drainage," the soils are described relative to their natural drainage, their in-place permeability, the presence of a seasonal high water table, and the availability of outlets.

Properties that affect suitability of soils for irrigation are the rate of water intake, permeability, natural drainage, and available moisture capacity. Slopes and susceptibility to flooding are also important. Estimates of the rate of water intake can be obtained from the figures for permeability of the surface layer, table 5.

The main features affecting construction and maintenance of terraces and diversions are slope and susceptibility to erosion. Depth to bedrock and the presence of a seasonal high water table are also important. Terraces are not needed on nearly level soils, and steep soils are not well suited to terracing. Highly erodible soils require special care in the construction of diversions.

Soil features that affect construction of waterways are about the same as those affecting terraces and diversions. In places a high water table or gravel or bedrock near the surface can affect suitability of a soil for a waterway.

Soils and Land Use Planning

Champaign County is dominantly rural. Urbana, near the center of the county, is the largest city. Smaller towns and communities are scattered thoroughout the county. About 17,000 acres, or approximately 6 percent of the county, is in nonfarm uses, according to the 1967 Conservation Needs Inventory of Champaign County. Included in this acreage are all tracts of 10 acres or more used for residential, industrial, and commercial purposes. The farming areas are being reduced each year as residential, industrial, transportation, and recreational facilities are developed.

The expansion of nonfarm uses of land can remove a large acreage from farm use in a short period. Highways can displace as much as 50 acres per mile. Shopping centers may be large enough to displace 50 to 100 acres. These uses permanently remove land from agricultural use.

This section of the soil survey provides information about the properties of the soils and their effect on selected nonfarm uses of land. Because development and maintenance costs are related to soil limitations, the survey will help community planners and industrial users of land, who generally look for areas that are least costly to develop and maintain. In addition to the information in this section, other information useful to planners can be found on the soil maps and in other parts of the survey. Table 7 gives the estimated degree and kinds of limitation for some land uses. By using this information, alternative uses can be developed as a basis for long-range planning and zoning.

TABLE 4.—*Engineering*

[Tests performed by the Ohio Department of Highways in accordance with

Soil name and location	Parent material	Ohio report No.	Depth from surface	Moisture density [1]		Mechanical analysis [2]					
				Maximum dry density	Optimum moisture	Percentage passing sieve—					
						3-in.	2-in.	1½-in.	1-in.	¾-in.	½-in.
			Inches	*Lb. per cu. ft.*	*Percent*						
Brookston silty clay loam: NE¼SW¼ sec. 26; Adams Township. (Modal profile)	Glacial till.	42250	0–9	95	24	------	------	------	------	------	------
		42251	30–39	102	20	------	------	------	------	------	------
		42252	45–60	122	12	------	------	------	------	------	100
Celina silt loam: 1,300 ft. S. of U.S. Highway No. 29; 700 ft. W. of Ohio Route No. 56; Union Township. (Modal profile)	Glacial till.	37680	0–9	107	15	------	------	------	------	------	------
		37681	9–28	108	19	------	------	------	------	------	------
		37682	28–96	123	12	------	------	------	------	100	90
Crosby silt loam: SE¼SE¼ sec. 27; Concord Township. (Modal profile)	Glacial till.	41040	3–8	105	17	------	------	------	------	------	------
		41041	14–24	100	22	------	------	------	------	100	99
		41042	26+	122	12	------	------	------	------	100	97
Fox silt loam: 1,000 ft. N. of County Line Rd.; 500 ft. E. of Buck Creek Rd.; Union Township. (Modal profile)	Silty alluvium over stratified sand and gravel.	37687	0–7	106	15	------	------	------	------	------	------
		37688	7–36	105	18	------	------	------	------	------	100
		37689	36–48	123	11	100	89	77	59	52	44
Lippincott silty clay loam: NW¼NW¼ sec. 3; Mad River Township. (Modal profile)	Outwash over stratified sand and gravel.	42246	4–13	102	20	------	------	------	------	------	------
		42247	18–30	102	20	------	------	------	------	------	------
		42248	30–42	119	13	------	------	------	------	------	100
		42249	42	----------	----------	100	87	87	55	50	43
Miami silt loam: 1,300 ft. S. of U.S. Highway No. 29; 250 ft. W. of Ohio Route No. 56; Union Township. (Finer textured B horizon than modal)	Glacial till.	37677	0–7	101	19	------	------	------	------	------	------
		37678	7–30	105	19	------	------	------	------	------	------
		37679	30–82	126	11	------	------	------	------	100	90
NW¼NW¼ sec. 26; Harrison Township. (Modal profile)	Glacial till.	41046	0–7	110	17	------	------	------	------	100	98
		41047	19–25	102	20	------	------	------	------	------	------
		41048	25	124	11	------	------	------	------	100	98
Ockley silt loam: 1,000 ft. N. of County Line Road; 1,150 ft. E. Buck Creek Road; Union Township. (Modal profile)	Silty alluvium over stratified sand and gravel.	37683	0–7	103	18	------	------	------	------	------	------
		37684	7–43	108	18	------	------	------	------	------	------
		37685	43–56	128	10	100	85	66	57	51	44
		37886	56	132	5	------	------	100	94	91	85

[1] Based on AASHO Designation T 99–57, Method A (*2*).

[2] Mechanical analyses according to AASHO Designation T 88–57. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 mm. in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 mm. in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for naming textural classes of soil.

[3] Based on AASHO Designation M 145–49 (*2*).

test data

standard procedures of the American Association of State Highway Officials (AASHO)]

Mechanical analysis [2]—Continued: Percentage passing sieve—Continued: ⅜-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Percentage smaller than 0.005 mm.	Liquid limit	Plasticity index	Classification: AASHO [3]	Unified [4]	Ohio [5]
-------	-------	100	98	91	48	45	16	A-7-6(11)	ML	A-7-6
-------	100	99	96	89	57	40	18	A-6(11)	CL	A-6b
99	99	94	88	76	36	24	6	A-4(8)	ML-CL	A-4a
100	99	92	89	77	28	[6] NP	NP	A-4(8)	ML	A-4a
100	98	86	82	71	41	38	16	A-6(10)	CL	A-6b
87	83	68	60	49	21	23	5	A-4(3)	SM-SC	A-4a
-------	-------	100	97	86	36	NP	NP	A-4(8)	ML	A-4b
99	99	95	93	82	59	53	31	A-7-6(19)	CH	A-7-6
95	93	81	74	62	31	25	11	A-6(6)	CL	A-6a
-------	-------	100	98	94	32	25	3	A-4(8)	ML	A-4b
98	96	90	83	75	39	44	12	A-7-5(10)	ML	A-7-5
39	30	22	14	11	4	NP	NP	A-1-a(0)	GW-GM	A-1-a
-------	-------	100	97	83	45	38	13	A-6(9)	ML-CL	A-6a
-------	-------	100	99	88	37	45	21	A-7-6(13)	ML-CL	A-7-6
99	99	99	93	64	14	NP	NP	A-4(6)	ML	A-4b
38	28	17	9	5	2	NP	NP	A-1-a(0)	GW-GM	A-1-a
-------	-------	100	98	89	26	NP	NP	A-4(8)	ML	A-4b
100	97	85	82	72	42	42	20	A-7-6(12)	CL	A-7-6
86	81	70	62	51	19	28	10	A-4(3)	CL	A-4a
96	96	94	90	76	35	28	6	A-4(8)	ML-CL	A-4a
-------	100	95	88	72	46	46	25	A-7-6(15)	CL	A-7-6
97	93	89	78	58	28	21	5	A-4(5)	ML-CL	A-4a
-------	-------	100	99	96	30	NP	NP	A-4(8)	ML	A-4b
100	99	93	90	86	31	36	12	A-6(9)	ML-CL	A-6a
39	30	25	15	11	3	NP	NP	A-1-a(0)	GW-GM	A-1-a
78	55	29	7	4	2	NP	NP	A-1-a(0)	SW	A-1-a

[4] Based on the Unified Soil Classification System, Technical Memorandum No. 3-357, v. 1, Corps of Engineers (*19*). SCS and Bureau of Public Roads have agreed to consider that all soils having plasticity indexes within two points of the A-line are to be given a borderline classification. An example of a borderline classification obtained by this use is ML-CL. Classification in this column was determined from the grain-size distribution and Atterburg test limit data furnished by the Ohio Department of Highways.

[5] Based on "Classification of Soils," Ohio State Highway Testing Laboratory, February 1, 1955.

[6] NP=Nonplastic.

[7] Tests in this horizon were performed by the Division of Lands and Soil, Ohio Department of Natural Resources, at the Soil Physics Laboratory, Ohio State University, in accordance with standard procedures of AASHO.

TABLE 7.—*Estimated degree and kind of*

Soil series and map symbols	Disposal of sewage effluent from septic tanks	Sewage lagoons	Homesite locations for homes of 3 stories or less [1]	Lawns, landscaping, and golf fairways
Shoals (Sh, Sm)	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Sloan (So, Sv)	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Uniontown (UnB)	Severe: moderately slow permeability.	Moderate: slope	Slight	Slight
Wallkill (Wa)	Severe: very poor drainage.	Severe: organic material.	Severe: very poor drainage.	Severe: very poor drainage.
Warners (Wn)	Severe: very poor drainage.	Severe: organic material.	Severe: very poor drainage.	Severe: very poor drainage.
Warsaw:				
(WrA)	Slight [2]	Severe: [2] permeable substratum.	Slight	Slight
(WrB)	Slight [2]	Severe: [2] permeable substratum.	Slight	Slight
Wea (WsA)	Slight [2]	Severe: [2] permeable substratum.	Slight	Slight

[1] The ratings in this column apply also to institutional, light industrial, and commercial buildings, three stories or less in height.

The ratings in table 7 represent typical conditions for each kind of soil shown on the detailed soil map. The limitations at a particular site or on a particular lot may vary in degree and kind from those listed in table 7 because of the natural variation within any one soil area. Also, because extensive manipulation of the soil alters some of its natural properties, the ratings for some uses will no longer apply to areas that have undergone extensive cutting and filling. Supplementary onsite investigations should be made before using the soils for the purposes shown in table 7, especially where considerable cost is involved.

In table 7 the estimated degree of limitations of the soils for a specified nonfarm use is expressed by the terms *slight*, *moderate*, or *severe*. A rating of *slight* means that the soil has no important limitations to the specified use. A rating of *moderate* means that the soil has some limitations to the specified use. These limitations should be recognized, but they generally can be overcome or corrected. A rating of *severe* means that the soil has serious limitations that are generally difficult and costly to overcome. A rating of severe, however, does not mean that the soil cannot be used for the specified purpose. It does mean that the limitation is more restrictive than a rating of either slight or moderate.

Uses for which the soils are rated in table 7 are explained in the following paragraphs.

Disposal of sewage effluent from septic tanks.—The suitability of a soil for disposing of effluent from septic tanks depends on depth to rock or other restrictive layer, slope, permeability, natural drainage, and hazard of flooding. Use of a soil for the disposal of effluent is limited by flooding, by poor to very poor drainage, or by slow to moderately slow permeability. See table 5 for estimates of permeability.

If filter fields for septic tanks are located on slopes of more than 12 percent, erosion and seepage downslope may be a problem, or the soil may be unstable when saturated. A severe limitation is imposed by a restrictive layer, such as solid bedrock, a dense, compact layer, or a layer of clay that interferes with adequate filtration and the removal of effluent.

Many soils in the county have a gravelly and sandy substratum through which inadequately filtered effluent can contaminate the ground water or nearby springs, lakes, or streams. Before a septic tank system is installed, an investigation should be made at the proposed site to determine limitations of the soils and related site factors.

Sewage lagoons.—Sewage lagoons are shallow ponds built to contain sewage and to dispose of it through oxidation. They may be needed in an area if septic tanks *limitations for land use planning*—Continued

Streets and parking lots	Recreation: Athletic fields and other intensive play areas	Recreation: Parks and extensive play areas	Recreation: Campsites: Tents	Recreation: Campsites: Trailers	Cemeteries and sanitary land fills
Severe: subject to flooding.	Moderate: somewhat poor drainage; flooding.	Moderate: somewhat poor drainage.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Severe: subject to flooding.	Severe: very poor drainage.	Severe: very poor drainage.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Moderate: slope	Moderate: slope; moderately slow permeability.	Slight	Slight	Moderate: slope	Slight.
Severe: very poor drainage.	Severe: very poor drainage.	Severe: very poor drainage.	Severe: very poor drainage.	Severe: very poor drainage.	Severe: very poor drainage.
Severe: very poor drainage.	Severe: very poor drainage.	Severe: very poor drainage.	Severe: very poor drainage.	Severe: very poor drainage.	Severe: very poor drainage.
Slight	Slight	Slight	Slight	Slight	Slight.[2]
Moderate: slope	Moderate: slope	Slight	Slight	Moderate: slope	Slight.[2]
Slight	Slight	Slight	Slight	Slight	Slight.[2]

[2] Danger of pollution to underground water because of inadequate filtration characteristics. In soils where such pollution is a hazard the limitation to use for sanitary land fills is severe.

or a central sewage system is not feasible or practical. Among the features that control the degree of limitation are the hazard of flooding, degree of slope, depth to rock, and permeability.

Homesite locations.—Features considered in rating the soils for this use were depth to bedrock, slope, natural drainage, hazard of flooding, and stoniness or rockiness of the soil surface. Not considered was a method of disposing of sewage. The ratings in table 7 are for houses of three stories or less that have a basement, but the ratings also apply to sites for small industrial, commercial, and institutional buildings.

Areas that are subject to flooding have severe limitations for permanent structures. In most places flooding is infrequent, but it is damaging and costly when it does occur. Homes constructed on naturally wet soils probably will have a wet basement unless adequate drainage is provided. Among the wet soils in the county are the Brookston and Crosby soils. In many places tile drains and open ditches have been installed for agricultural use, but excavations for homes or other structures can disrupt these systems and cause recurrence of the original wetness.

The Uniontown, Henshaw, and other soils that have a high content of silt are less suitable for supporting foundations of buildings than the Casco and other coarser textured soils. Soils that have a high shrink-swell potential are likely to heave and cause foundations to crack. In addition, shrinking and swelling disrupt the alinement of sidewalks, patios, floors, and rock walls. These effects can be lessened by placing layers of sandy or gravelly material below the structure. Excavating for basements and installing underground utility lines are difficult and expensive on soils that are shallow over bedrock. On slopes of more than 12 percent, erosion is a hazard and excavating and grading are difficult.

Lawns, landscaping, and golf fairways.—In most areas developed for homes and golf courses, the natural surface soil is desirable for lawns, flowers, trees, and shrubs. It should be carefully removed, stored until construction and grading are completed, and then returned. The natural surface soil from areas graded for streets also can be used for lawns and fairways. Among the soil properties that determine whether a good lawn or fairway can be established are natural drainage, degree of slope, depth to bedrock, texture of the surface soil, stoniness or rockiness, and the hazard of flooding.

Streets and parking lots.—The ratings in table 7 are for soils used for streets and parking lots in subdivisions where traffic is not heavy. Considered in estimating the ratings were drainage, slope, depth to rock, hazard of flooding, and stoniness or rockiness. For streets and parking lots in subdivisions, limitations are severe on slopes of more than 6 percent. The percentage of slope selected for the sides of cuts and fills depend on erodibility of the soil and on the capacity of the soil for supporting close-growing plants. Tables 5 and 6, in the section "Engineering Uses of the Soils," give additional information that is important where streets and parking lots are to be established in subdivisions.

Athletic fields and other intensive play areas.—Athletic fields and other areas suitable for intensive play are fairly small tracts used for baseball diamonds, football fields, and tennis, volleyball, and badminton courts. Because these areas must be nearly level, considerable shaping may be needed. For this reason, slope is an important feature that helps to determine the rating for this use. Also important are the texture of the surface layer, the hazard of flooding, soil permeability, and natural drainage.

Parks and extensive play areas.—Considered in rating the soils for parks and extensive play areas used for picnicking, hiking, nature study, and similar uses were degree of slope, texture of the surface soil, natural drainage, stoniness, and hazard of flooding. Paths in picnic and play areas should be constructed and maintained in a way that controls gullying. Flood plains, though having severe limitations for buildings or highways, can be developed and used as areas for extensive play if local flooding is not too frequent.

Campsites.—Campsites for tents should be located in areas where the landscape is attractive, the trafficability is good, and the productivity of grasses and trees is medium or high. Soils in which the natural drainage is good or moderately good have less serious limitations than wetter soils. Limitations are moderate on somewhat poorly drained soils and severe on poorly drained and very poorly drained soils. In addition, limitations are severe on muck soils, on soils along streams where flooding is a hazard, and on soils in basinlike areas where water is ponded after heavy rains. As a rule, slopes in excess of 12 percent have severe limitations for use as tent campsites.

Desirable soils for tent campsites are those that are firm when moist and nonsticky when wet. Most suitable for campsites are soils having a surface layer of silt loam, loam, sandy loam, fine sandy loam, or very fine sandy loam.

Cemeteries and sanitary land fills.—Soils that are deep, are well drained or moderately well drained and have slopes of less than 12 percent have slight or moderate limitations for use as cemeteries. Steeper soils have severe limitations, and so do soils that are naturally somewhat poorly drained to very poorly drained and that are affected by a seasonal high water table. If the water table is permanently lowered, limitations are only slight or moderate on some soils. The use of soils for cemeteries is severely limited by hard bedrock near the surface, but it is only slightly or moderately restricted if the underlying material is soft or rippable. Excavation is easier and more favorable during all seasons of the year in the sandier soils. Shoring the sides of excavations is necessary where the soil is loose or otherwise is unstable. Preserving the original surface soil is important, and liming and fertilizing are needed for maintaining sod. Some medium-textured and fine-textured soils are subject to heaving caused by freezing and thawing. Applying gravel as a subbase under the foundations of monuments maintains better alinement of the monument and minimizes the damage from frost action.

In considering use of soils for sanitary land fills, the depth to underlying rock is especially important. The most favorable soils for the trench type of sanitary land fill are those that are friable and that are underlain by unconsolidated material. Features both of the soils and of the site should allow year-round cutting and filling operations. Among features that limit use are shallowness to bedrock, wetness, rapid permeability, steep slopes, and flooding. Enough slowly permeable soil material should be available to adequately cover all sides of buried, decomposing refuse. Contamination of the underground water can be avoided by onsite investigation to assure that the soils have adequate filtering qualities.

Utility lines.—Table 7 does not rate the soils according to their suitability to use for utility lines, but the installation and maintenance of these lines are affected by properties of the soils. Among the properties that affect installation and maintenance of utility lines are depth to bedrock, natural drainage, water table characteristics, and corrosion potential. The section "Descriptions of the Soils" gives facts about the properties of the soils. Additional information about corrosion potential and other properties can be obtained from table 5, in the section "Engineering Uses of the Soils."

Descriptions of the Soils

This section describes the soil series and mapping units of Champaign County. The acreage and proportionate extent of each mapping unit are given in table 8.

The procedure in this section is first to describe the soil series, and then the mapping units in that series. For each soil series, a profile of a soil representative of the series is briefly described. Thus, to get full information on any one mapping unit, it is necessary to read the description of that unit and also the description of the soil series to which it belongs. Unless otherwise stated, the colors given in the descriptions are for the soils when moist. As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Gravel pit, for example, does not belong to a soil series, but, nevertheless, it is listed in alphabetic order along with the soil series.

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

Terms related to soil science that are used in the soil descriptions and in other parts of the survey are defined in the Soil Survey Manual (*17*). Many of these terms are also defined in the Glossary.

TABLE 8.—*Approximate acreage and proportionate extent of soils*

Soil	Acres	Percent
Algiers silt loam	4, 166	1. 5
Brookston silty clay loam, 0 to 2 percent slopes	32, 511	11. 7
Brookston silty clay loam, 2 to 6 percent slopes	2, 546	. 9
Carlisle muck	2, 715	1. 0
Casco loam, 2 to 6 percent slopes	382	. 1
Casco loam, 6 to 12 percent slopes, moderately eroded	1, 038	. 4
Casco gravelly loam, 12 to 18 percent slopes, moderately eroded	703	. 3
Casco-Miami-Fox complex, 12 to 18 percent slopes, moderately eroded	1, 034	. 4
Celina silt loam, 0 to 2 percent slopes	660	. 2
Celina silt loam, 2 to 6 percent slopes	26, 750	9. 7
Celina silt loam, 2 to 6 percent slopes, moderately eroded	228	. 1
Celina silt loam, 6 to 12 percent slopes, moderately eroded	562	. 2
Celina bouldery silt loam, 2 to 6 percent slopes	109	(1)
Crosby silt loam, 0 to 2 percent slopes	18, 984	6. 9
Crosby silt loam, 2 to 6 percent slopes	32, 926	11. 9
Crosby bouldery silt loam, 0 to 6 percent slopes	114	(1)
Edwards muck	236	. 1
Eel silt loam	661	. 2
Fox silt loam, 0 to 2 percent slopes	17, 089	6. 2
Fox silt loam, 2 to 6 percent slopes	8, 771	3. 2
Fox silt loam, 2 to 6 percent slopes, moderately eroded	835	. 3
Fox silt loam, 6 to 12 percent slopes, moderately eroded	1, 206	. 4
Fox loam, 2 to 6 percent slopes	184	. 1
Fox sandy loam, 2 to 6 percent slopes	131	. 1
Fox-Miami silt loams, 6 to 12 percent slopes, moderately eroded	518	. 2
Genesee silt loam	2, 327	. 8
Gravel pit	480	. 2
Henshaw silt loam, 0 to 2 percent slopes	121	(1)
Henshaw silt loam, 2 to 6 percent slopes	64	(1)
Homer silt loam, 0 to 2 percent slopes	2, 822	1. 0
Ionia silt loam, 0 to 2 percent slopes	836	. 3
Ionia silt loam, 2 to 6 percent slopes	140	. 1
Kane silt loam, 0 to 2 percent slopes	473	. 2
Kendallville silt loam, 0 to 2 percent slopes	87	(1)
Kendallville silt loam, 2 to 6 percent slopes	1, 276	. 5
Kendallville silt loam, 6 to 12 percent slopes, moderately eroded	411	. 1
Kendallville silt loam, 12 to 18 percent slopes, moderately eroded	70	(1)
Linwood muck	1, 797	. 6
Lippincott silty clay loam	17, 649	6. 4
Made land	182	. 1
Miami silt loam, 0 to 2 percent slopes	3, 442	1. 2
Miami silt loam, 2 to 6 percent slopes	21, 560	7. 8
Miami silt loam, 2 to 6 percent slopes, moderately eroded	2, 044	. 7
Miami silt loam, 6 to 12 percent slopes	1, 299	. 5
Miami silt loam, 6 to 12 percent slopes, moderately eroded	26, 381	9. 5
Miami silt loam, 12 to 18 percent slopes	1, 471	. 5
Miami silt loam, 12 to 18 percent slopes, moderately eroded	8, 902	3. 2
Miami silt loam, 18 to 25 percent slopes	518	. 2
Miami silt loam, 18 to 25 percent slopes, moderately eroded	2, 162	. 8
Miami bouldery silt loam, 2 to 12 percent slopes	130	(1)
Miami soils, 6 to 12 percent slopes, severely eroded	839	. 3
Miami soils, 12 to 18 percent slopes, severely eroded	2, 352	. 8
Miami soils, 18 to 25 percent slopes, severely eroded	851	. 3
Miami and Lewisburg silt loams, 25 to 50 percent slopes, moderately eroded	431	. 2
Miami-Rodman complex, 25 to 50 percent slopes, moderately eroded	205	. 1
Miami-Casco-Rodman complex, 18 to 25 percent slopes, moderately eroded	766	. 3
Ockley silt loam, 0 to 2 percent slopes	1, 698	. 6
Ockley silt loam, 2 to 6 percent slopes	257	. 1
Patton silty clay loam	2, 309	. 8
Quarry	7	(1)
Rodman gravelly loam, 12 to 18 percent slopes, moderately eroded	216	. 1
Rodman gravelly loam, 18 to 50 percent slopes, moderately eroded	1, 203	. 4
Ross silt loam	389	. 1
Shoals silt loam	1, 643	. 6
Shoals silt loam, till subsoil variant	155	. 1
Sloan silt loam	3, 195	1. 2
Sloan silt loam, gravelly subsoil variant	1, 257	. 5
Uniontown silt loam, 2 to 6 percent slopes	83	(1)
Wallkill silt loam	1, 111	. 4
Warners silt loam	32	(1)
Warsaw silt loam, 0 to 2 percent slopes	3, 538	1. 3
Warsaw silt loam, 2 to 6 percent slopes	383	. 1
Wea silt loam, 0 to 3 percent slopes	838	. 3
Water areas 3 to 40 acres in size and streams less than one-eighth of a mile wide	1, 659	. 6
Total	277, 120	100. 0

[1] Less than 0.05 percent.

Algiers Series

The Algiers series consists of light-colored, nearly level, mostly somewhat poorly drained soils on flood plains, as well as in upland areas subject to ponding, throughout the county. These soils have formed in a layer of light-colored, loamy alluvium, 10 to 40 inches thick, over dark-colored loamy alluvium. The alluvium was washed from areas where the soils were derived mainly from calcareous glacial till.

In a typical profile of a cultivated Algiers soil, the plow layer is dark grayish-brown silt loam about 8 inches thick. Between depths of 8 and 20 inches is dark grayish-brown silt loam. Black silty clay loam is at a depth of 20 inches. Bedrock is normally at a depth greater than 8 to 10 feet.

The water table is high during wet seasons, and flooding is a hazard. If adequate drainage is provided, however, the root zone is deep enough for most of the commonly grown crops. The available moisture capacity is high. Permeability is moderate to a depth of about 20 inches, but it is moderately slow below that depth.

If adequately drained, the Algiers soils are suitable for the crops commonly grown in this area. Most of the acreage is in corn and soybeans, but a small acreage, mainly where the hazard of flooding or ponding is severe, is in pasture and trees.

Typical profile of Algiers silt loam in a cultivated field in Union Township (sec. 24, R. 11 N., T. 6 E.):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable when moist; mildly alkaline; abrupt, smooth boundary.

C—8 to 20 inches, dark grayish-brown (10YR 4/2) silt loam; massive; friable when moist; mildly alkaline; clear, smooth boundary.

Ab—20 to 40 inches, black (N 2/0) silty clay loam; weak, fine, blocky structure; firm when moist; neutral.

The color of the Ap and C horizons is dominantly dark grayish brown (10YR 4/2), but it is dark grayish brown (2.5Y 4/2) in some areas. The reaction of the Ap and C horizons ranges from neutral to mildly alkaline. In places the C horizon contains a few lenses of sand. Color of the buried Ab horizon ranges from black (N 2/0) and 10YR 2/1) to very dark gray (N 3/0 and 10YR 3/1).

Algiers soils are adjacent to the well drained Genesee, the moderately well drained Eel, and the very poorly drained Sloan soils, all of which are on flood plains. They also are adjacent to the Lippincott, Brookston, and other soils on terraces and uplands. The Algiers soils are less brownish than the Genesee soils. They have a surface layer similar to that of the Eel soils, but they are underlain by black rather than by dark grayish-brown material, and they have poorer drainage than the Eel soils. In contrast to the Sloan soils, Algiers soils have a light-colored surface layer.

Algiers silt loam (Ag).—This is the only Algiers soil mapped in Champaign County. It is in nearly level areas or depressions. Many of the areas along the major streams are as large as 10 to 30 acres. Areas along the smaller streams and on terraces are long, narrow, and winding. Upland areas are generally small and circular.

Natural wetness is the major limitation to use of this soil, and generally this limitation is moderate for farm uses. Flooding is a moderate hazard in areas that are not protected. (Capability unit IIw–1)

Brookston Series

The Brookston series consists of dark-colored soils that are very poorly drained. These soils are on uplands, mostly in nearly level areas or in depressions. They have formed in loamy, calcareous glacial till of Wisconsin age.

In a typical profile of a cultivated Brookston soil, the plow layer is very dark gray silty clay loam about 9 inches thick. The subsoil is mottled, mostly grayish silty clay loam. The substratum of grayish-brown, calcareous silt loam is at a depth of about 39 inches.

The water table is high during wet seasons. The grayish colors in the subsoil indicate natural wetness. Where adequate drainage is provided, the root zone is deep and is suitable for most of the annual crops commonly grown. The available moisture capacity is high, and the content of organic matter is generally high. Permeability is moderate in the surface layer and the subsoil, but it is moderately slow in the substratum.

Brookston soils are used mainly for field crops. The crops commonly grown are corn, soybeans, wheat, and hay.

Typical profile of Brookston silty clay loam, 0 to 2 percent slopes, in a cultivated field in Adams Township (sec. 26, R. 13 N., T. 3 E.; laboratory No. CH–50):

Ap—0 to 9 inches, very dark gray (10YR 3/1) silty clay loam; weak, coarse, granular structure; friable when moist; slightly acid; abrupt, smooth boundary.

B21t—9 to 12 inches, black (10YR 2/1) silty clay loam; a few, fine, faint, yellowish-brown (10YR 5/6) mottles; moderate, fine, subangular blocky structure; firm when moist; common thin clay films on ped faces; slightly acid; clear, smooth boundary.

B22tg—12 to 19 inches, dark-gray (10YR 4/1) silty clay loam; a few, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium and fine, angular blocky structure; firm when moist; a few thin clay films on ped faces; neutral; clear, smooth boundary.

B23tg—19 to 30 inches, olive-gray (5Y 5/2) silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, angular blocky structure; firm when moist; a few thin clay films on ped faces; a few manganese concretions; neutral; clear, wavy boundary.

B24g—30 to 39 inches, grayish-brown (2.5Y 5/2) silty clay loam; many, fine and medium, prominent, yellowish-brown (10YR 5/8) mottles; weak, medium, angular blocky structure; firm when moist; a few dark-gray (N 4/0) and black (10YR 2/1) coatings of organic matter on ped faces; some crayfish channels; mildly alkaline; clear, smooth boundary.

C1—39 to 45 inches, grayish-brown (2.5Y 5/2) silt loam; many, medium, prominent, yellowish-brown (10YR 5/8) mottles; massive; firm when moist; common partly weathered dolomite pebbles; calcareous; gradual, smooth boundary.

C2—45 to 60 inches, grayish-brown (2.5Y 5/2) silt loam; many, medium, prominent, yellowish-brown (10YR 5/8) mottles; massive; very firm when moist; calcareous.

The color of the A horizon ranges from black (10YR 2/1) to very dark gray (10YR 3/1). The combined thickness of the A and B21t horizons ranges from 11 to 17 inches. The texture of the B22tg and B23tg horizons ranges from silty clay loam or clay loam to silty clay, and the texture of the B24g horizon ranges from clay loam to silty clay loam. The average clay content in the B horizon is about 35 percent. Calcareous till is at depths ranging from 27 to 50 inches, but it is nearer the surface in the sloping areas than in the more nearly level areas. Reaction ranges from medium acid to neutral in the upper part of the solum. In areas that have not received lime, the pH values are lowest in the Ap horizon, and they increase with depth.

Brookston soils are members of a topographic sequence that includes the higher lying, somewhat poorly drained Crosby soils, the moderately well drained Celina soils, and the well drained Miami soils. They have a darker colored surface layer and a more grayish subsoil than any of these soils.

Brookston silty clay loam, 0 to 2 percent slopes (BsA).—This soil has the profile described as typical for the series. It occurs at a lower elevation than the adjacent soils and is in circular areas containing 3 to 15 acres. Some areas resemble a basin. In those places water stands if adequate drainage is not provided. Included with this soil in mapping were a few small areas of light-colored Crosby soils on low knolls.

Wetness is a moderate limitation to use of this Brookston soil for crops. (Capability unit IIw–3)

Brookston silty clay loam, 2 to 6 percent slopes (BsB).—This soil is commonly in or adjacent to drainageways, where it occupies long, narrow, tongue-shaped areas containing 5 to 10 acres. Except in fields that have been cultivated when wet, this soil generally is in good tilth.

Moderate wetness is the primary limitation to use of this soil. Runoff is rapid, however, especially when the surface is not protected by a cover of plants. As a result, erosion is a moderate hazard. (Capability unit IIw–3)

Carlisle Series

The Carlisle series consists of organic soils that are dark colored, very poorly drained, and nearly level. These soils are mostly composed of muck that has accumulated from the partly decomposed remains of trees, fibrous grasses, sedges, and reeds. The organic material is greater than 42 inches in thickness and is underlain by mineral soil material. These soils are in low-lying, swampy areas on bottom lands and uplands throughout the county. Size of the areas is variable.

In a typical profile of a Carlisle soil, the upper layers are black muck that is underlain by black and dark-brown peat at a depth of about 38 inches. The substratum generally is light olive-brown glacial till of silty clay loam texture, and it underlies the organic material at a depth greater than 42 inches. Both the organic material and the material in the substratum have a smooth feel when rubbed between the fingers.

Carlisle soils are normally saturated with water and must be drained before they can be farmed. Where these soils are adequately drained, they have a deep root zone that is suitable for the commonly grown annual crops. The available moisture capacity is very high. Permeability is moderately rapid in the muck and peat and very slow in the substratum. Controlling the level of the water table prevents excessive subsidence.

Carlisle soils are used mainly to grow corn, soybeans, and other general crops, but they are also used for specialized crops. A small acreage where these soils have not been drained is used for pasture or trees. The content of phosphorus and potash is generally low.

Typical profile of Carlisle muck in a pasture in Harrison Township (sec. 19, R. 13 N., T. 4 E.):

1—0 to 7 inches, black (10YR 2/1), well-decomposed muck; moderate, fine, granular structure; friable when moist; slightly acid; gradual, smooth boundary.

2—7 to 13 inches, black (N 2/0), well-decomposed muck that breaks out in chunks; firm when moist; slightly acid; gradual, smooth boundary.

3—13 to 38 inches, black (10YR 2/1), partly decomposed muck; friable when moist; some plant remains visible; slightly acid; gradual, smooth boundary.

4—38 to 42 inches, black (10YR 2/1) and dark-brown (7.5YR 3/2), disintegrated peat; friable when moist; neutral; gradual, smooth boundary.

5—42 to 72 inches, dark-brown (7.5YR 4/4), raw peat; massive; a few fragments of wood; neutral.

IIC—72 to 100 inches, light olive-brown (2.5Y 5/4), compact silty clay loam glacial till; calcareous.

Total thickness of the organic matter is much greater than 42 inches in most places. In the areas where the organic material is much thicker than 42 inches, the muck is commonly underlain by dark-brown (7.5YR 4/4) peat below a depth of 36 inches. Light olive-brown (2.5Y 5/4) silt loam or silty clay loam is at a depth of 42 inches in some places. In other places the substratum is dark-gray, clayey material.

In many places the Carlisle soils on bottom lands are adjacent to Genesee, Eel, and Sloan soils. On uplands they are adjacent to mineral soils that are underlain by glacial material.

Carlisle muck (Co).—This is the only soil of the Carlisle series mapped in Champaign County. It occupies areas that range from 3 to 20 acres in size. The areas on bottom lands are long and narrow, and those in potholes on uplands are circular. Included with this soil in mapping were a few areas of Linwood and Wallkill soils. Also included were small areas where the depth of organic material is less than 42 inches.

Areas that have not been drained are saturated with free water and are generally swampy and marshy. Those that have been drained are subject to subsidence (shrinkage) as the result of oxidation of the organic material. This soil is subject to blowing during dry periods, especially when the surface is bare and is exposed to strong prevailing winds. When dry, the soil also is subject to damage from fire. Wetness is a severe hazard, even where this soil has been drained. (Capability unit IIIw-2)

Casco Series

The Casco series consists of soils that are light colored, gently sloping to steep, and well drained. These soils are underlain by gravelly outwash of Wisconsin age, which tends to make them droughty. The gently sloping areas are commonly on stream terraces, and the steeper areas are mostly on glacial kames.

In a typical profile of a Casco soil in a wooded area, the surface layer is very dark brown to brown loam about 7 inches thick. The subsoil consists mostly of reddish-brown gravelly clay loam and gravelly clay. The substratum of loose, stratified gravel and sand is at a depth of about 20 inches.

Permeability is moderate to moderately rapid in the surface layer and subsoil and moderately rapid to very rapid in the gravelly substratum. The root zone is shallow, and the available moisture capacity is low because of the limited depth to gravel and sand.

Gently sloping and sloping areas of Casco soils are used mostly for pasture and field crops. The steeper areas are in pasture and trees.

Typical profile of Casco loam, 2 to 6 percent slopes, in a wooded area in Urbana Township (sec. 1, T. 5 E., R. 11 N.):

A1—0 to 3 inches, very dark brown (10YR 2/2) loam; moderate, fine, crumb structure; very friable when moist; neutral; clear, smooth boundary.

A2—3 to 7 inches, brown (7.5YR 4/2) loam; weak, very fine, subangular blocky structure; friable when moist; 10 percent of horizon is coarse fragments; neutral; clear, smooth boundary.

IIB1—7 to 11 inches, reddish-brown (5YR 4/4) gravelly clay loam; moderate, very fine and fine, subangular blocky structure; friable when moist; slightly acid; clear, smooth boundary.

IIB2t—11 to 18 inches, reddish-brown (5YR 5/4) gravelly clay; moderate to strong, very fine and fine, subangular blocky structure; firm when moist; common thin clay films on ped faces; slightly acid; clear, smooth boundary.

IIB3t—18 to 20 inches, dark-brown to brown (7.5YR 4/4) gravelly clay loam; friable when moist; common partly weathered pebbles of dolomite; a few thin clay films on the pebbles; calcareous; clear, wavy boundary.

IIC1—20 to 25 inches, dark-brown to brown (7.5YR 4/4), stratified gravel and sand; loose; calcareous; clear, wavy boundary.

IIC2—25 to 50 inches, brown (10YR 5/3) and pale-brown (10YR 6/3), stratified gravel and sand; loose; calcareous.

In places the A horizon is gravelly. The color of the Ap horizon is commonly dark grayish brown (10YR 4/2). The color of the B horizons includes both 7.5YR and 5YR hues, and the value and chroma in those horizons range from 4/3 to 5/5. Clay coatings are generally of lower chroma and have a darker color in the lower part of the IIB2t horizon than in the upper part. The texture of the IIB2t horizon ranges from clay loam or gravelly clay loam to sandy clay loam, clay, or gravelly clay. The weighted average clay content of the Bt horizons is less than 35 percent. In many places thin clay films coat the pebbles below a depth of 24 inches. The reaction of the IIB1 and IIB2t horizons ranges from strongly acid to neutral. Depth to calcareous gravel and sand ranges from 10 to 24 inches.

Casco soils commonly occur near Fox and Rodman soils. They are similar to the Fox soils but are shallower over the underlying gravelly and sandy substratum than are those soils. Unlike the Rodman soils, they are generally free of gravel and sand at or near the surface, except in eroded areas.

Casco loam, 2 to 6 percent slopes (CcB).—This soil has the profile described as typical for the series. The soil occurs in circular areas that range from 5 to 20 acres in size. Included in mapping were a few nearly level areas.

Because water infiltrates well, this Casco soil is suitable for irrigation. The less sloping areas are the most suitable. In areas that are not irrigated, the low available moisture capacity is a severe limitation that restricts the kinds of crops that can be grown. (Capability unit IIIs–1)

Casco loam, 6 to 12 percent slopes, moderately eroded (CcC2).—Areas of this soil range from 5 to 25 acres in size. They are irregular in shape, and their surface is uneven, especially in the areas on kames. Because of past erosion, the plow layer consists of the remaining original surface soil and of material from the upper part of the subsoil. Included in mapping were a few areas of Fox soils, which are deeper than this soil.

This Casco soil is droughty, and erosion is a very severe hazard if cultivated crops are grown. (Capability unit IVe–2)

Casco gravelly loam, 12 to 18 percent slopes, moderately eroded (CgD2).—As a result of past erosion, this soil has a plow layer that is a mixture of the remaining original surface soil and of material from the upper part of the subsoil. Gravel makes up more than 20 percent, but less than 50 percent, of the plow layer and the subsoil. Both the size and the shape of the areas vary greatly, but mostly this soil is in nearly circular areas or in long, curving, broad areas 10 to 30 acres in size. The surface is commonly uneven, especially where this soil is on kames.

This soil is droughty, and erosion is a severe hazard unless a thick cover of plants is maintained. (Capability unit VIe–2)

Casco-Miami-Fox complex, 12 to 18 percent slopes, moderately eroded (CmD2).—In this soil complex, Casco, Miami, and Fox soils are so intermingled that mapping them separately was not practical. Because of past erosion, the present plow layer consists of a mixture of the remaining original surface soil and of material from the upper part of the subsoil. A few severely eroded areas were included with these soils in mapping. The Casco soils of this complex have a profile similar to the one described as typical for the Casco series, except that from 20 to 50 percent of both the surface layer and the subsoil is gravel. Profiles typical of the Miami and Fox soils are described under the Miami and Fox series.

Soils of this complex have an uneven surface, and they mostly occur in areas of circular or irregular shape that range from 10 to 30 acres in size. The areas are on or near moraines and kames.

The composition of the materials from which these soils were derived is variable, and the materials of different composition overlap within a short horizontal distance. Therefore, many differences in the extent of each kind of soil can be expected within a specific area, as well as differences in the properties of the soils. In most areas, however, about 40 percent of the acreage is Casco soils, another 40 percent is Miami soils, and about 20 percent is Fox soils.

The Casco and Fox soils are droughty. The primary limitation to use of the soils of this complex, however, is a very severe risk of erosion if cultivated crops are grown. (Capability unit IVe–1)

Celina Series

Light-colored, moderately well drained, nearly level to sloping or undulating soils of uplands are in the Celina series. These soils have formed in a mantle of silty material and in the underlying calcareous, loamy till of Wisconsin age.

In a typical profile of a Celina soil in pasture, the surface layer is dark grayish-brown to brown silt loam about 8 inches thick. The subsoil consists mostly of brown and yellowish-brown, mottled silty clay loam to clay that extends to a depth of about 30 inches. The substratum is yellowish-brown and brown, calcareous, massive loam till.

The moderate wetness of these soils is indicated by mottling in the subsoil. Permeability is moderately slow, and the available moisture capacity is medium. The root zone is moderately deep for most annual crops.

Celina soils are well suited to the crops commonly grown in the county. Most of the acreage is in corn, soybeans, wheat, and hay.

Typical profile of Celina silt loam, 2 to 6 percent slopes, in a pasture near the junction of State Route No. 559 and Glendenning Road in Rush Township (Laboratory No. CH–27):

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine and medium, granular structure; very friable when moist; many fine roots; strongly acid; clear, wavy boundary.

A2—3 to 8 inches, brown (10YR 5/3) silt loam; weak, thin, platy structure; friable when moist; fine roots fewer than in A1 horizon; coatings of organic matter in root channels and worm burrows; strongly acid; clear, wavy boundary.

B1—8 to 13 inches, brown (10YR 5/3) silt loam; a few, medium, faint, strong-brown 7.5YR 5/6) mottles; weak to moderate, fine and medium, subangular blocky structure; friable when moist; plentiful fine roots; a few dark-gray (10YR 4/1) worm casts; very strongly acid; gradual, wavy boundary.

B21t—13 to 18 inches, brown (10YR 5/3) silty clay loam; common, medium, faint, yellowish-brown (10YR 5/6) mottles; moderate, fine and medium, subangular blocky structure; firm when moist; a few fine roots; thin clay films on ped faces; very strongly acid; gradual, wavy boundary.

B22t—18 to 23 inches, brown (10YR 4/3) clay; many, medium, faint, yellowish-brown (10YR 5/6) mottles; strong, fine and medium, subangular blocky structure; firm when moist; a few fine roots; many clay films on ped faces; a few stains of manganese; strongly acid; gradual, wavy boundary.

B23t—23 to 26 inches, yellowish-brown (10YR 5/4) clay; many, fine, faint, yellowish-brown (10YR 5/6) mottles; moderate, coarse and medium, subangular blocky structure; firm when moist; many dark-brown (10YR 4/3) coatings and many clay films on ped faces; neutral; clear, wavy boundary.

B3t—26 to 30 inches, yellowish-brown (10YR 5/4) clay loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; firm when moist; dark-brown (10YR 4/3) coatings; few to many clay films; many partly weathered dolomite fragments; mildly alkaline and intermittently calcareous; clear, wavy boundary.

C1—30 to 40 inches, yellowish-brown (10YR 5/4) and light yellowish-brown (10YR 6/4) loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles and a few, medium, distinct, light brownish-gray (10YR 6/2) mottles; massive but a slight tendency toward thick platy structure; firm when moist; many dolomite stones; calcareous; gradual, smooth boundary.

C2—40 to 60 inches, yellowish-brown (10YR 5/4) and brown (10YR 5/3) loam; common, fine, distinct, yellowish-brown (10YR 5/8) mottles and a few, medium, distinct, light brownish-gray (10YR 6/2) mottles; massive; firm when moist; many dolomite stones; calcareous.

The upper part of the solum developed in a mantle of silt 8 to 13 inches thick. Depth to mottling ranges from 8 to 28 inches. In many places the B1 horizon is faintly mottled and the B21t and B22t horizons contain little or no mottling. The soil material that has the maximum content of clay is generally between depths of 12 and 25 inches, and clay films are normally most numerous between those depths. In many places the boundary between the B3t and C horizons is very irregular. In those areas tongues of material from the B3t horizon extend downward into the C horizon. Reaction ranges from neutral to strongly acid in the A horizons. It ranges from medium acid to very strongly acid in the upper two-thirds of the B horizon and is generally mildly alkaline in the B3t horizon. Depth to calcareous till ranges from 18 to 32 inches. In a few places, mainly in the western part of the county, numerous boulders are on the surface and throughout the solum.

The Celina soils are members of a topographic sequence that includes the higher lying, well-drained Miami soils and the lower lying, somewhat poorly drained Crosby and very poorly drained Brookston soils. The Celina soils differ from the Miami soils in having mottling in their subsoil. They are browner and less mottled than the Crosby soils, and they have a lighter colored surface layer than the Brookston soils.

Celina silt loam, 0 to 2 percent slopes (CnA).—This soil is mainly in circular areas that contain 3 to 10 acres. In many places it is surrounded by gently sloping Celina soils. Included in mapping were a few areas of Crosby soils in low positions.

This Celina soil has few, if any, limitations to use for crops. (Capability unit I–1)

Celina silt loam, 2 to 6 percent slopes (CnB).—This gently sloping soil has the profile described as typical for the series. The slopes are long and are slightly convex in many places. Areas of this soil are generally broad and have a circular shape. They contain 5 to 20 acres. Most of them are in the upper part of a drainageway.

Surface runoff is rapid, especially when this soil is not protected by a cover of plants. The hazard of erosion in cultivated areas is moderate. (Capability unit IIe–1)

Celina silt loam, 2 to 6 percent slopes, moderately eroded (CnB2).—This soil has lost part of its original surface layer through erosion. The plow layer is a mixture of the remaining original surface soil and of brownish soil material from the upper part of the subsoil. The slopes are generally long and slightly convex. This soil is in the upper parts of drainageways. It is in broad, nearly circular areas containing 5 to 20 acres.

The range of moisture content within which this soil can be tilled is narrower than for the less eroded Celina soils. Runoff is rapid, especially when the surface is not protected by a cover of plants. The amount of runoff is greater than from soils that have shorter and milder slopes. The hazard of further erosion is moderate in cultivated areas. (Capability unit IIe–1)

Celina silt loam, 6 to 12 percent slopes, moderately eroded (CnC2).—This soil generally lies below areas of less sloping Celina or Miami soils. The shape of many of the areas is circular and follows the contour of the hillside. These areas contain 5 to 25 acres. Erosion has removed part of the original surface layer. The plow layer is a mixture of the remaining original surface soil and of brownish soil material from the upper part of the subsoil. Drainageways cross many of the areas, and seep spots are common.

The range of moisture content within which this soil can be tilled is narrower than in areas of less eroded Celina soils. Runoff is rapid, especially when the surface is not protected by a cover of plants. The hazard of further erosion is severe if cultivated crops are grown. (Capability unit IIIe–1)

Celina bouldery silt loam, 2 to 6 percent slopes (CoB).—This soil occurs in what is known as the boulder belt, shown on the General Soil Map at the back of this survey. It has numerous boulders on and in the soil. The boulders are generally round "floaters" 10 to 36 inches in diameter. Areas from which they have been removed can be easily cultivated. Erosion is a moderate hazard in cultivated areas. (Capability unit IIe–1)

Crosby Series

In the Crosby series are light-colored, somewhat poorly drained soils that are nearly level and gently sloping. These soils have formed in a mantle of silty material and in the underlying calcareous, loamy till of Wisconsin age. They occupy ground moraines on uplands.

In a typical profile of a Crosby soil in pasture, the surface layer is dark grayish-brown to light brownish-gray silt loam about 9 inches thick. The subsoil is mottled, brown and yellowish-brown silty clay loam and clay. Below the subsoil at a depth of about 24 inches is yellowish-brown, massive, calcareous loam till.

The water table is high during wet seasons, and mottling in the subsoil indicates that these soils are moderately wet all the time. Permeability is moderately slow. Clay in the subsoil and a dense substratum restrict the growth of roots in the lower part of the profile more than in the uppermost part. If adequate drainage is provided, the root zone is moderately deep for most annual crops. The available moisture capacity is medium.

These soils are well suited to the crops commonly grown in the county. They are used mainly for corn, soybeans, wheat, and hay.

Typical profile of Crosby silt loam, 0 to 2 percent slopes, in a pasture in Urbana Township (sec. 10, 11 N., T. 5 E.; laboratory No. CH–40):

A1—0 to 4 inches, dark grayish-brown (2.5Y 4/2) silt loam; moderate, fine, granular structure; very friable when moist; slightly acid; clear, wavy boundary.

A2—4 to 9 inches, light brownish-gray (10YR 6/2) silt loam; common, fine, faint, yellowish-brown (10YR 5/6) mottles; moderate, very thin, platy structure; friable when moist; a few very dark gray (10YR 3/1) coatings of organic matter on the peds; very strongly acid; clear, smooth boundary.

B1—9 to 13 inches, brown (10YR 5/3) silty clay loam; many, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, fine and medium, subangular blocky structure; friable when moist; very strongly acid; clear, smooth boundary.

B21t—13 to 16 inches, brown (10YR 4/3) clay; common, medium, distinct, yellowish-brown (10YR 5/4) and grayish-brown (10YR 5/2) mottles; moderate, medium and fine, subangular blocky structure; firm when moist; when the horizon is dry, common very pale brown (10YR 7/3) degradation faces are on the surfaces of peds; common, discontinuous, thin clay films on ped faces; very strongly acid; clear, smooth boundary.

B22t—16 to 24 inches, yellowish-brown (10YR 5/4) clay; many, medium, distinct, grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/6) mottles; strong, coarse, subangular blocky structure but tends toward strong, coarse, prismatic structure when in place; very firm when moist; dark grayish-brown (10YR 4/2) coatings and many, continuous, medium clay films on the surfaces of peds; slightly acid; clear, irregular boundary.

C1—24 to 35 inches, yellowish-brown (10YR 5/4) loam; common, fine, faint, light brownish-gray (10YR 6/2) mottles and a few, fine, distinct, strong-brown (7.5YR 5/6) mottles; massive; firm when moist; a few, thin, dark grayish-brown (10YR 4/2) clay films in fractures; dolomite pebbles adjacent to fractures show weathering; calcareous; gradual, wavy boundary.

C2—35 to 60 inches, yellowish-brown (10YR 5/4) loam; common, fine, faint, yellowish-brown (10YR 5/8) mottles; massive; firm when moist; calcareous.

In cultivated areas the Ap horizon ranges from dark grayish brown (10YR 4/2) to grayish brown (10YR or 2.5Y 5/2). The upper part of the solum developed in a mantle of silt 8 to 12 inches thick. Depth to mottling ranges from 4 to 15 inches. The color of the B2t horizons ranges from brown (10YR 4/3) or yellowish brown (10YR 5/4) to very dark grayish brown (10YR 3/2), and clay coatings of dark grayish brown (10YR 4/2) or grayish brown (10YR 5/2) are on the surfaces of the peds. In a few places the profile contains a B3 horizon, generally of clay loam that ranges from 2 to 6 inches in thickness. This B3 horizon contains numerous partly weathered dolomite pebbles, and common, thin, discontinuous, dark grayish-brown (10YR 4/2) clay films. Reaction ranges from neutral to very strongly acid in the A horizons, from slightly acid to very strongly acid in the B1 and B21t horizons, and from slightly acid to neutral in the B22t horizon. Depth to carbonates ranges from 24 to 36 inches.

The Crosby soils are in a topographic sequence that includes the higher lying, well drained Miami and moderately well drained Celina soils and the lower lying, very poorly drained Brookston soils. Crosby soils differ from Miami soils in having a grayish, mottled profile. They are more grayish and more mottled than the Celina soils and are lighter colored than the Brookston soils.

Crosby silt loam, 0 to 2 percent slopes (CrA).—This soil has the profile described as typical for the series. It occurs in broad, nearly circular areas containing 3 to 15 acres. Included in mapping were a few areas of lower lying Brookston soils.

This Crosby soil dries more slowly in spring than gently sloping Crosby soils because of its position on the landscape and because a larger proportion of Brookston soils was included in mapping. Moderate wetness is a limitation to use of this soil for crops. (Capability unit IIw–2)

Crosby silt loam, 2 to 6 percent slopes (CrB).—This soil occupies wide, nearly circular areas containing 5 to 20 acres. Included with it in mapping were a few small areas of moderately eroded Crosby soils that have a plow layer less suitable for plant growth than the plow layer of this soil. Also included were small higher lying areas of Celina soils that are generally on the crests of ridges.

Runoff is rapid, especially when the soil surface is not protected by a cover of plants. Moderate wetness is the primary limitation of this soil. Erosion, intensified by runoff from the long slopes, is also a hazard. (Capability unit IIw–2)

Crosby bouldery silt loam, 0 to 6 percent slopes (CsB).—This soil is in the western part of the county in the area known as the boulder belt. Its profile is similar to the one described as typical for the series, except that it contains many scattered boulders. Most of the boulders are nearly round, and they range from 1 to 5 feet in diameter. In places subsurface boulders interfere with ditching and excavating.

Use of equipment needed for planting and harvesting crops and for managing pastures is restricted by the boulders. After the boulders have been removed, this soil can be managed like Crosby silt loam, 2 to 6 percent slopes. (Capability unit IIw–2)

Edwards Series

In the Edwards series are organic soils that are dark colored, nearly level, and very poorly drained. These soils consist of layers of muck that have accumulated to a thickness of 12 to 42 inches, and they are underlain by marl. The muck was formed by the decomposition of trees, fibrous grasses, sedges, and weeds when the area was saturated with water. These soils are in bogs and swamps on bottom lands.

In a typical profile of an Edwards soil, black muck extends to a depth of about 21 inches. It has a smooth feel when it is wet and is rubbed between the fingers. The underlying marl is calcareous and consists of loose shells that resemble beads. In areas that have not been drained, both the muck and the marl are saturated.

This soil has a seasonal high water table. If adequate drainage is provided, however, the root zone is moderately deep for the commonly grown annual crops. The available moisture capacity is very high. Permeability is moderate to moderately rapid, both in the muck and in the marl.

The Edwards soils are mostly in pasture or trees. A small acreage is used to grow corn and soybeans.

Typical profile of Edwards muck in a cultivated field in Salem Township (sec. 31, R. 13 N., T. 5 E.):

1—0 to 12 inches, black (N 2/0), well-decomposed muck; moderate, fine, granular structure; very friable when moist; shell fragments common on the surface; calcareous; abrupt, smooth boundary.

2—12 to 21 inches, black (N 2/0), well-decomposed muck; common, faint, dark reddish-brown (5YR 3/2) mottles; breaks out in chunks; friable to firm when moist; mildly alkaline; abrupt, smooth boundary.

IIC1—21 to 45 inches, light brownish-gray (2.5Y 6/2) marl; massive; friable when moist; some shell fragments; calcareous; gradual, smooth boundary.

IIC2—45 inches +, light-gray (2.5Y 7/2) and light yellowish-brown (2.5Y 6/4) marl; massive; friable when moist; some shell fragments; calcareous.

In places the organic material is neutral. In some areas many shells are on the surface. In places the solum has fragments of shells throughout. Thickness of the organic material ranges from 12 to 42 inches. The underlying marl varies in degree of purity and ranges from 12 to 50 inches in thickness.

On uplands Edwards soils are adjacent to soils underlain by glacial material. On flood plains they commonly are near higher lying Genesee, Eel, Shoals, and Sloan soils. They differ from these higher lying soils in being composed of organic material. The Edwards soils are similar to the Linwood soils, but unlike those soils, they are underlain by marl. They are also similar to the Carlisle and Warners soils, but Edwards soils do not have so thick a layer of organic material as the Carlisle soils. Unlike the Warners soils, they lack marl at or near the surface and they have a surface layer of well-decomposed muck instead of a surface layer consisting of silty inwash, muck, and marl.

Edwards muck (Ed).—This is the only soil of the Edwards series mapped in Champaign County. It occurs in nearly circular areas that contain 3 to 15 acres.

Where this soil is drained, it is subject to subsidence unless the level of the water table is controlled. Soil blowing is also a hazard, especially when this soil is dry and the surface is not protected by a cover of plants. Generally, the content of potash and phosphorus is low. Prolonged wetness is a very severe limitation to all uses. In some places drainage outlets are difficult to establish. (Capability unit IVw–1)

Eel Series

The Eel series consists of light-colored, moderately well drained, nearly level soils on flood plains along most of the streams in the county. These soils have formed in loamy alluvium washed from soils underlain by calcareous glacial till of Wisconsin age.

In a typical profile of a cultivated Eel soil, the plow layer is dark-brown silt loam about 7 inches thick. The subsoil is mottled, dark-brown silt loam. The substratum of calcareous, dark grayish-brown, stratified sand, silt, and gravel is at a depth of about 39 inches. Bedrock is at a depth greater than 8 to 10 feet in most places.

These soils are subject to flooding. Mottling in the subsoil indicates that the soils are wet some of the time. The root zone is deep, and the available moisture capacity is high. Permeability is moderate.

In Champaign County the Eel soils are important because they are so well suited to corn, soybeans, and other crops commonly grown. A small acreage where flooding is a hazard is mainly in pasture or trees, but most of the acreage is in field crops.

Typical profile of Eel silt loam in a cultivated field in Concord Township (sec. 31, R. 12 N., T. 4 E.):

Ap—0 to 7 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable when moist; neutral; abrupt, smooth boundary.

B1—7 to 26 inches, dark-brown (10YR 4/3) silt loam; weak, medium, subangular blocky structure; friable when moist; neutral; clear, smooth boundary.

B2—26 to 39 inches, dark-brown (10YR 4/3) silt loam; common, fine, distinct, brown (7.5YR 4/4) mottles; weak, medium, subangular blocky structure; friable when moist; neutral; clear, smooth boundary.

C—39 to 50 inches, dark grayish-brown (2.5Y 4/2) gravelly loamy sand; common, fine, distinct, brown (7.5YR 4/4) mottles; loose; calcareous.

The color of the Ap horizon ranges from very dark grayish brown (10YR 3/2) to dark grayish brown (10YR 4/2) or dark brown (10YR 4/3). Reaction of the A horizon ranges from neutral to slightly acid. Depth to mottling ranges from 16 to 28 inches.

Eel soils are commonly adjacent to other soils formed in alluvium, including the well-drained Genesee, the somewhat poorly drained Shoals, and the very poorly drained Sloan soils. Eel soils are less grayish than the Genesee soils, and unlike the Genesee soils, they contain mottles. They are less mottled and have a less grayish color than the Shoals soils, and they have a lighter colored surface layer than the Sloan soils.

Eel silt loam (Ee).—This is the only Eel soil mapped in Champaign County. Most of the areas, especially those along the large streams, have a circular or crescent shape and contain 5 to 10 acres. Typically, the areas in flood channels are long and narrow. Along the small streams, areas of this soil are smaller than those along the large streams. Many of them are long, narrow, and winding.

This soil has few limitations to use for farming. Flooding is a hazard, however, and it limits to a moderate degree the kinds of crops that can be grown. (Capability unit IIw–5)

Fox Series

In the Fox series are light-colored soils that are well drained and nearly level to sloping. These soils have formed in loamy material 24 to 42 inches thick over stratified gravel and sand. They are mostly on glacial outwash terraces.

In a typical profile of a cultivated Fox soil, the plow layer is dark grayish-brown silt loam about 9 inches thick. The subsoil is mostly brown and dark-brown silty clay loam, clay, gravelly clay, and gravelly loam. The substratum of calcareous, stratified, loose gravel and sand is at a depth of about 36 inches.

The surface layer and the subsoil are moderately permeable, but the substratum is rapidly permeable. The root zone is moderately deep for most of the annual crops commonly grown, but its depth is generally limited by the gravel and sand in the substratum. These soils have medium to low available moisture capacity, and they tend to be droughty, especially for crops that mature late in summer. They warm up early in spring.

Fox soils are moderately well suited to the crops commonly grown in the county. They are used mainly for corn, wheat, soybeans, and hay.

Typical profile of Fox silt loam, 0 to 2 percent slopes, in a cultivated field near the junction of State Route No. 4 and Casey Road in Union Township, Virginia Military District (Laboratory No. CH–13):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine and medium, granular structure; friable when moist; neutral; clear, smooth boundary.

B1—9 to 17 inches, brown (7.5YR 4/2 and 4/4) silt loam; moderate, fine and medium, subangular blocky structure; friable when moist; strongly acid; gradual, wavy boundary.

B21t—17 to 21 inches, brown (7.5YR 4/4) silty clay loam; moderate, fine and medium, subangular blocky structure; firm when moist; thin, patchy clay films on ped faces; very strongly acid; gradual, wavy boundary.

IIB22t—21 to 26 inches, dark-brown (7.5YR 4/4) clay; moderate, fine, subangular blocky structure; firm to very firm when moist; common clay films on ped faces; 5 percent of horizon is coarse fragments; strongly acid; clear, wavy boundary.

IIB23t—26 to 30 inches, dark-brown (7.5YR 4/4 and 3/2) gravelly clay; very fine to fine, strong, subangular blocky structure; very firm when moist; many clay films on ped faces; common stains of manganese; slightly acid; clear, wavy boundary.

IIB3t—30 to 36 inches, dark-brown (7.5YR 3/2) gravelly loam; weak, medium, subangular blocky structure; friable when moist; many, pink (7.5YR 7/4), partly weathered dolomite pebbles; common clay films on the pebbles; mildly alkaline; clear, irregular boundary.

IIC—36 to 50 inches, brown (10YR 5/3), dark-brown (10YR 4/3), and very dark grayish-brown (10YR 3/2) stratified gravel and sand; single grain; loose; calcareous.

In places the A horizon is loam or sandy loam. Where the A horizon is loam, the B1 horizon is loam and the B21t horizon is clay loam. Where the A horizon is sandy loam, the B1 horizon is sandy loam, the B21t horizon is sandy clay loam, and the IIB22t horizon is sandy clay. In areas that have an A horizon of silt loam, the mantle of silty material ranges from 12 to 18 inches in thickness. The color of the B2t horizons for all of these soils ranges from dark brown or brown (7.5YR 4/4 or 4/2) to reddish brown (5YR 4/3) or dark reddish brown (5YR 3/4). Irregular tongues of soil material from the IIB3t horizon extend downward into the IIC horizon to a depth of several feet. Depth to calcareous gravel and sand ranges from 24 to 42 inches, but it is about 36 inches in most places.

Fox soils commonly occur with Ockley, Casco, and Warsaw soils. Unlike the Ockley soils, they contain some gravel. Also, they have a higher content of clay in the subsoil and are less deep over gravel and sand than the Ockley soils. Fox soils are lighter colored than the Warsaw soils.

Fox silt loam, 0 to 2 percent slopes (FnA).—This soil is mainly on broad terraces in areas that contain 5 to 20 acres. The surface layer is generally in good tilth, but it is subject to crusting if cultivation is intensive. The profile is the one described as typical for the series.

This soil is suitable for irrigation. It has few, if any, limitations to use for farming, except that it is moderately droughty. (Capability unit IIs–1)

Fox silt loam, 2 to 6 percent slopes (FnB).—This soil is mainly on broad terraces in areas that are commonly long and narrow. The areas range from 5 to 20 acres in size. Slopes generally are too short for erosion control practices, such as terracing and stripcropping.

This soil is suitable for irrigation. Erosion is a moderate hazard if the soil is cultivated. (Capability unit IIe–2)

Fox silt loam, 2 to 6 percent slopes, moderately eroded (FnB2).—This soil is on broad terraces. The areas are generally nearly circular in shape and contain 5 to 20 acres. Except for erosion, the profile is similar to the one described as typical for the series. Erosion has removed part of the original surface layer, and the plow layer is a mixture of the remaining original surface soil and of brownish material from the upper part of the subsoil. The slopes are generally long, and this intensifies the hazard of erosion.

Because of the hazard of further erosion, this soil has moderate limitations to use for cultivated crops. It is more droughty than uneroded Fox soils. (Capability unit IIe–2)

Fox silt loam, 6 to 12 percent slopes, moderately eroded (FnC2).—This soil is in long, narrow areas that range from 5 to 20 acres in size. It has lost part of the original surface layer through erosion, and it is more droughty than uneroded Fox soils. The plow layer is a mixture of the remaining original surface soil and of brownish material from the upper part of the subsoil. Included with this soil in mapping were a few areas of Casco soils, and a few severely eroded spots in the steeper areas and in places where tillage has been up and down the slope. These severely eroded areas have a uniformly brown color that contrasts noticeably with the surrounding areas when the soil is bare.

Because the hazard of further erosion is severe, this Fox soil is severely limited in its use for cultivated crops. (Capability unit IIIe–2)

Fox loam, 2 to 6 percent slopes (FlB).—This soil has a profile similar to the one described as typical for the series, except that the plow layer and the upper part of the subsoil are loam. It is mainly on broad terraces, in nearly circular areas that contain 3 to 10 acres.

This soil is suitable for irrigation, and the plow layer is better suited to tillage than that of Fox silt loams. Also, the surface is less susceptible to crusting. Erosion is a moderate hazard if this soil is used for cultivated crops. (Capability unit IIe–2)

Fox sandy loam, 2 to 6 percent slopes (FmB).—This soil is on broad terraces in areas that are nearly circular and that contain 5 to 10 acres. In places the surface is uneven, and there are many long, narrow, gently sloping ridges. The upper part of the profile contains more sand than the profile described as typical for the Fox soils. Both the plow layer and the upper part of the subsoil have a texture of sandy loam.

The plow layer of this soil is more suitable for tillage than the plow layer of Fox silt loams, and the available moisture capacity is lower than typical for Fox soils. This soil is suitable for irrigation. Erosion is a moderate hazard if cultivated crops are grown. (Capability unit IIe–2)

Fox-Miami silt loams, 6 to 12 percent slopes, moderately eroded (FoC2).—In this soil complex, Fox and Miami soils are so intermingled that mapping them separately was not feasible. About 60 percent of each area consists of Fox soils, and about 40 percent consists of Miami soils. Except for changes caused by erosion, the profiles are similar to the ones described as typical for the Fox and Miami series. The plow layer is a mixture of the remaining original surface soil and that of material from the upper part of the subsoil. The Fox soils are underlain by gravel and sand, and the Miami soils are underlain by glacial till.

Included with these soils in mapping were some severely eroded places on the steeper slopes and in areas where tillage has been up and down the slope. These severely eroded places have a uniformly brown color that contrasts markedly with the surrounding areas when the surface is bare.

Soils of this complex occur in long, narrow, winding areas typical of terrain where kames and moraines are common. The areas contain 5 to 25 acres. Further erosion is a severe hazard if these soils are cultivated. (Capability unit IIIe–2)

Genesee Series

The Genesee series consists of light-colored, well-drained, nearly level soils on the flood plains of most of the streams in the county. These soils have formed in loamy alluvium that washed from soils underlain by calcareous glacial till of Wisconsin age.

In a typical profile of a cultivated Genesee soil, the plow layer is dark grayish-brown silt loam about 12 inches thick. The subsoil is dark grayish-brown silt loam. Beneath the subsoil, at a depth of about 46 inches, are calcareous, stratified silt, sand, and gravel. Bedrock is at a depth greater than 8 to 10 feet in most places.

Permeability is moderate, and the available moisture capacity is high. The root zone is deep for most of the annual crops commonly grown. Flooding is a hazard.

Genesee soils are well suited to the crops generally grown in the county. They are used mainly to grow corn and soybeans, but a small acreage where the hazard of flooding is most severe is mostly in pasture or trees.

Typical profile of Genesee silt loam in a pasture in Mad River Township (sec. 10, R. 11 N., T. 4 E.):

Ap—0 to 12 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium and coarse, granular structure; friable when moist; mildly alkaline; abrupt, smooth boundary.

B—12 to 46 inches, dark grayish-brown (10YR 4/2) silt loam; weak, coarse, granular structure; friable when moist; a few sand lenses; mildly alkaline; gradual, smooth boundary.

C1—46 to 53 inches, very dark grayish-brown (10YR 3/2) silt loam; massive; friable when moist; slight effervescence when treated with dilute hydrochloric acid; clear, smooth boundary.

C2—53 to 68 inches, dark-brown (10YR 4/3) loamy sand grading to sandy loam with increasing depth; single grain; friable when moist; calcareous; clear, smooth boundary.

C3—68 inches +, brown (10YR 4/3) and very dark grayish-brown (10YR 3/2) gravel and sand; single grain; loose; calcareous.

Color of the Ap horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 4/3). The reaction of the Ap horizon is neutral or mildly alkaline. The color of the C horizons is mainly dark grayish brown (10YR 4/2), dark brown (10YR 4/3), or very dark grayish brown (10YR 3/2).

Genesee soils are commonly adjacent to moderately well drained Eel soils, somewhat poorly drained Shoals soils, and very poorly drained Sloan soils. They lack mottling that is typical in the Eel soils, and they lack the grayish colors and mottling that are typical in the Shoals soils. Genesee soils have a lighter colored surface layer than the Sloan soils.

Genesee silt loam (Gn).—This is the only Genesee soil mapped in Champaign County. Most of the areas, especially those along the larger streams, are circular or have a crescent shape and contain 5 to 20 acres. Long narrow flood channels parallel most of the larger areas. Along the small streams, areas of this soil are long, narrow, and winding. Included with this soil in mapping were a few areas of lower lying Eel soils and a few areas in which buried soils that resemble Fox and Warsaw soils are at a depth of 2 to 3 feet.

This Genesee soil has few, if any, adverse soil characteristics that limit use for crops. To a moderate degree, however, flooding limits the kinds of crops that can be grown. (Capability unit IIw-5)

Gravel Pit

Gravel pit (Gp) is a miscellaneous land type consisting of areas from which gravel has been taken or is now being taken for use in construction. This land type generally is on kames and in areas underlain by glacial outwash, in association with Casco, Fox, Ockley, and other soils underlain by gravelly and sandy outwash. The areas contain 3 to 10 acres. Some pits are actively mined and are being enlarged.

The material in Gravel pit consists of layers of gravel and sand that are variable in thickness and in orientation. The kinds of aggregate and the sizes of grains are fairly uniform within a layer, but they are likely to differ considerably from the material in an adjacent layer. Some layers contain an appreciable amount of silt and sand. Selective mining is practiced so that the desirable kinds of aggregate can be obtained.

Nearly all of the large aggregates are rounded. Quartz, granite, and other siliceous materials are common, but carbonatic pebbles are dominant. Most areas also contain dolomite, but the amount is variable from place to place. In some places a weakly bonded conglomerate has formed through cementation by calcareous material. Limestone and shale in this land type are generally of local origin.

Because of the nature of the operations, soil material in spoil banks varies within short horizontal distances. As a rule, the stripped soil material is low in content of organic matter and in available moisture capacity, and it is poorly suited to the growth of plants. As a result of the instability of the stripped soil material, most areas are subject to erosion and are a potential source of siltation.

Areas that are no longer being mined should be treated so that plants can be established to help reduce erosion. Grasses and trees that can tolerate the low available moisture capacity and unfavorable properties of the soil material should be selected for seeding and planting.

Ponded areas of this land type are potentially suitable for development for wildlife habitat and recreational facilities. (Not placed in a capability unit)

Henshaw Series

The Henshaw series consists of light-colored, somewhat poorly drained, nearly level or gently sloping soils that are mostly on stream terraces. These soils have formed in calcareous, loamy and silty lacustrine material of Wisconsin age.

In a typical profile of a cultivated Henshaw soil, the plow layer is dark grayish-brown silt loam about 7 inches thick. The subsurface layer, about 6 inches thick, is yellowish-brown silt loam. The subsoil is mostly mottled, yellowish-brown silty clay loam and silt loam, and it extends to a depth of about 31 inches. The substratum is light yellowish-brown to grayish-brown and light brownish-gray silt loam.

The water table is high during wet seasons, and grayish coatings in the subsoil indicate that these soils are naturally wet. If adequate drainage is provided, however, the root zone is moderately deep for most of the annual crops commonly grown. The available moisture capacity is medium to high, and permeability is slow in the subsoil and the substratum.

The Henshaw soils are used mostly for the growing of corn, soybeans, wheat, and hay.

Typical profile of Henshaw silt loam, 0 to 2 percent slopes, in a cultivated field east of Hunt Clymer Road and near the Clark County line in Goshen Township, Virginia Military District:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak to moderate, fine, granular structure; friable when moist; medium acid; abrupt, smooth boundary.

A3—7 to 13 inches, yellowish-brown (10YR 5/4) silt loam; many, fine, faint, yellowish-brown (10YR 5/8) mottles; weak, coarse, granular structure; friable when moist; strongly acid; clear, wavy boundary.

B21tg—13 to 18 inches, dark yellowish-brown (10YR 4/4) silty clay loam; a few, medium, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, subangular blocky structure; firm when moist; thin, continuous, dark grayish-brown (2.5Y 4/2) clay films on ped faces; common manganese concretions; medium acid; clear, smooth boundary.

B22tg—18 to 27 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine and medium, subangular blocky structure; firm when moist; few, dark grayish-brown (2.5Y 4/2) clay films on ped faces; a few pebbles; slightly acid; clear, smooth boundary.

B3tg—27 to 31 inches, yellowish-brown (10YR 5/6) fine silt loam; a few, fine, faint, yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; firm when moist; few gray (10YR 5/1) clay films on ped faces; a few manganese concretions; slight effervescence when treated with dilute hydrochloric acid; clear, smooth or wavy boundary.

C1—31 to 42 inches, light yellowish-brown (2.5Y 6/4) silt loam; many, medium, distinct, yellowish-brown (10YR 5/8) mottles; massive; friable when moist; calcareous; clear, smooth boundary.

C2—42 inches +, grayish-brown (2.5Y 5/2) and light brownish-gray (2.5Y 6/2) silt loam; many, coarse, prominent, yellowish-brown (10YR 5/8) mottles; laminated; friable when moist; calcareous.

Texture of the B2t horizons is mainly silty clay loam, but the upper and lower parts of these horizons are fine silt loam in places. Hues in the B horizons are 10YR and 2.5Y, and the B horizons generally contain a few to many mottles of yellowish brown to strong brown. The reaction in the Ap horizon ranges from neutral to medium acid. Reaction in the B21tg horizon ranges from medium acid to very strongly acid, and reaction in the B22tg horizon ranges from strongly acid to slightly acid. Depth to calcium carbonates ranges from about 28 to 50 inches.

Henshaw soils are in a topographic sequence that includes the higher lying, moderately well drained Uniontown soils and the lower lying, very poorly drained Patton soils. They are more mottled and tend to be more grayish than the Uniontown soils, and they are lighter colored than the Patton soils.

Henshaw silt loam, 0 to 2 percent slopes (HeA).—This soil has the profile described as typical for the series. Most of the areas are broad and nearly circular, and they contain 5 to 10 acres. Included with this soil in mapping were a few areas of Patton soils, and a few areas in which sandy material is as shallow as 3 feet.

Moderate wetness is a limitation to use of this Henshaw soil for cultivated crops. (Capability unit IIw–2)

Henshaw silt loam, 2 to 6 percent slopes (HeB).—This soil occupies tongue-shaped or nearly circular areas that contain 5 to 10 acres. The tongue-shaped areas are commonly dissected by drainageways. Included in mapping were a few areas where sandy material is as shallow as 3 feet.

Moderate wetness is the primary limitation to use of this Henshaw soil for crops. Runoff is rapid from the long slopes that are not protected by a cover of plants. As a result, erosion is a hazard. (Capability unit IIw–2)

Homer Series

In the Homer series are light-colored, somewhat poorly drained soils that are nearly level. These soils are mostly on stream terraces. They have formed in loamy material over gravelly and sandy outwash.

In a typical profile of a Homer soil in a wooded area, the surface layer is very dark brown silt loam about 4 inches thick. The subsurface layer, about 5 inches thick, is light brownish-gray silt loam. The subsoil is mostly mottled grayish or brownish silty clay loam to clay. The substratum of loose, calcareous, gravelly and sandy material is at a depth of about 31 inches.

The water table is high during wet seasons, and the mottling and grayish colors indicate that these soils are naturally wet. Where adequate drainage is provided, however, the root zone is moderately deep for most of the annual crops commonly grown. The available moisture capacity is medium to low. Permeability is moderately slow in the subsoil, which is the layer most restrictive to the movement of water and air. The substratum is rapidly permeable.

Homer soils are suitable for field crops. They are used mainly for the growing of corn, soybeans, and wheat.

Typical profile of Homer silt loam, 0 to 2 percent slopes, in a wooded area in Mad River Township (sec. 3, R. 11 N., T. 4 E.):

A1—0 to 4 inches, very dark brown (10YR 2/2) silt loam; moderate, medium and fine, crumb structure; very friable when moist; slightly acid; clear, smooth boundary.

A2—4 to 9 inches, light brownish-gray (2.5Y 6/2) silt loam; common, fine, faint, brown (10YR 4/3) mottles; weak, very thin, platy structure; friable when moist; slightly acid; clear. wavy boundary.

B1—9 to 13 inches, light brownish-gray (2.5Y 6/2) silt loam; many, medium, distinct, yellowish-brown (10YR 5/8) mottles; weak, fine, subangular blocky structure; friable when moist; medium acid; clear, wavy boundary.

B21t—13 to 18 inches, grayish-brown (2.5Y 5/2) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, fine, subangular blocky structure; firm when moist; a few thin clay films on ped faces; a few manganese concretions; medium acid; clear, wavy boundary.

B22t—18 to 25 inches, olive-brown (2.5Y 4/4) clay; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; strong, fine and medium, subangular blocky structure; very firm when moist; patchy medium clay films on ped faces; dark grayish-brown (2.5Y 4/2) coatings; common manganese concretions; medium acid; clear, wavy boundary.

B23t—25 to 31 inches, yellowish-brown (10YR 5/6) clay; weak to moderate, fine, subangular blocky structure; very firm when moist; a few, thin, dark grayish-brown (2.5Y 4/2) clay films on ped faces; slightly acid; clear, wavy boundary.

IIC1—31 to 39 inches, grayish-brown (2.5Y 5/2) and light-gray (2.5Y 7/2) gravelly loam; massive; loose; many partly weathered dolomite pebbles; calcareous; clear, smooth boundary.

IIC2—39 to 50 inches, grayish-brown (2.5Y 5/2) and light brownish-gray (2.5Y 6/2) coarse sand; loose; calcareous; abrupt, smooth boundary.

IIC3—50 inches +, yellowish-brown (10YR 5/6), stratified gravel and sand; loose; calcareous.

In cultivated areas the Ap horizon is dark grayish brown (10YR or 2.5Y 4/2), is 7 to 10 inches thick, and is neutral to medium acid in reaction. Depth to mottling ranges from 4 to 12 inches, and depth to gravel and sand ranges from 24 to 40 inches. Reaction in the upper part of the B horizon ranges from medium acid to very strongly acid. The upper part of the B horizon is more acid than other parts.

Homer soils are members of a topographic sequence that includes the higher lying, moderately well drained Ionia soils and the lower lying, very poorly drained Lippincott soils. They are more grayish and more mottled than the Ionia soils and are lighter colored than the Lippincott soils. Homer soils are similar to the Kane soils, but they have a thinner surface layer and are lighter colored than the Kane soils.

Homer silt loam, 0 to 2 percent slopes (HoA).—This is the only Homer soil mapped in Champaign County. It occurs as broad, nearly circular areas that contain 3 to 15 acres. Included with this soil in mapping were a few gently sloping areas, mainly along the east side of Buck Creek. Also included were a few areas in which the surface layer is sandy loam and the upper part of the subsoil has a higher content of sand than is typical for Homer soils. These areas are indicated on the soil map by an appropriate symbol.

Seasonal wetness is a moderate limitation to use of this Homer soil for farming. (Capability unit IIw-2)

Ionia Series

The Ionia series consists of light-colored soils that are moderately well drained and nearly level or gently sloping. These soils are mostly on stream terraces, where they have formed in loamy material and the underlying calcareous gravelly and sandy outwash.

In a typical profile of a cultivated Ionia soil, the plow layer is dark grayish-brown silt loam about 7 inches thick. The subsurface layer, about 4 inches thick, is also dark grayish-brown silt loam. The subsoil consists of dark-brown and dark yellowish-brown silty clay loam, clay loam, and clay, and it has contrasting brownish mottles in the lower part. The substratum, at a depth of about 32 inches, is dark-brown and white gravelly sandy loam over loose, stratified gravel and sand.

Mottling in the subsoil indicates a moderate degree of natural wetness. The root zone is moderately deep for most of the annual crops commonly grown. The available moisture capacity is medium to low. Permeability is moderate in the surface layer and the subsoil, but it is rapid in the substratum.

The Ionia soils are important to farming. Most of the acreage is in corn, wheat, soybeans, and hay.

Typical profile of Ionia silt loam, 0 to 2 percent slopes, in a cultivated field in Concord Township (sec. 9, R. 12 N., T. 4 E.):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable when moist; neutral; abrupt, smooth boundary.

A2—7 to 11 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, subangular blocky structure; friable when moist; medium acid; clear, smooth boundary.

B1—11 to 15 inches, dark-brown (10YR 4/3) silty clay loam; moderate, fine, subangular blocky structure; firm when moist; a few pebbles; strongly acid; clear, smooth boundary.

B21t—15 to 18 inches, dark-brown (10YR 4/3) clay loam; strong, fine, subangular blocky structure; very firm when moist; common clay films on ped faces; 5 percent of horizon is pebbles; strongly acid; clear, wavy boundary.

B22t—18 to 23 inches, dark yellowish-brown (10YR 4/4) clay; common, fine, distinct, dark grayish-brown (10YR 4/2) and very dark grayish-brown (10YR 3/2) mottles and coatings, and fine, prominent, yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; very firm when moist; many clay films on ped faces; 10 percent of horizon is pebbles; strongly acid; clear, wavy boundary.

IIB23t—23 to 32 inches, dark-brown (10YR 4/3) gravelly clay loam; common, fine, distinct, yellowish-brown (10YR 5/6 to 5/8) mottles; massive; firm when moist; common clay films on pebbles; dolomite pebbles are partly weathered; mildly alkaline; clear, irregular boundary.

IIC1—32 to 39 inches, dark-brown (10YR 4/3) and white (10YR 8/1) gravelly sandy loam; many, fine, prominent, yellowish-brown (10YR 5/8) mottles; friable when moist; dolomite pebbles show evidence of weathering; a few clay films on the pebbles; calcareous; clear, wavy boundary.

IIC2—39 inches +, grayish-brown (10YR 5/2), stratified gravel and sand; common, medium, prominent, yellowish-brown (10YR 5/8) mottles; loose; calcareous.

Depth to mottling ranges from 16 to 28 inches. In many places the B1 horizon contains faint yellowish-brown (10YR 5/6) mottles but there is little or no mottling in the B21t horizon. Depth to calcareous gravel and sand ranges from 24 to 40 inches.

Ionia soils are members of a topographic sequence that includes the higher lying, well-drained Fox soils and the lower lying, somewhat poorly drained Homer soils and very poorly drained Lippincott soils. They are less grayish and less mottled than the Homer soils and are lighter colored than the Lippincott soils.

Ionia silt loam, 0 to 2 percent slopes (IoA).—This soil has the profile described as typical for the series. It generally occurs on stream terraces as broad, nearly circular areas that contain 5 to 20 acres. Included in mapping were a few areas of Homer soils at a lower elevation than this soil.

Natural drainage is good enough that most of the common annual crops can be grown. Droughtiness is a moderate hazard, especially for crops that mature late in the growing season. This soil is suited to irrigation. (Capability unit IIs-1)

Ionia silt loam, 2 to 6 percent slopes (IoB).—Most areas of this soil are long and narrow, and they parallel the channel of the main streams in some places. Many of the areas are dissected by flood channels.

The primary limitation to use of this soil for crops is a moderate hazard of erosion. Droughtiness is also a hazard, especially for crops that mature late in the growing season. This soil is suited to irrigation. (Capability unit IIe-2)

Kane Series

The Kane series consists of dark-colored, somewhat poorly drained soils that are nearly level. These soils are on low terraces, where they have formed in 24 to 40 inches of loamy material and in the underlying stratified gravelly and sandy outwash. The natural vegetation was tall prairie grasses.

In a typical profile of a cultivated Kane soil, the plow layer is black silt loam about 10 inches thick. The subsurface layer, about 3 inches thick, is very dark gray silt loam. The subsoil consists of brownish silt loam, or silty clay loam to clay, and it has gravel in the lower part. The substratum of stratified, calcareous gravel and sand is at a depth of about 36 inches.

The water table is high during wet periods. Grayness and mottling in the profile indicate that these soils are naturally wet. The root zone is moderately deep for most of the commonly grown annual crops if adequate drainage is provided. The available moisture capacity is medium to low. Permeability is moderately slow in the subsoil, the most restrictive layer, but it is rapid in the substratum.

Kane soils are well suited to the crops commonly grown in the county. Most of the acreage is in such crops as corn, soybeans, and wheat.

Typical profile of Kane silt loam, 0 to 2 percent slopes, in a cultivated field in Union Township (sec. 27, R. 11 N., T. 6 E.; laboratory No. CH-39):

Ap—0 to 10 inches, black (10YR 2/1) silt loam; moderate, medium and fine, granular structure; friable when moist; medium acid; abrupt, smooth boundary.

A1—10 to 13 inches, very dark gray (10YR 3/1) silt loam; weak, medium, granular structure; friable when moist; slightly acid; clear, smooth boundary.

B1—13 to 17 inches, dark-brown (10YR 4/3) silt loam; common, fine, faint, strong-brown (7.5YR 5/6) and dark-brown (7.5YR 3/2) mottles; weak, very fine, subangular blocky structure; friable when moist; common coatings of organic matter on ped faces; medium acid; clear, smooth boundary.

B21t—17 to 22 inches, brown (10YR 4/3) silty clay loam; common, fine, distinct, strong-brown (7.5YR 5/6) mottles; moderate, fine and medium, subangular blocky structure; firm when moist; medium acid; clear, smooth boundary.

B22t—22 to 27 inches, yellowish-brown (10YR 5/6) clay; moderate to weak, coarse, subangular blocky to weak, coarse, prismatic structure; very firm when moist; common clay films on ped faces; very dark grayish-brown (10YR 3/2) ped coatings; slightly acid; clear, wavy boundary.

IIB3—27 to 36 inches, grayish-brown (2.5Y 5/2) gravelly silt loam; common, medium, distinct, yellowish-brown (10YR 5/8) mottles; massive; friable when moist; many partly weathered dolomite pebbles; calcareous; clear, smooth boundary.

IIIC—36 to 40 inches, grayish-brown (2.5Y 5/2) and light brownish-gray (2.5Y 6/2), stratified gravel and sand; loose; calcareous.

The A horizons range from 12 to 15 inches in combined thickness. The color of the B2t horizons ranges from very dark grayish brown (10YR 3/2) or dark grayish brown (10YR 4/2) to brown (10YR 4/3). The B22t horizon is gravelly clay in some areas, and it is gravelly clay loam in others. The IIB3 horizon is 6 to 12 inches thick, and it is gravelly loam in places. In some places a few clay films are on the pebbles. Depth to calcareous gravel and sand ranges from 24 to 42 inches.

Kane soils commonly occur with Homer and Lippincott soils. They are darker colored than the Homer soils, and they have less clay in their surface layer and a less grayish subsoil than the Lippincott soils.

Kane silt loam, 0 to 2 percent slopes (KaA).—This is the only Kane soil mapped in Champaign County. It is in depressions that generally contain 3 to 10 acres and are at a slightly higher elevation than the adjacent Lippincott soils. Some areas of Lippincott soils were included with this soil in mapping.

Seasonal wetness is a moderate limitation to use of this Kane soil for crops. (Capability unit IIw-6)

Kendallville Series

The Kendallville series consists of soils that are light colored, well drained, and nearly level to moderately steep. These soils are on moraines in the uplands and on the till plain. In some upland areas, they are near the break between stream terraces. These soils are mostly moderately deep over compact, limy glacial till. They have formed in a thin mantle of material—silty in the upper part and gravelly in the lower part—and in the underlying glacial till.

In a typical profile of a cultivated Kendallville soil, the plow layer is brown silt loam about 7 inches thick. The upper part of the subsoil, extending to a depth of about 22 inches, is mostly dark-brown clay and gravelly clay. Dark-brown and yellowish-brown loam that formed in the upper part of the till is between a depth of 22 and 34 inches. This layer contains glacial pebbles, cobblestones, and fragments of limestone. Limy, massive loam glacial till is at a depth of about 34 inches.

Permeability is moderate above the till and moderately slow in the till. In most places the root zone is only moderately deep because the depth to which roots can penetrate is limited by the compact underlying till. Within the root zone, the available moisture capacity is medium.

In this county the Kendallville soils are generally farmed.

Typical profile of Kendallville silt loam, 2 to 6 percent slopes, in a cultivated field near the junction of State Highway No. 161 and Madden Road in Union Township, Virginia Military District:

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; friable when moist; medium acid; abrupt, smooth boundary.

B1—7 to 11 inches, brown (7.5YR 5/4) and dark-brown (7.5YR 4/2) silty clay loam; moderate, fine, subangular blocky structure; firm when moist; a few clay films on ped faces; 5 percent of horizon is coarse fragments; strongly acid; clear, smooth boundary.

IIB21t—11 to 15 inches, dark-brown (7.5YR 4/3) clay; strong, fine, subangular blocky structure; very firm when moist; moderate, continuous clay films on ped faces; 10 percent of horizon is coarse fragments; strongly acid; clear, smooth boundary.

IIB22t—15 to 22 inches, dark-brown (7.5YR 3/3) gravelly clay; strong, medium, prismatic structure breaking to medium and coarse subangular blocky structure; very firm when moist; many clay films on ped faces and on pebbles; medium acid; clear, wavy to irregular boundary.

IIIB3t—22 to 34 inches, dark-brown (7.5YR 3/2) and yellowish-brown (10YR 5/4) loam; weak, coarse, subangular blocky structure; firm when moist; common thin clay films; the dolomite pebbles show evidence of weathering; many cobblestones; calcareous; abrupt, smooth boundary.

IIIC—34 to 40 inches, yellowish-brown (10YR 5/4) loam; massive; very firm when moist; calcareous.

The Ap horizon ranges from 6 to 10 inches in thickness and from brown (10YR 4/3) to dark grayish brown (10YR 4/2) in color. The B horizon ranges from clay loam or gravelly clay loam to clay or gravelly clay in texture. In some profiles the colors in the B horizon include dark brown and dark yellowish brown or reddish brown in hues of 10YR to 5YR. Reaction is medium acid to strongly acid in the IIB2 horizons. The IIIB3t horizon is moderately alkaline and calcareous. In some areas the boundary between the part of the solum developed in gravelly material and that developed in till is not well defined. In some of those areas, soil material that is leached or partly leached extends 2 to 15 inches into the till. In other areas soil material that has a texture of clay loam and that has clay films on the peds and on the surfaces of the pebbles, especially on the vertical surfaces, extends 2 to 15 inches into the till. In a few profiles, the solum rests directly on calcareous till or on calcareous gravelly sand or sandy loam. In a profile that extends to a depth of 40 inches, less than one-fifth of the solum above the till was derived from gravelly material. Depth to till ranges from 22 to 40 inches.

Kendallville soils are commonly adjacent to Miami and Fox soils. They have a more gravelly subsoil than the Miami soils. In contrast to the Fox soils, which have a substratum of gravel and sand, they have a substratum of glacial till.

Kendallville silt loam, 0 to 2 percent slopes (KeA).—This soil is on uplands adjacent to stream terraces. Included with it in mapping were small areas of Fox and Miami soils.

This Kendallville soil is well suited to the crops commonly grown in the county. It has higher available moisture capacity than other Kendallville soils. Erosion is not a hazard or is only a slight hazard if cultivated crops are grown. (Capability unit I-1)

Kendallville silt loam, 2 to 6 percent slopes (KeB).—This soil has the profile described as typical for the series. It is mostly on moraines. Included in mapping in many places were small areas of a Fox silt loam.

This gently sloping Kendallville soil is used mainly for general farming. Erosion is a moderate hazard, however, where cultivated crops are grown. (Capability unit IIe-1)

Kendallville silt loam, 6 to 12 percent slopes, moderately eroded (KeC2).—This soil has lost about half of its original surface layer through erosion, and some severely eroded areas were included in mapping. The available moisture capacity is lower than in an uneroded Kendallville soil, and the present surface layer is more sticky because material from the subsoil has been mixed into the surface layer by tillage. Gravel is common on the surface in some places, especially in the included severely eroded areas.

General farming is the main use of this soil. The hazard of further erosion is severe if cultivated crops are grown. (Capability unit IIIe-1)

Kendallville silt loam, 12 to 18 percent slopes, moderately eroded (KeD2).—Partly as the result of the strong slopes and partly because of erosion, the profile of this soil is thinner over calcareous till than the one described as typical for the series. The plow layer contains some material from the subsoil. As a result, it is more sticky and more cloddy than that of an uneroded Kendallville soil. Past erosion has lowered the capacity of this soil to absorb and retain moisture. Some areas contain shallow gullies and gravelly spots. The hazard of further erosion is very severe if this soil is cultivated. (Capability unit IVe-1)

Lewisburg Series

In the Lewisburg series are light-colored, very steep, well drained or moderately well drained soils on glacial moraines. These soils have formed in 10 to 18 inches of loamy material over firm, calcareous glacial till.

In a typical profile of a Lewisburg soil in a wooded area, the surface layer is very dark grayish-brown silt loam about 4 inches thick. The subsurface layer, between depths of about 4 and 7 inches, is dark grayish-brown silt loam. The subsoil consists of firm, brown silty clay loam. It is underlain at a depth of about 14 inches by the substratum of massive, firm, calcareous, yellowish-brown loam till.

Permeability is moderately slow in the subsoil and the substratum. The material in the subsoil restricts the movement of water and air to a greater extent than that in the surface layer, and the material in the substratum commonly limits the development of roots. Therefore, this soil has a shallow root zone for most annual plants. The available moisture capacity is low, and erosion is a severe hazard.

The Lewisburg soils are used mainly for pasture or trees. In this county they are not mapped separately but are mapped in an undifferentiated unit with Miami soils.

Typical profile of a Lewisburg silt loam in a wooded area in Johnson Township (sec. 22, R. 12 N., T. 3 E.):

A1—0 to 4 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, crumb structure; friable when moist; neutral; clear, wavy boundary.

A2—4 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; common, very dark grayish-brown (10YR 3/2) coatings of organic matter; weak, coarse, granular structure; friable when moist; neutral; clear, smooth boundary.

B2t—7 to 14 inches, brown (10YR 4/3) fine silty clay loam; weak, fine, subangular blocky structure; firm when moist; thin clay films; neutral; clear, wavy boundary.

C—14 to 40 inches, yellowish-brown (10YR 5/4) loam; massive; firm when moist; calcareous.

In places the texture of the B2t horizon is clay loam. Depth to calcareous till ranges from 10 to 18 inches.

Linwood Series

Dark-colored, nearly level organic soils that are very poorly drained are in the Linwood series. These soils are in bogs and swamps, generally on terraces, and in potholes on moraines. They consist mainly of layers of muck that are underlain by loamy material at depths ranging from 12 to 42 inches. The muck was formed in wet areas as the result of the partial decomposition of the remains of plants, mostly trees, fibrous grasses, sedges, and reeds.

In a typical profile of a Linwood soil, muck that is mostly black and that has a smooth, soft feel when rubbed between the fingers extends to a depth of about 22 inches. Dark grayish-brown sedimentary peat is between depths of 22 and about 29 inches. The underlying material beneath the muck and peat is light olive-brown and dark greenish-gray, calcareous silt loam.

In areas that have not been drained, the water table is high throughout the entire year. Where adequate drainage is provided, the root zone is moderately deep for the crops commonly grown. The available moisture capacity is high. Permeability of the organic material is moderately slow to moderately rapid, and permeability of the underlying material is slow to moderate. Linwood soils are highly compressible and unstable.

In Champaign County most areas of Linwood soils have been drained and are used mainly for growing corn and soybeans. A few areas that have not been drained are in pasture or trees.

Typical profile of Linwood muck in a cultivated field in Harrison Township (sec. 18, R. 13 N., T. 4 E.):

1—0 to 6 inches, black (N 2/0), well-decomposed muck; very fine, weak, granular structure; very friable when moist; slightly acid; clear, smooth boundary.

2—6 to 14 inches, black (N 2/0), well-decomposed muck; strong, fine, angular blocky structure; firm when moist; slightly acid; clear, wavy boundary.

3—14 to 22 inches, black (10YR 2/1) and yellowish-brown (10YR 5/8) muck; massive; firm when moist; calcareous; clear, smooth boundary.

4—22 to 29 inches, dark grayish-brown (2.5Y 4/2) sedimentary peat; common, medium, distinct, dark-brown (7.5YR 4/4) mottles; weak, thick, platy structure; friable when moist; some shells; calcareous; clear, wavy boundary.

IIC1—29 to 38 inches, light olive-brown (2.5Y 5/4) silt loam; massive; friable when moist; a few shells; calcareous; gradual, irregular boundary.

IIC2—38 to 60 inches, dark greenish-gray (5GY 4/1) silt loam; yellowish-brown (10YR 5/8) color around old root channels; massive; friable when moist; calcareous.

The combined thickness of the layers of muck and peat ranges from 12 to 42 inches. The organic material ranges from slightly acid to mildly alkaline, and it is calcareous in many places. In some places the layer of sedimentary peat is absent.

Linwood soils are commonly near the Carlisle, Edwards, and Lippincott soils. They are shallower over the underlying mineral material than the Carlisle soils and are underlain by loamy material instead of by marl like the Edwards soils. Linwood soils, unlike the Lippincott, consist of organic material.

Linwood muck (Ln).—This is the only Linwood soil mapped in Champaign County. It is mainly on terraces that border the valley of the Mad River. Most of the areas are nearly circular and contain 3 to 15 acres.

This soil is subject to subsidence if it is drained, and if the level of the water table is not controlled. It is also subject to blowing, especially in open areas when the surface is dry and is not protected by a cover of plants. In most places the content of available potash and phosphorus is low.

This soil is suitable for irrigation and can be used for specialized crops if it is intensively managed. Wetness is a moderate limitation where this soil is used for crops. (Capability unit IIw-4)

Lippincott Series

The Lippincott series consists of dark-colored soils that are very poorly drained and nearly level. These soils are mostly on low terraces, where they have formed in loamy material and in the underlying calcareous outwash consisting of gravel and sand.

In a typical profile of a cultivated Lippincott soil, the plow layer is black silty clay loam about 7 inches thick. Just below the plow layer is a subsurface layer of black silty clay loam about 5 inches thick. The subsoil consists of very dark gray silty clay loam, dark grayish-brown silty clay, and grayish-brown gravelly silt loam. It extends to a depth of about 36 inches and is underlain by the substratum consisting of loose, stratified gravel and sand.

These soils have a seasonal high water table, and mottling and grayish colors in the subsoil indicate natural wetness. The surface layer has a high content of organic matter. If adequate drainage is provided, the root zone is moderately deep for most of the annual crops commonly grown. The available moisture capacity is high. The surface layer and the subsoil are moderately permeable. The substratum is rapidly permeable.

Most areas of Lippincott soils are drained and are used mainly for growing corn and soybeans.

Typical profile of Lippincott silty clay loam in a cultivated field in Salem Township (sec. 20, R. 13 N., T. 5 E.; laboratory No. CH-36):

Ap—0 to 7 inches, black (10YR 2/1) silty clay loam; moderate, medium and coarse, granular structure; friable when moist; neutral; abrupt, smooth boundary.

A3—7 to 12 inches, black (10YR 2/1) silty clay loam; moderate, coarse, angular blocky structure; firm when moist; neutral; clear, wavy boundary.

B21tg—12 to 16 inches, very dark gray (10YR 3/1) silty clay loam; many, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, fine and medium, prismatic structure breaking to strong, medium, angular blocky structure; very firm when moist; some crayfish channels; thin, continuous clay coatings and coatings of organic matter on the peds; neutral; clear, wavy boundary.

B22tg—16 to 27 inches, dark grayish-brown (2.5Y 4/2) silty clay; common, medium, distinct, strong-brown (7.5YR 5/6) mottles; strong, medium, prismatic structure breaking to strong, medium, angular blocky structure; very firm when moist; moderate, patchy clay films on ped faces; some crayfish channels; neutral; clear, wavy boundary.

IIB3t—27 to 36 inches, grayish-brown (2.5Y 5/2) gravelly silt loam; massive; friable when moist; many, light-gray (2.5Y 7/2), partly weathered dolomite pebbles; a few crayfish channels; few dark-gray (10YR 4/1) clay films on vertical surfaces; moderately alkaline and calcareous; clear, wavy boundary.

IIC1—36 to 50 inches, grayish-brown (2.5Y 5/2) gravel and sand; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; single grain; loose; calcareous; clear, smooth boundary.

IIC2—50 inches +, gray (5Y 5/1) gravel and sand; loose, calcareous.

The A horizon ranges from 10 to 20 inches in thickness, and dark-colored material from that horizon extends downward into the upper part of the B horizon in places. The color of the A horizon ranges from black (10YR 2/1 or N 2/0) to very dark gray (10YR 3/1 or N 3/0). In places the lower part of the A horizon contains distinct mottling. The B horizons generally contain common or many mottles that range from yellowish brown to brown or strong brown in color. The texture of the B2 horizons ranges from fine or medium silty clay loam or clay loam to silty clay or clay. The weighted average clay content of the B2 horizons exceeds 35 percent. Color of the B2 horizons ranges from very dark gray to gray, dark grayish brown, or grayish brown. In these horizons the hue is 10YR, 2.5Y, or 5Y; value ranges from 3 to 5; and chroma is 1 or 2. The IIB3t horizon is gravelly and ranges from loam to silt loam in texture, from gray or light brownish gray to grayish brown in color, and from 5 to 15 inches in thickness. In that horizon loamy material surrounds the partly weathered dolomitic pebbles.

In places the underlying material is very gravelly loam or sandy loam. Thickness of the solum above the loose, stratified gravelly and sandy material ranges from 30 to 40 inches. In some areas till is at a depth of 50 inches. Reaction is neutral or slightly acid in the A horizon and ranges from neutral to moderately alkaline and calcareous in the lower part of the solum. In some places the pH values remain constant throughout the solum. In others they increase with increasing depth.

Lippincott soils are in the same topographic sequence as the higher lying, somewhat poorly drained Homer soils and the moderately well drained Ionia soils. They are darker colored than the Homer and Ionia soils.

Lippincott silty clay loam. (Lp).—This is the only Lippincott soil mapped in Champaign County. Most of the areas have an oval shape or are long and narrow. The areas range from 3 to 20 acres in size. Along the larger streams, many of the areas are dissected by flood channels. Included with this soil in mapping were areas in which the surface layer is thicker and the subsoil is more grayish than in the profile described as typical for the series. In those places permeability of the subsoil is moderate but is close to being moderately slow. Other inclusions consist of areas where gravelly loam till is a depth of about 34 inches. These areas are generally in depressions on terraces along small streams and in upland drainageways.

Wetness is a moderate limitation to use of this Lippincott soil for crops. (Capability unit IIw-6)

Made Land

Made land (Ma) is a miscellaneous land type consisting of material that has been deposited as fill, or of other areas from which the soil material has been removed. The areas commonly result from construction activities and from the disposal of debris.

This land type is not associated with any special kinds of soils, but its characteristics are generally similar to those of adjacent or nearby soils. Most of the areas are 3 to 5 acres in size, but the size is continually being enlarged in areas that are actively used for disposal of debris.

In areas where soil material has been removed, the material of this land type is generally similar to the material in the substratum of the adjacent soils. In fill or disposal areas, the soil material has more variable characteristics because it ordinarily consists of varying amounts of material from the subsoil and substratum of nearby soils.

The soil material in this land type generally is poor for plant growth. It is normally calcareous, especially in areas where material has been removed from areas of soils underlain by till. Both the available moisture capacity and the content of organic matter are low, and most areas are susceptible to erosion. Instability of the soil material causes gullying and siltation.

Where a cover of plants is to be established and maintained, resurfacing areas of this land type with favorable soil material provides a more suitable root zone. Grasses and trees that are tolerant of the adverse characteristics of this soil material can be used to provide cover. Most of these areas would be suitable for wildlife habitat or for development for recreational purposes. (Not placed in a capability unit)

Miami Series

In the Miami series are light-colored, well-drained soils that are nearly level to very steep. These soils are on the glacial till plain, and they are moderately deep over limy, compact glacial till. They have formed in a mantle of silty material about 12 inches thick and in the underlying glacial till.

In a typical profile of a cultivated Miami soil, the plow layer is dark grayish-brown silt loam about 7 inches thick. The subsoil consists mostly of dark-brown, firm silty clay loam and clay, and it extends to a depth of about 25 inches. The subsoil commonly contains some crystalline glacial pebbles and fragments of limestone. The substratum consists of dense, compact loam glacial till that is variable in thickness but is generally at least 5 feet thick.

The underlying glacial till restricts the depth to which roots can penetrate, but these soils have a moderately deep root zone for most annual crops. Also because of the glacial till, permeability of the Miami soils is moderately slow. The available moisture capacity is medium within the root zone of most of these soils. It is low in areas that are severely eroded.

The Miami soils of this county are important for farming. Cultivated areas are used mostly for corn, wheat, oats, and soybeans.

The soils correlated as the Miami soils in this county contain more clay in the subsoil than permitted by the present definition. For these soils having a higher content of clay, a new series, the Miamian series, was recognized after the correlation for Champaign County had been completed.

Typical profile of Miami silt loam, 6 to 12 percent slopes, moderately eroded, in a cultivated field in Harrison Township (sec. 26, R. 13 N., T. 4 E.; laboratory No. CH-47):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine and medium, granular structure; friable when moist; medium acid; abrupt, smooth boundary.

B1—7 to 12 inches, brown (7.5YR 5/4) to dark-brown (7.5YR 4/4) silty clay loam; moderate, fine, subangular blocky structure; firm when moist; medium acid; clear, wavy boundary.

B21t—12 to 19 inches, dark-brown (7.5YR 4/4) clay; moderate to strong, medium, subangular blocky structure; very firm when moist; patchy clay films on ped faces; strongly acid; clear, wavy boundary.

B22t—19 to 25 inches, dark yellowish-brown (10YR 4/4) clay; moderate to strong, medium, subangular blocky structure; firm when moist; patchy dark-brown (7.5YR 4/2) clay films on ped surfaces; some crystalline pebbles; a few stains of manganese; slightly acid; clear, irregular boundary.

C—25 to 60 inches, yellowish-brown (10YR 5/4) loam; massive; firm when moist; 10 percent of horizon is coarse fragments; calcareous.

In areas under forest, the profile contains an A1 horizon, 3 to 5 inches thick, of very dark gray (10YR 3/1) or very dark grayish-brown (10YR 3/2) silt loam. It also contains an A2 horizon of yellowish-brown (10YR 5/4) silt loam that has weak, thin, platy structure and is 3 to 4 inches thick. The color of the B horizons ranges from brown (7.5YR 4/4) to dark brown (10YR 4/3). The amount of clay in the B21t and B22t horizons ranges from 38 to 48 percent. In places a B3 horizon that is as much as 12 inches thick and is similar to the B22t horizon in containing many clay films is between the B22t horizon and the C horizon. Reaction ranges from neutral to strongly acid in the A horizon, from medium acid to very strongly acid in the upper two-thirds of the B21t horizon, and from neutral to slightly acid in the B22t horizon. Thickness of the solum and depth to carbonates range from 18 to 36 inches.

The Miami soils are in a drainage sequence with the Celina, Crosby, and Brookston soils, and they are generally adjacent to those soils. All of these soils have formed in the same kind of material, but they differ in topographic position and in natural drainage. Miami soils are less mottled and generally occur at a higher elevation than the moderately well drained Celina and the somewhat poorly drained Crosby soils. They are lighter colored than the very poorly drained Brookston soils. Miami soils are adjacent to steep Lewisburg soils but are thicker over limy till than Lewisburg soils, and they are slightly better drained than those soils.

Miami silt loam, 0 to 2 percent slopes (MlA).—This soil is mainly in the east-central part of the county. It has a profile similar to the one described as typical for the series, but gravel and sand are at depths ranging from 5 to 25 feet. Because of the underlying gravel and sand, this soil has better natural drainage than typical Miami soils. Included with this soil in mapping were areas of moderately well drained Celina soils that stay wet later in spring than does this Miami soil.

This Miami soil is well suited to the crops commonly grown in the county. Erosion is not a hazard or is only a slight hazard. (Capability unit I-1)

Miami silt loam, 2 to 6 percent slopes (MlB).—This soil is on low knolls and in undulating areas throughout the till plain. The size and shape of the areas vary greatly from place to place. Included in mapping were some spots of moderately well drained Celina soils. Also included was a small area in which limestone bedrock is near the surface. This included area is adjacent to the limestone quarry north of Urbana.

Surface runoff is moderate on this Miami soil. Erosion is a moderate hazard. (Capability unit IIe–1)

Miami silt loam, 2 to 6 percent slopes, moderately eroded (MlB2).—This soil has a profile similar to the one described as typical for the series, but it has lost part of the original surface layer through erosion. The present plow layer contains some material from the upper part of the subsoil. As a result, seeds germinate less readily than in uneroded Miami soils. The amount and velocity of runoff is greater than it was before this soil was eroded, and the surface tends to seal over after rains. Also, the capacity to absorb and to supply moisture to plants is lower than in uneroded Miami soils. Included with this soil in mapping were small areas of a severely eroded Miami soil.

Runoff is moderate, and further erosion is a moderate hazard if cultivated crops are grown. (Capability unit IIe–1)

Miami silt loam, 6 to 12 percent slopes (MlC).—This soil is on moraines and on side slopes adjacent to drainageways. It has a profile similar to the one described as typical for the series, except that, in many places, the surface layer is about 7 inches thick. In the vicinity of the Ohio Caverns and along Slatestone Road, areas of soils that contain coarse fragments of shaly material, and that are underlain by shale at a depth of 20 to 36 inches, were included with this soil in mapping. Also included in this part of the county were areas of a soil that is moderately deep over limestone.

Runoff is rapid on this Miami soil, and the hazard of erosion is severe in fields where cultivated crops are grown. Much of the acreage is wooded or in permanent pasture. (Capability unit IIIe–1)

Miami silt loam, 6 to 12 percent slopes, moderately eroded (MlC2).—This soil has the profile described as typical for the series. Erosion has removed part of the original surface layer, and the plow layer contains material from the upper part of the subsoil. The surface layer is more sticky when wet than the surface layer of an uneroded Miami soil that has similar slopes, and the available moisture capacity is lower than in a similar, but uneroded, Miami soil. Included with this soil in mapping were areas of soils that contain coarse fragments of shaly material and that are underlain by shale at a depth of 20 ot 36 inches. Most of these areas are in the vicinity of the Ohio Caverns. Also included were severely eroded areas in which the present surface layer consists almost entirely of material from the subsoil. In many places the effects of sheet erosion are noticeable, and some areas contain shallow gullies.

Runoff is rapid on this Miami soil, and erosion is a severe hazard if cultivated crops are grown. (Capability unit IIIe–1)

Miami silt loam, 12 to 18 percent slopes (MlD).—This soil has a profile that is slightly thinner over compact glacial till than the one described as typical for the series. It occupies long, narrow areas on the sides of valleys that are generally parallel to drainageways. Near the Ohio Caverns and along Slatestone Road, some areas of a shaly soil that is only 20 to 36 inches deep over shale were included with this soil in mapping. Other inclusions in the same vicinity consist of areas of soils that are moderately deep over limestone bedrock.

Runoff is rapid. Erosion is a very severe hazard if cultivated crops are grown. (Capability unit IVe–1)

Miami silt loam, 12 to 18 percent slopes, moderately eroded (MlD2).—This soil has lost much of its original surface layer through erosion. The present surface layer, in many places, consists mainly of brown material from the subsoil. As a result, the available moisture capacity is lower than in a similar, but uneroded, Miami soil. Seeds germinate less readily than seeds planted in areas of uneroded Miami silt loams. Included with this soil in mapping were areas of a soil that is underlain by limestone at a moderate depth. One such area is near the limestone quarry north of Urbana. Other inclusions consist of a shaly soil that is only 20 to 36 inches thick over shale. This shaly soil is near the Ohio Caverns and along Slatestone Road.

Runoff is rapid. The hazard of further erosion is very severe if cultivated crops are grown. Much of the acreage is in pasture. (Capability unit IVe–1)

Miami silt loam, 18 to 25 percent slopes (MlE).—This soil is on side slopes of deep valleys. It has a profile similar to the one described as typical for the series, except that limy till is nearer the surface. Included with this soil in mapping were areas of a soil that is underlain by limestone bedrock at a depth of less than 40 inches. One such area is near the limestone quarry north of Urbana. Also included were areas of a soil that is only 20 to 36 inches thick over shale. The areas underlain by shale and some of those moderately deep over limestone are adjacent to the Ohio Caverns and along Slatestone Road.

Runoff from this Miami soil is rapid. Erosion is a severe hazard unless a thick cover of vegetation is maintained. (Capability unit VIe–1)

Miami silt loam, 18 to 25 percent slopes, moderately eroded (MlE2).—This soil has lost much of its original surface layer through erosion. As a result, the available moisture capacity is lower than that of a similar, but uneroded, Miami soil. In addition, the amount and velocity of runoff and the damage from erosion have also increased. In many places there are shallow gullies. Included with this soil in mapping were some areas of soils that are moderately deep over limestone, and other areas of shaly soils that are adjacent to the Ohio Caverns and along Slatestone Road near these caverns.

The moderately steep or steep slopes and past erosion make this soil unsuitable for cultivated crops, and most of the acreage is in pasture. Further erosion is a severe hazard unless a thick cover of plants is maintained. (Capability unit VIe–1)

Miami bouldery silt loam, 2 to 12 percent slopes (MbC).—This soil is in the area known as the boulder belt. The profile is similar to the one described as typical for the series, except that many loose boulders are on and in the soil. After the boulders are removed, this soil can be managed like a similar Miami soil that is not bouldery. Some boulders within the profile, however, can still interfere with the use of tilling machines and similar equipment. Where the boulders have been removed and this soil is cultivated, erosion is a moderate to severe hazard. (Capability unit IIIe–1)

Miami soils, 6 to 12 percent slopes, severely eroded (MmC3).—The surface layer of these soils is mostly clayey material from the subsoil. In a few areas, limy till is at the surface. Shallow gullies are common, and there are some deep gullies.

Seeds planted in areas of these soils do not germinate well. The available moisture capacity is low, and runoff is rapid. Erosion is a very severe hazard if cultivated crops are grown. (Capability unit IVe–1)

Miami soils, 12 to 18 percent slopes, severely eroded (MmD3).—These soils have lost most of their original surface layer through erosion, and the brown, clayey subsoil is exposed in many places. In some areas limy glacial till is at the surface. Scattered gullies 1 to 3 feet deep are common. The available moisture capacity is low. Much of the water from rainfall is lost through rapid runoff.

These soils are not suited to cultivated crops, because they are too steep and eroded. They are suited to pasture. (Capability unit VIe–1)

Miami soils, 18 to 25 percent slopes, severely eroded (MmE3).—These soils are similar to Miami soils, 12 to 18 percent slopes, severely eroded, except that they are steeper. Included with them in mapping were areas of a shaly soil, and some areas of a soil that is moderately deep over limestone. These included soils are near the Ohio Caverns and along Slatestone Road.

The soils of this mapping unit are too steep and eroded to be suitable for cultivated crops. They are suited to pasture, but erosion is a severe hazard unless a thick cover of plants is maintained. (Capability unit VIe–1)

Miami and Lewisburg silt loams, 25 to 50 percent slopes, moderately eroded (MoF2).—In this undifferentiated unit, steep Miami and Lewisburg soils were mapped together because they are similar and are used and managed in about the same way. Some areas consist entirely of Lewisburg soils, others contain only Miami soils, and still others contain both soils in various proportions and patterns. The Miami soils are shallower over till than typical for the Miami series. A profile that is typical of the Lewisburg soils is described under the Lewisburg series.

These soils are too steep to be used for crops. They are better suited to native pasture than to field crops or improved pasture. Erosion is a very severe hazard if an adequate cover of plants is not maintained. (Capability unit VIIe–1)

Miami-Rodman complex, 25 to 50 percent slopes, moderately eroded (MrF2).—The soils of this complex occur in such an intricate pattern that mapping them separately was not practical. About 60 percent of the complex is Miami soils, and the rest is Rodman soils. The Rodman soils are more gravelly and more droughty than the Miami soils.

These soils are too steep for cultivation. They are better suited to permanent pasture or trees than to field crops. (Capability unit VIIe–1)

Miami-Casco-Rodman complex, 18 to 25 percent slopes, moderately eroded (MsE2).—In this soil complex, areas of Miami, Casco, and Rodman soils are too intermingled for separate mapping to be feasible. Miami soils occupy about 60 percent of the acreage; Casco soils, about 20 percent; and Rodman soils, about 20 percent. These soils are mainly on valley walls. The Casco and Rodman soils are more gravelly and droughty than the Miami soils.

Soils of this complex are too steep to be suitable for crops. Erosion is a severe hazard where the surface is not protected by an adequate cover of plants. (Capability unit VIe–1)

Ockley Series

The Ockley series consists of light-colored soils that are well drained and nearly level or gently sloping. These soils are on outwash terraces, where they have formed in 42 to 48 inches of loamy material and in the underlying stratified gravel and sand.

In a typical profile of a cultivated Ockley soil, the plow layer is dark grayish-brown silt loam about 7 inches thick. The subsoil is brown to dark-brown or strong-brown silty clay loam over gravelly clay, and it extends to a depth of about 47 inches. The substratum consists of loose, calcareous, stratified gravel and sand.

The surface layer and the subsoil are moderately permeable, and the substratum is rapidly permeable. The root zone is deep for most of the annual crops commonly grown, but roots generally do not extend into the substratum. The available moisture capacity is high.

Ockley soils warm up early in spring and are well suited to crops. They are used mainly for corn, wheat, soybeans, and hay.

Typical profile of Ockley silt loam, 0 to 2 percent slopes, in a cultivated field in Urbana Township (sec. 13, R. 11 N., T. 5 E.):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium and coarse, granular structure; friable when moist; neutral; abrupt, smooth boundary.

B1—7 to 14 inches, brown (7.5YR 5/4) silty clay loam; moderate to weak, fine, subangular blocky structure; friable when moist; neutral; gradual, smooth boundary.

B21t—14 to 22 inches, brown (7.5YR 5/4) silty clay loam; moderate, fine and medium, subangular blocky structure; firm when moist; a few faint stains of manganese; a few thin clay films on ped faces; slightly acid; gradual, smooth boundary.

B22t—22 to 31 inches, strong-brown (7.5YR 5/6) silty clay loam; strong, medium and fine, subangular blocky structure; firm when moist; a few, thin, brown (7.5YR 5/2) clay films; common very dark gray (10YR 3/1) stains of manganese; strongly acid; gradual, wavy boundary.

IIB23t—31 to 40 inches, brown (7.5YR 5/4) silty clay loam; moderate, fine and medium, subangular blocky structure; friable when moist; thin clay films on ped faces; strongly acid; gradual, wavy boundary.

IIB24t—40 to 43 inches, brown (7.5YR 5/4) silty clay loam; weak, medium, subangular blocky structure; friable when moist; medium acid; thin, intermittent clay films on ped faces; clear, smooth boundary.

IIIB3t—43 to 47 inches, dark-brown (7.5YR 3/2) gravelly clay; weak, medium, subangular blocky structure; firm when moist; common clay films on pebbles; neutral; clear, wavy boundary.

IIIC—47 to 56 inches, dark-brown (10YR 4/3) and very dark grayish-brown (10YR 3/2), stratified gravel and sand; loose; calcareous.

The color of the Ap horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 4/3). The color of the B2t horizons ranges from dark brown (7.5YR 4/3 or 10YR 4/3) to brown (7.5YR 5/4), strong brown (7.5YR 5/6), dark

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yellowish brown (10YR 4/4), and reddish brown (5YR 4/3 or 4/4). In places the texture of the B2t horizons is clay loam, and those horizons contain thin layers of clay in some places. The content of sand increases significantly at depths of 20 to 36 inches. Depth to calcareous gravel and sand ranges from 42 to 48 inches, but the depth is generally nearer 42 inches than 48 inches. In the Ap, B1, and B21t horizons, reaction ranges from neutral to medium acid. Reaction ranges from medium acid to very strongly acid in the B22t and IIB23t horizons, and from medium acid to neutral in the IIB24t and IIIB3t horizons.

Ockley soils are members of a topographic sequence that includes the well-drained Wea soils, but they occur at a higher elevation and have a lighter colored surface layer than the Wea soils. Ockley soils are commonly near areas of Fox and Warsaw soils, but they are thicker to sand and gravel than those soils. They are lighter colored than the Warsaw soils.

Ockley silt loam, 0 to 2 percent slopes (OcA).—This soil is on broad terraces. The areas are long and narrow, and they contain 5 to 25 acres. The profile is the one described as typical for the series.

This soil is suitable for irrigation. It has few, if any, limitations to use for farming. (Capability unit I–1)

Ockley silt loam, 2 to 6 percent slopes (OcB).—This soil is on the breaks along broad terraces. The areas are long and narrow, and they range from 5 to 20 acres in size.

This soil is suitable for irrigation. Erosion is a moderate hazard if this soil is cultivated. (Capability unit IIe–3)

Patton Series

In the Patton series are dark-colored, very poorly drained, nearly level soils on stream terraces. These soils are mostly in slight depressions. They have formed in loamy, calcareous lacustrine material.

In a typical profile of a cultivated Patton soil, the plow layer is very dark gray silty clay loam about 7 inches thick. The plow layer is underlain by a layer of very dark gray silty clay loam about 5 inches thick. The subsoil is gray and light brownish-gray silty clay loam that extends to a depth of about 43 inches. The substratum is massive, yellowish-brown, gray, and grayish-brown silty clay loam and silt loam.

These soils have a seasonal high water table, and the mottling and the gray clay films in the subsoil indicate natural wetness. Where adequate drainage is provided, the root zone is deep for most of the commonly grown annual crops. The available moisture capacity is high, and the surface layer generally has a high content of organic matter. Permeability of the subsoil is moderately slow.

If Patton soils are adequately drained, they are suited to the crops commonly grown in the county and are important for farming. They are used mainly for growing corn and soybeans.

Typical profile of Patton silty clay loam in a cultivated field in Urbana Township (sec. 6, R. 11 N., T. 5 E.):

Ap—0 to 7 inches, very dark gray (10YR 3/1) silty clay loam; moderate, medium and coarse, granular structure; friable when moist; medium acid; abrupt, smooth boundary.

A3—7 to 12 inches, very dark gray (10YR 3/1) silty clay loam; moderate, medium and fine, subangular blocky structure; firm when moist; medium acid; clear, smooth boundary.

B21t—12 to 16 inches, very dark gray (10YR 3/1) silty clay loam; strong, medium, subangular blocky structure; firm when moist; slightly acid; clear, wavy boundary.

B22tg—16 to 30 inches, gray (N 5/0) silty clay loam; many, fine, distinct yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; firm when moist; few dark-gray (N 4/0) clay films; neutral; clear, irregular boundary.

B23tg—30 to 37 inches, light brownish-gray (10YR 6/2) silty clay loam; many, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; firm when moist; few dark-gray (N 4/0) clay films on ped faces; neutral; clear, wavy boundary.

B24tg—37 to 43 inches, light brownish-gray (10YR 6/2) silty clay loam; weak, coarse, subangular blocky structure; firm when moist; a few very dark gray (N 3/0) and gray (N 5/0) clay films; neutral; diffuse, wavy boundary.

C1—43 to 74 inches, yellowish-brown (10YR 5/8) and gray (N 5/0) silty clay loam; massive; firm when moist; calcareous; gradual, smooth boundary.

C2—74 inches +, gray (N 5/0) and grayish-brown (2.5Y 5/2) silt loam; common, coarse, distinct, strong-brown (7.5YR 5/8) mottles; friable when moist; sediment shows laminations; calcareous.

The combined thickness of the A horizons ranges from 10 to 19 inches. In places the color of these horizons is black (10YR 2/1 or N 2/0). The Btg horizons generally have a texture of silty clay loam, but these horizons contain thin layers of silty clay in places. The combined thickness of the Btg horizons ranges from 18 to 40 inches. Texture of the C horizons is generally silty clay loam and silt loam, but it is very fine sandy loam in some areas. Depth to calcareous material ranges from 25 to 55 inches.

The Patton soils are members of a topographic sequence that includes the higher lying, moderately well drained Uniontown soils. They have a darker colored surface layer and a more grayish, more mottled subsoil than the Uniontown soils. Patton soils are similar to the Brookston soils. They are slightly more silty, however, and unlike the Brookston soils, they are underlain by loamy lacustrine material that has a high content of silt.

Patton silty clay loam (Pa).—This is the only Patton soil mapped in Champaign County. The areas are mostly wide, have a nearly circular shape, and contain 5 to 15 acres.

Tilling this soil when it is neither too wet nor too dry helps to keep it in good tilth. Seasonal wetness is a moderate limitation in areas used for crops. (Capability unit IIw–3)

Quarry

Quarry (Qu) is a miscellaneous land type from which dolomite limestone has been removed for use in construction or for agricultural purposes. This land type generally occurs where the layer of till is fairly thin over the underlying bedrock of dolomitic limestone. As a rule, it occurs within areas of Miami, Celina, and Kendallville soils. The pits range from 3 to 4 acres in size.

Because of the nature of strip mining operations, the soil material in spoil banks varies within short horizontal distances. As a rule, the stripped soil material is low in content of organic matter and in available moisture capacity, and it is poorly suited to the growth of plants. Because of the instability of the stripped soil material, most areas are subject to erosion and are a source of siltation.

Areas that are no longer being mined should be treated so that plants can be established to help reduce erosion.

Grasses and trees that can tolerate the low available moisture capacity and unfavorable properties of the soil material should be selected for seeding and planting.

Ponded areas of this land type are generally suitable for development for wildlife habitat and recreational facilities. (Not placed in a capability unit)

Rodman Series

The Rodman series consists of gravelly soils that are dark colored, well drained, and hilly to steep. These soils are shallow over stratified gravel and sand. They are on terrace escarpments, kames, and valley walls.

In a typical profile of a Rodman soil in pasture, the surface layer is neutral, very dark brown gravelly loam about 7 inches thick. The subsoil is dark-brown, calcareous gravelly loamy coarse sand, and it extends to a depth of about 13 inches. The underlying material is yellowish-brown, calcareous gravel and sand.

These soils have rapid permeability, a shallow root zone, and low available moisture capacity. They are extremely droughty.

Rodman soils are too steep and too droughty to be suitable for cultivated crops. They are mostly in pasture or trees.

Typical profile of a Rodman gravelly loam in a pasture about 1¼ miles west-northwest of Cable in Wayne Township:

A1—0 to 7 inches, very dark brown (10YR 2/2) gravelly loam; moderate, fine and medium, granular structure; friable when moist; neutral; clear, wavy boundary.

IIB—7 to 13 inches, dark-brown (10YR 4/3) gravelly loamy coarse sand; loose; calcareous; clear, wavy boundary.

IIC—13 to 24 inches, yellowish (10YR 5.4) and light yellowish-brown (10YR 6/4) gravel and sand; loose; calcareous.

Some areas are severely eroded, and in those places the A horizon is mostly gravel. In other places little or no erosion has occurred and the A horizon is dark colored and has a high content of organic matter. The A1 horizon ranges from 4 to 10 inches in thickness and from very dark brown (10YR 2/2) to very dark grayish brown (10YR 3/2) in color. The IIB horizon ranges from 2 to 10 inches in thickness and from brown (10YR 5/3) to dark brown (10YR 4/3) or dark yellowish brown (10YR 4/4) in color. The A1 horizon is neutral or slightly calcareous, and the IIB horizon is slightly calcareous to strongly calcareous. Where these soils grade toward Casco soils, the B horizon contains a thin layer of gravelly loam.

Rodman soils are generally adjacent to Casco and Fox soils. They are darker colored and are shallower over gravel and sand than the Casco and Fox soils, and they lack the clayey subsoil that is typical in the profile of those soils.

Rodman gravelly loam, 12 to 18 percent slopes, moderately eroded (RgD2).—This soil is generally on terrace escarpments. Erosion has removed much of the original surface layer, and the gravelly substratum is exposed in places. Small areas of Casco soils were included with this soil in mapping.

The strong slopes and limited available moisture capacity make this Rodman soil unsuitable for cultivated crops. (Capability unit VIs–1)

Rodman gravelly loam, 18 to 50 percent slopes, moderately eroded (RgF2).—This soil has a large amount of gravel throughout the profile. Only a thin layer of loamy material overlies the gravel and sand. Otherwise, the profile is similar to the one described as typical for the series.

This soil is extremely droughty and is of little use for farming. Slope is a major limitation to most uses. (Capability unit VIIs–1)

Ross Series

The Ross series consists of deep, dark-colored, well-drained soils on flood plains. These soils have formed in soil material that washed from areas of exposed limy upland glacial till and from soils formed in glacial till.

In a typical profile of a cultivated Ross soil, the surface layer is very dark brown silt loam about 27 inches thick. The subsurface layer, about 10 inches thick, is very dark grayish-brown silt loam. The underlying material is black silty clay loam.

These soils are moderately permeable, have a deep root zone, and have high natural fertility. They can absorb and retain a large amount of moisture for the use of plants. The soils are in good tilth and can be tilled throughout a wide range of moisture content because they have a high content of organic matter. Periodic flooding is a hazard. Flooding generally occurs in winter and spring.

Most areas of Ross soils are in row crops. Small areas generally are wooded.

Typical profile of Ross silt loam in a cultivated field 3 miles southwest of Mechanicsburg in Goshen Township:

Ap—0 to 9 inches, very dark brown (10YR 2/2) silt loam; moderate, fine, granular structure; friable when moist; neutral; clear, smooth boundary.

A11—9 to 27 inches, very dark brown (10YR 2/2) silt loam; moderate, medium, granular structure; friable when moist; neutral; clear, smooth boundary.

A12—27 to 37 inches, very dark grayish-brown (10YR 3/2) silt loam; massive; friable when moist; neutral; clear, smooth boundary.

IIC1—37 to 50 inches, black (10YR 2/1) silty clay loam; massive; firm when moist; neutral; clear, smooth boundary.

IIC2—50 to 60 inches, black (10YR 2/1) silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; massive; firm when moist; neutral.

Color of the Ap horizon ranges from black (10YR 2/1) to very dark brown (10YR 2/2). Color of the profile to a depth of 30 to 50 inches ranges from black (10YR 2/1) to very dark brown (10YR 2/2) or very dark grayish brown (10YR 3/2). Depth to the IIC1 horizon ranges from 30 to 50 inches. In places, at depths of 30 to 50 inches, the C horizons are stratified and have a loam or silt loam texture and a brown (10YR 4/3) or dark grayish-brown (10YR 4/2) color.

Ross soils are commonly adjacent to the light-colored Genesee and Eel soils, and they are also adjacent to the somewhat poorly drained, light-colored Shoals soils and the very poorly drained, dark-colored Sloan soils. Ross soils are in many respects similar to the Wea soils, but they are not underlain by gravel and sand as are those soils. Also, they lack the well-defined B horizon that is typical in the Wea profile.

Ross silt loam (Rn).—This is the only soil of the Ross series mapped in Champaign County. It occupies long, narrow areas that generally are immediately adjacent to a stream channel. This soil occurs with the less well drained Shoals, Sloan, or Eel soils but at a slightly higher elevation than those soils. A few areas of Shoals, Sloan, and Eel soils were included in mapping.

This Ross soil is well suited to the crops commonly grown in the county. Flooding is the principal hazard where crops are grown. (Capability unit IIw–5)

Shoals Series

The Shoals series consists of light-colored, somewhat poorly drained, nearly level soils on flood plains along most of the major streams in the county. These soils have formed in loamy alluvium washed from soils derived from calcareous glacial till of Wisconsin age.

In a typical profile of a cultivated Shoals soil, the plow layer is dark grayish-brown silt loam about 8 inches thick. The subsoil, which extends to a depth of about 37 inches, is mottled dark grayish-brown, olive-gray, and gray loam and silt loam. The substratum is dark-gray, calcareous sandy loam.

Flooding is a hazard, and the water table is high during wet seasons. Both the gray color and mottling of the soil material indicate natural wetness. Normally, where drainage is adequate, the root zone is moderately deep, but the depth to which roots can penetrate is variable. The available moisture capacity is high. Permeability is moderate in the surface layer and the subsoil. It is moderately slow to moderate in the substratum.

Shoals soils are used mostly for growing corn, soybeans, and hay. The areas where the hazard of flooding is greatest, however, are generally used for pasture or trees.

Typical profile of Shoals silt loam in a cultivated field in Mad River Township (sec. 29, R. 11 N., T. 4 E.):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, granular structure; friable when moist; mildly alkaline; abrupt, smooth boundary.

B21g—8 to 20 inches, dark grayish-brown (2.5Y 4/2) silt loam; common, fine, distinct, yellowish-brown (10YR 5/4) mottles; massive; friable when moist; neutral; clear, smooth boundary.

B22g—20 to 30 inches, olive-gray (5Y 5/2) fine silt loam; common, fine, distinct, dark-brown (7.5YR 4/4) mottles; massive; friable when moist; neutral; clear, smooth boundary.

B23g—30 to 37 inches, gray (5Y 5/1) loam; many, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; massive; friable when moist; neutral; clear, smooth boundary.

C—37 to 40 inches, dark-gray (5Y 4/1) sandy loam; massive; friable when moist; calcareous.

In places the color of the Ap horizon is very dark grayish brown (10YR 3/2). In some areas the soil material consists of stratified silt loam and sandy loam to a depth of about 40 inches.

In many places the Shoals soils occur with moderately well drained Eel, well drained Genesee, and very poorly drained soils. They are more grayish and more mottled than the Eel and Genesee soils, and they are lighter colored than the Sloan soils.

Shoals silt loam (Sh).—This soil occupies areas 5 to 10 acres in size on broad, low flood plains. Flooding is a hazard, and natural wetness is a moderate limitation to use of this soil for crops. (Capability unit IIw–1)

Shoals Series, Till Subsoil Variant

Soils of the Shoals series, till subsoil variant, are light colored, somewhat poorly drained, and nearly level. They have formed in alluvium over glacial till and are on flood plains, mainly along Storms Creek.

A typical profile in pasture has a surface layer of dark grayish-brown or dark-brown silt loam about 13 inches thick. The subsoil is dark grayish-brown or gray, friable sandy loam that extends to a depth of 33 inches. Below the subsoil, and extending to a depth of 5 feet or more, is compact, limy, loam glacial till.

Properties of these soils are similar to those of typical Shoals soils, except that permeability is moderately slow in the underlying glacial till.

Typical profile of Shoals silt loam, till subsoil variant, in a pasture along Storms Creek, 1,000 feet west of Terre Haute and 200 feet south of State Road No. 55 in Mad River Township (SE¼NW¼ sec. 25):

A11—0 to 7 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; friable when moist; neutral; clear, wavy boundary.

A12—7 to 13 inches, dark grayish-brown (10YR 4/2) sandy loam; common, fine, faint, brown (10YR 4/3) mottles; weak, fine, subangular blocky structure; friable when moist; 10 percent of horizon is coarse fragments; mildly alkaline; clear, wavy boundary.

B21—13 to 22 inches, dark grayish-brown (2.5Y 4/2) sandy loam; many, medium, distinct, yellowish-brown (10YR 5/8) mottles; weak, medium, distinct, yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; friable when moist; 5 percent of horizon is coarse fragments; mildly alkaline; clear, wavy boundary.

B22g—22 to 33 inches, gray (5Y 5/1) gravelly sandy loam; many, medium, distinct, yellowish-brown (10YR 5/8) mottles; massive; friable when moist; calcareous; abrupt, smooth boundary.

IIC—33 inches +, gray (5Y 5/1) loam; massive; firm when moist; calcareous.

In these soils depth to firm loam till ranges from 24 to 36 inches.

Shoals silt loam, till subsoil variant (Sm).—This soil is underlain by firm, calcareous glacial till at depths ranging from 24 to 36 inches. It is mainly between a stream and the uplands, and it occurs where the flood plain merges with the foot slopes adjacent to the uplands. The areas range from 5 to 15 acres in size, and most of them are long and narrow.

The root zone is shallower than the root zone in a typical Shoals soil. Also, the available moisture capacity is lower.

Where this soil is farmed, natural wetness is a moderate limitation and flooding is a hazard. (Capability unit IIw–1)

Sloan Series

The Sloan series consists of dark-colored, very poorly drained soils that are nearly level. These soils have formed in loamy alluvium that washed from soils underlain by calcareous till of Wisconsin age. They are on flood plains along most of the streams in the county.

In a typical profile of a cultivated Sloan soil, the plow layer is very dark brown silt loam about 8 inches thick. The subsurface layer, about 9 inches thick, is mottled, very dark brown silt loam. The subsoil is mottled, black silt loam, and it extends to a depth of about 24 inches. The upper part of the substratum is mottled, very dark gray silt loam, and the lower part, at a depth of about 42 inches, is stratified, calcareous gravel and sand.

Flooding is a hazard, and these soils have a seasonal high water table. Both the grayness and the mottling in the profile indicate natural wetness. Where adequate drainage is provided, the root zone is deep for most annual crops commonly grown. The available moisture capacity and the content of organic matter are high. Permeability is moderate in the surface layer and the subsoil, but it is rapid in the substratum.

The Sloan soils are suited to crops, and most of the acreage is in corn and soybeans. Where the hazard of flooding is greatest, however, these soils are in pasture or trees.

Profile of Sloan silt loam, in a pasture in Salem Township (sec. 20, R. 12 N., T. 5 E.):

Ap—0 to 8 inches, very dark brown (10YR 2/2) silt loam; moderate, medium and fine, granular structure; friable when moist; calcareous; clear, smooth boundary.

A1—8 to 17 inches, very dark brown (10YR 2/2) silt loam; common, fine, distinct, dark-brown (7.5YR 4/4) mottles; moderate, medium, granular structure; friable when moist; calcareous; clear, smooth boundary.

B2—17 to 24 inches, black (10YR 2/1) silt loam; common, fine, distinct, dark-brown (7.5YR 3/2) mottles; weak, fine and medium, subangular blocky structure; friable when moist; calcareous; clear, smooth boundary.

C1g—24 to 42 inches, very dark gray (10YR 3/1) silt loam; few, fine, faint, yellowish-brown (10YR 5/6) mottles; massive; friable when moist; calcareous; clear, smooth boundary.

IIC2g—42 inches +, grayish-brown (2.5Y 5/2) gravel; loose; calcareous.

The color of the A horizons ranges from black (10YR 2/1) or very dark gray (10YR 3/1) to very dark brown (10YR 2/2). The soil material to a depth of 30 to 50 inches has values of 3 or less in the matrix. The dominant texture of the A horizons is silt loam, but the texture ranges to silty clay loam in places. In the uppermost 40 inches of the soil profile, the soil material consists of stratified silt loam, loam, and silty clay loam and some layers contain a small amount of gravel. In places the structure of the B2 horizon is moderate, fine and medium, subangular blocky.

In Champaign County the profile of the Sloan soils is not exactly typical of the Sloan series, because the soils are dominantly calcareous to a depth of 40 inches. The profile of typical Sloan soils is commonly slightly acid to neutral. In some areas in Champaign County, the profile contains calcareous pebbles that are between depths of 12 and 36 inches.

Sloan soils commonly occur with other soils formed in alluvium, including the somewhat poorly drained Shoals, the moderately well drained Eel, and the well drained Genesee. They are darker colored than those soils.

Sloan silt loam (So).—This soil is in areas commonly 5 to 10 acres in size, that are mostly crescent shaped and lie roughly parallel to the channel of a stream. Most of the larger areas contain long, narrow flood channels. Where this soil is along small streams, the areas are commonly long, narrow, and winding. Included with this soil in mapping were some areas that have a surface layer of silty clay loam.

Natural wetness is a severe limitation to use of this soil for crops. Flooding is a hazard that limits most uses. (Capability unit IIIw–1)

Sloan Series, Gravelly Subsoil Variant

Soils of the Sloan series, gravelly subsoil variant, are dark colored, nearly level, and very poorly drained. They have formed in alluvium over gravelly outwash. These soils are on flood plains, mainly along the Mad River.

A typical profile in pasture has a surface layer of very dark gray silt loam about 8 inches thick. The subsurface layer, about 8 inches thick, is mottled, very dark gray silty clay loam. The subsoil consists of dark-gray silt loam that extends to a depth of about 23 inches. Below the subsoil is limy gravelly sand that extends to a depth of 5 feet or more.

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These soils, like the typical Sloan soils, have a rapidly permeable substratum. They have a root zone that is shallow over gravelly sand, and they have low available moisture capacity.

Typical profile of Sloan silt loam, gravelly subsoil variant, in a cultivated field 2 miles southwest of Urbana in Urbana Township (500 feet north of Old Troy Pike and 1,000 feet west of State Route No. 55):

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam; moderate, medium and fine, granular structure; friable when moist; calcareous; clear, smooth boundary.

A1—8 to 16 inches, very dark gray (10YR 3/1) silty clay loam; common, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; moderate, coarse, angular blocky structure; firm when moist; many dark-gray (10YR 4/1) shells and shell fragments; calcareous; clear, wavy boundary.

B2—16 to 23 inches, dark-gray (10YR 4/1) silt loam; common, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, fine, angular blocky structure; firm when moist; many shells and shell fragments; calcareous; clear, wavy boundary.

IIC—23 inches +, very pale brown (10YR 8/3) gravelly sand; common, coarse, prominent, strong-brown (7.5YR 5/6) mottles; structureless (single grain); loose; calcareous.

Thickness of the A horizon ranges from 10 to 20 inches. The color of the A horizon ranges from black (10YR 2/1) or very dark gray (10YR 3/1) to very dark brown (10YR 2/2). In places the B2 horizon is gravelly silt loam or silty clay loam. Depth from the surface to the IIC horizon ranges from 12 to 36 inches.

Sloan silt loam, gravelly subsoil variant (Sv).—This soil is on flood plains of the larger streams, generally in low areas and in stream channels. Most of the areas are long and narrow, and they contain 3 to 10 acres.

Because this soil is shallow over gravel and sand, it has lower available moisture capacity than Sloan silt loam. It tends to be too droughty for crops that mature late in summer. Flooding is a hazard that limits most uses. Wetness and flooding are severe limitations where crops are grown. (Capability unit IIIw–1)

Uniontown Series

In the Uniontown series are light-colored, undulating, deep soils that are moderately well drained. These soils are on stream terraces, where they have formed in limy, silty or loamy sediment.

In a typical profile of a cultivated Uniontown soil, the plow layer is dark grayish-brown silt loam about 8 inches thick. The upper part of the subsoil is yellowish-brown silt loam that extends to a depth of about 15 inches. The middle part, between depths of about 15 and 26 inches, is yellowish-brown and dark yellowish-brown silty clay loam, and the lower part is dark grayish-brown, mottled silt loam that extends to a depth of about 30 inches. The substratum is yellowish-brown and grayish-brown, massive silt loam.

Mottles in the lower part of the subsoil indicate that these soils are slightly wet. They are soft and unstable when saturated. They have moderately slow permeability, a deep root zone, and high available moisture capacity.

Typical profile of Uniontown silt loam, 2 to 6 percent slopes, in a cultivated field 2 miles south of Springhills in Harrison Township:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium and fine, granular structure; friable when moist; medium acid; abrupt, smooth boundary.

B1—8 to 15 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, subangular blocky structure; friable when moist; medium acid; clear, smooth boundary.

B21t—15 to 19 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine and medium, subangular blocky structure; firm when moist; strongly acid; clear, smooth boundary.

B22t—19 to 26 inches, yellowish-brown (10YR 5/8) silty clay loam; strong, medium, subangular blocky structure; firm when moist; common stains of manganese; common thin clay films; strongly acid; clear, wavy boundary.

B23t—26 to 30 inches, dark grayish-brown (10YR 4/2) silt loam; common, fine, prominent, yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; firm when moist; common stains of manganese; a few thin clay films; medium acid; clear, wavy boundary.

C1—30 to 48 inches, yellowish-brown (10YR 5/8) and grayish-brown (2.5Y 5/2) silt loam; massive; friable when moist; weakly effervescent when treated with dilute hydrochloric acid; a few clay films in fractures; diffuse, smooth boundary.

C2—48 inches +, yellowish-brown (10YR 5/8) and gray (5YR 5/1) silt loam; massive; friable when moist; calcareous.

In some places faint mottling is apparent in the B1 horizon but little or no mottling is apparent in the B2 horizons. The texture of the B horizons ranges from medium silty clay loam to fine silt loam. In the Ap horizon, reaction ranges from neutral to medium acid. Reaction ranges from medium acid to very strongly acid in the upper B horizons and from strongly acid to medium acid in the lower B horizons. Depth to calcium carbonates ranges from about 28 to 50 inches.

The Uniontown soils have formed in about the same kind of material as the Patton and Henshaw soils. They are easily distinguished from those soils, however, because they are lighter colored than the Patton soils, and they are less gray and mottled in the subsoil than the Henshaw soils.

Uniontown silt loam, 2 to 6 percent slopes (UnB).—This is the only soil of the Uniontown series mapped in Champaign County. It is on stream terraces. The areas in which it occurs are variable in size and shape, but generally they are long and narrow. In places this soil contains wet areas that dry more slowly in spring than the surrounding areas. Surface crusting is common.

Runoff is moderate to rapid. Erosion is a moderate hazard where this soil is cultivated. (Capability unit IIe–3)

Wallkill Series

The Wallkill series consists of deep, poorly drained, light-colored mineral soils underlain by muck. These soils are in nearly level areas or depressions, generally in kettleholes or former drainageways. They are on moraines or stream terraces.

In a typical profile of a Wallkill soil, the upper layers are dark grayish-brown and very dark grayish-brown silt loam to a depth of about 24 inches. The underlying material is black, well-decomposed muck. The entire profile is neutral in reaction.

Unless these soils have been drained, they have a high water table for long periods of time. Permeability is generally moderate, but it ranges from moderately slow to moderately rapid.

Typical profile of Wallkill silt loam in a cultivated field south of Triad High School, 3 miles west of Woodstock and 2 miles northeast of Cable in Wayne Township:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; weak, coarse, granular structure; friable when moist; neutral; abrupt, smooth boundary.

C1—6 to 24 inches, very dark grayish-brown (10YR 3/2) silt loam; massive; firm when moist; neutral; abrupt, smooth boundary.

24 to 48 inches, black (10YR 2/1), well-decomposed muck; very friable when moist; neutral.

Thickness of the mineral alluvial material over muck ranges from 10 to 40 inches. In places the C horizons contain common, fine, faint, dark-brown (7.5YR 4/4) mottles. In the Ap and C1 horizons, the color includes a hue of 2.5Y and the chroma is 1 or 2. In some areas the muck is 24 to 36 inches thick, but it is thicker in many places.

Wallkill soils are similar to Algiers soils, but they are underlain by muck and the Algiers soils are underlain by dark-colored mineral material. The Wallkill soils occur near the Lippincott soils. They are lighter colored than the Lippincott soils, and they are not underlain by gravel and sand as are those soils.

Wallkill silt loam (Wa).—This is the only Wallkill soil mapped in Champaign County. Included with it in mapping were small areas of muck soils.

Artificial drainage is needed before this Wallkill soil can be farmed. Some areas are difficult to drain because suitable outlets are lacking. The high water table is the principal limitation to use of this soil for crops. (Capability unit IIw–1)

Warners Series

The Warners series consists of dark-colored, nearly level soils that are very poorly drained. These soils are on moraines and terraces. On the moraines they are in potholes. On the terraces they are in bogs and swamps. The soils have formed in an accumulation of saturated, partly decomposed vegetation and mineral matter. They consist of a mixture of muck, silty inwash, and marl.

In a typical profile of a Warners soil that is cultivated, the plow layer is about 10 inches thick and consists of dark-colored silt loam that contains some shells and has a high content of organic matter. The underlying marl consists of loose, calcareous shells.

In areas that have not been drained, these soils have a high water table throughout the year. Even where adequate drainage is provided, the root zone is shallow for most of the commonly grown annual crops because of the marl near the surface. The available moisture capacity is medium. Permeability is moderate to moderately slow in the surface layer and moderately slow or slow in the underlying marl.

Warners soils are mostly in pasture or trees.

Typical profile of Warners silt loam in a cultivated field in Union Township (sec. 19, R. 11 N., T. 6 E.):

Ap—0 to 10 inches, black (N 2/0), highly organic silt loam; fine granular structure; very friable when moist; common shell fragments; calcareous; abrupt, smooth boundary.

C—10 inches +, white (10YR 8/1) marl that grades to light brownish gray (10YR 6/2) with depth; massive; friable when moist.

Thickness of the organic-mineral layer is less than 12 inches. In many places marl is exposed on the surface during cultivation.

Warners silt loam (Wn).—This is the only Warners soil mapped in Champaign County. Most of the areas are nearly circular, and they contain 3 to 10 acres.

Where this soil has not been drained, it is subject to ponding. Excess moisture is a severe limitation if crops are grown. (Capability unit IVw–1)

Warsaw Series

Soils that are dark colored, nearly level or gently sloping, and well drained make up the Warsaw series. These soils are on outwash terraces. They have formed in 20 to 40 inches of loamy material and in the underlying stratified gravel and sand. The natural vegetation was tall prairie grasses.

In a typical profile of a cultivated Warsaw soil, the plow layer is very dark brown silt loam about 7 inches thick. The plow layer is underlain by a layer of dark-brown silt loam about 6 inches thick. The subsoil is brownish silty clay loam, clay loam, and sandy clay loam, and it extends to a depth of about 39 inches. Approximately the lower half of the subsoil is gravelly. The substratum is loose, calcareous, stratified gravel and sand.

The surface layer and the subsoil are moderately permeable, and the substratum is rapidly permeable. The root zone is moderately deep for most of the commonly grown annual crops. The available moisture capacity is medium to low. These soils are droughty, especially for crops that mature late in summer. They warm up early in spring. Normally, they can be tilled soon after a rain.

Most of the acreage is in field crops. The crops generally grown are corn, wheat, soybeans, and hay.

Typical profile of Warsaw silt loam, 0 to 2 percent slopes, in a cultivated field in Urbana Township (sec. 7, R. 11 N., T. 5 E.; laboratory No. CH–34):

Ap—0 to 7 inches, very dark brown (10YR 2/2) silt loam; weak, medium, granular structure; friable when moist; slightly acid; abrupt, smooth boundary.

A1—7 to 13 inches, dark-brown (10YR 3/3) silt loam; moderate, medium, granular structure; friable when moist; strongly acid; clear, wavy boundary.

B1—13 to 19 inches, dark yellowish-brown (10YR 4/4) silty clay loam; very dark grayish-brown (10YR 3/2) coatings on peds; weak, fine, subangular blocky structure; friable when moist; very strongly acid; clear, wavy boundary.

B21t—19 to 25 inches, brown (7.5YR 5/4) clay loam; dark-brown (7.5YR 4/2) coatings on peds; moderate, medium, subangular blocky structure; firm when moist; moderate, continuous clay films on peds; very strongly acid; clear, wavy boundary.

IIB22t—25 to 30 inches, dark-brown (7.5YR 4/2) gravelly sandy clay loam; weak, medium, subangular blocky structure; firm when moist; thin clay films on peds; very strongly acid; gradual, wavy boundary.

IIB23t—30 to 36 inches, dark-brown (7.5YR 3/2) gravelly sandy clay loam; firm when moist; patchy clay films; strongly acid; clear, wavy boundary.

IIB24—36 to 39 inches, very dark brown (10YR 2/2) gravelly sandy clay loam; very firm when moist; medium acid; abrupt, irregular boundary.

IIC—39 to 50 inches, yellowish-brown (10YR 5/4) and light yellowish-brown (10YR 6/4) gravel and sand; loose; calcareous.

In some areas the B22t and B23t horizons are sandy clay loam, clay loam, or gravelly clay. Hues throughout the profile are 7.5YR and 10YR. In many areas clay films extend as coatings on the pebbles to a depth of 4 to 5 feet. The dolomite pebbles in contact with the clay films show evidence of weathering. Depth to gravel and sand ranges from 20 to 40 inches. In the upper and middle parts of the B horizon, which are the most acid parts of the profile, reaction ranges from very strongly acid to medium acid.

In many places Warsaw soils occur with Wea and Fox soils. The Warsaw soils are darker colored than the Fox soils. They are less deep over gravel and sand than the Wea soils, and they have a higher content of gravel and sand than those soils.

Warsaw silt loam, 0 to 2 percent slopes (WrA).—This soil is on broad terraces in areas that contain 5 to 20 acres. The profile is the one described as typical for the series.

Droughtiness is a moderate hazard to crops grown on this soil, but there are few, if any, other limitations that would affect crops. This soil is suitable for irrigation. (Capability unit IIs–1)

Warsaw silt loam, 2 to 6 percent slopes (WrB).—This soil is on breaks along broad terraces. Most of the areas contain 5 to 20 acres.

This soil is suitable for irrigation. Surface runoff is moderate, and erosion is a moderate hazard if cultivated crops are grown. (Capability unit IIe–2)

Wea Series

In the Wea series are dark-colored, well-drained soils that are nearly level. These soils are on outwash terraces, where they have formed in loamy material, 40 to 72 inches thick, and in the underlying stratified gravel and sand. The natural vegetation was tall prairie grasses.

In a typical profile of a cultivated Wea soil, the plow layer is very dark brown silt loam about 7 inches thick. The plow layer is underlain by a similar layer, also about 7 inches thick. The subsoil extends to a depth of about 50 inches. It consists mostly of dark-brown or brown silt loam and clay loam, but about 5 inches of the lowest part is gravelly clay. The substratum is loose, calcareous, stratified gravel and sand.

The surface layer and the subsoil are moderately permeable, and the substratum is rapidly permeable. The root zone is deep for most annual crops, and the available moisture capacity is high. These soils warm up early in spring. They can be tilled soon after rains.

The Wea soils are well suited to the crops commonly grown in this county. Most of the acreage is in corn, wheat, soybeans, and hay.

Typical profile of Wea silt loam, 0 to 3 percent slopes, in a cultivated field in Union Township (sec. 24, R. 10 N., T. 6 E.):

Ap—0 to 7 inches, very dark brown (10YR 2/2) silt loam; moderate, fine, granular structure; friable when moist; medium acid; abrupt, smooth boundary.

A1—7 to 14 inches, very dark brown (10YR 2/2) silt loam; weak, coarse, granular structure; friable when moist; slightly acid; clear, wavy boundary.

B1—14 to 21 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, subangular blocky structure; friable when moist; many coatings of organic matter on ped faces; slightly acid; clear, smooth boundary.

B21t—21 to 28 inches, dark-brown (10YR 4/3) clay loam; very dark grayish-brown (10YR 3/2) coatings on ped faces; moderate, medium, subangular blocky structure; firm when moist; thin, continuous clay films on ped faces; common coatings of organic matter; strongly acid; clear, smooth boundary.

B22t—28 to 40 inches, dark-brown (10YR 4/3) clay loam; very dark grayish-brown (10YR 3/2) coatings on peds; strong, coarse, subangular blocky structure; very firm when moist; moderate, continuous clay films and a few coatings of organic matter on ped faces; strongly acid; clear, smooth boundary.

B23t—40 to 45 inches, brown (7.5YR 4/2) clay loam; moderate, coarse, subangular blocky structure; very firm when moist; patchy clay films on ped faces; medium acid; clear, smooth boundary.

IIB24t—45 to 50 inches, brown (7.5YR 4/2) gravelly clay; weak, medium, subangular blocky structure; firm when moist; patchy clay films on ped faces; neutral; clear, irregular boundary.

IIC1—50 to 60 inches, dark-brown (7.5YR 3/2) and white (10YR 8/1) gravelly loam; friable when moist; many partly weathered dolomite pebbles; common clay films on pebbles; calcareous; gradual, wavy boundary.

IIC2—60 to 65 inches, brown (7.5YR 4/4) gravelly sandy loam; loose; a few clay films on pebbles; calcareous; clear, wavy boundary.

IIC3—65 inches +, brown (10YR 5/3) gravel and sand; loose; calcareous.

The combined thickness of the A horizons ranges from 14 to 22 inches. Coatings of dark material from the A horizons extend downward into the B1 horizon and form a coating on the peds. The colors in the B horizons include both 10YR and 7.5YR hues. In general, the texture in the B horizons is silt loam or clay loam to sandy clay loam, but a thin horizon of clay or gravelly clay is in the lower part. The content of gravel in the solum increases below a depth of 20 to 36 inches. Depth to calcareous sand and gravel commonly ranges from about 40 to 72 inches. The reaction in the surface layer ranges from medium acid to neutral. The upper and middle parts of the B horizon are the most acid parts of the solum. In these parts the reaction ranges from very strongly acid to slightly acid.

Wea soils occur with Warsaw and Fox. They are deeper over the underlying gravel and sand, and they have less sand and gravel in the subsoil than either the Warsaw or Fox soils. Wea soils are darker colored than the Fox soils.

Wea silt loam, 0 to 3 percent slopes (WsA).—This is the only soil of the Wea series mapped in Champaign County. It is mostly on broad terraces in areas that contain 5 to 20 acres. Some of the areas are long and narrow. Included with this soil in mapping were areas where slopes are 2 to 6 percent. Also included, on alluvial fans, were areas of soils that have slopes of 2 to 3 percent and that are overlain by 1 to 2 feet of very dark brown alluvium. The included areas on alluvial fans occur where the water from streamflow has spread out and deposited alluvium over the Wea soil.

This Wea soil is suitable for irrigation. It has few, if any, limitations to use for farming. (Capability unit I–2)

Formation and Classification of Soils

This section tells how the factors of soil formation have affected the development of soils in Champaign County. It also explains the current system of soil classification and places the soil series in higher categories. The soil series represented in this county are discussed in the section "Descriptions of the Soils," and in that section a representative profile is described for each.

Formation of Soils

Soils are produced when climate, plants and animals, parent material, and topography, or relief, interact for a long period of time. These factors largely determine the properties of the soil that forms at any given point on the earth. All of them affect the formation of a soil, but the relative importance of each differs from place to place.

Parent material, relief, and, to a lesser extent, vegetation, are the factors mainly responsible for the differences among the soils of Champaign County. Climate and time also have played an important role, but the effects of these factors are so nearly uniform throughout the county that they have tended to make the soils similar rather than different from each other.

Parent material

Parent material is the mass of material from which a soil develops. The major kind of parent material from which the soils of Champaign County have developed is glacial deposits (fig. 7),[5] mainly glacial till and glacial outwash. Some soils have formed in more than one kind of parent material. The Miami, Crosby, and Celina soils, for example, have formed in a mantle of silty material that is 8 to 14 inches thick over glacial till. In most of the county, the layer of glacial drift is thick enough that bedrock has had little direct influence on the development of the soils. Dolomite or shale bedrock is within 5 feet of the surface in less than 100 acres of Miami soils. The following paragraphs discuss the various kinds of parent material from which the soils have developed.

Glacial deposits.—All of the glacial drift exposed at the surface in this county was deposited during the Wisconsin age of the Pleistocene epoch. The general north-south orientation of the major soil areas (see the general soil map at the back of this survey) is closely related to the advances and retreats of the glacier.

Glacial till, deposited in ground moraines and in end moraines, covers a large part of the county. Crosby and Brookston soils commonly occur on the ground moraines. Miami soils occur on the end moraines, but they also occur in areas where ground moraines are underlain by deposits of gravelly outwash that are fairly near the surface. Those areas are in the central part of the county. The till is nearly uniform in texture and in content of carbonates, as shown in table 9. The texture is typically loam, but the till contains thin layers of gravel, especially where it was deposited in end moraines. Fragments of dolomite and of crystalline rock are the coarse material in the till.

Outwash in the form of stratified gravel and sand deposited in outwash terraces and kames occupies large areas in this county. The gravel and sand were derived mainly from dolomitic rocks. On the outwash terraces, the major soils are the Fox and Lippincott. On the kames that are covered by a thin layer of till are intermingled areas of Rodman, Casco, Miami, and Fox soils.

Lacustrine deposits are mainly in depressions on ground moraines and in areas where melt waters from glaciers were trapped between moraines. The lacustrine material generally has a texture of silt loam and has a calcium carbonate equivalent of between 30 and 35 percent. The major soils that have formed in this material are the Patton and Henshaw.

[5] GOLDTHWAIT, R. P. GLACIAL GEOLOGY OF CHAMPAIGN COUNTY. Ohio Dept. of Natural Resources, Div. of Geol. Survey. [Unpublished manuscript]

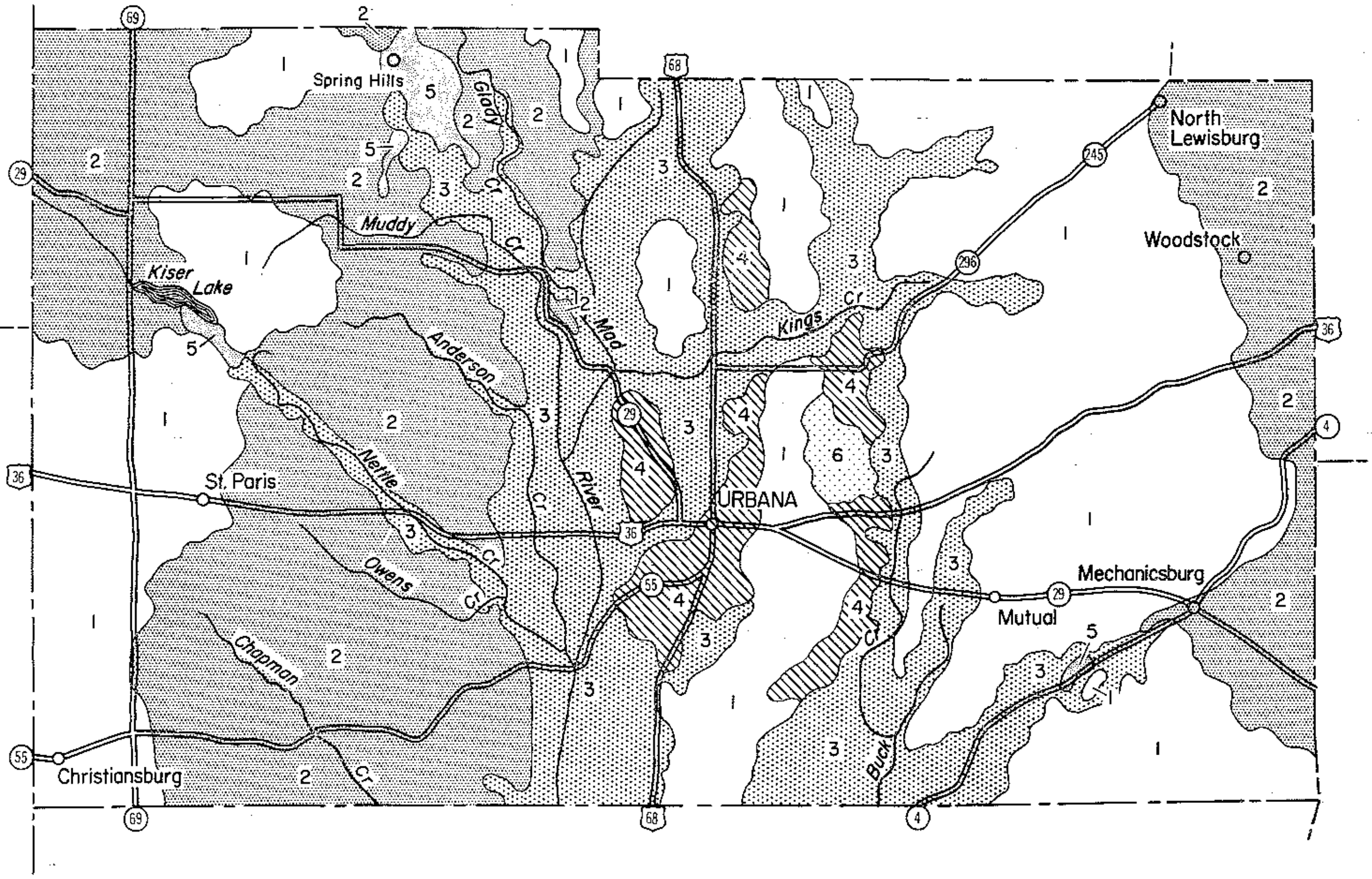

Figure 7.—**Distribution of glacial deposits in Champaign County: 1, end moraines; 2, ground moraines; 3, outwash terraces; 4, till over gravel; 5, kames and kame moraines; and 6, lacustrine terraces.**

Recent alluvium.—This material is of minor extent in Champaign County. It is most extensive along Nettle and Darby Creeks, where it generally has a silt loam texture and is neutral or slightly calcareous. The major soils formed in alluvium along Nettle and Darby Creeks are the Genesee, Eel, Shoals, and Sloan. Less extensive areas of alluvium occur along the Mad River and Kings Creek. Along these streams the Sloan soils and the gravelly subsoil variants of the Sloan series have formed. This alluvium apparently was derived from dark-colored soils on terraces, and it was also derived from organic soils in dissected areas on terraces.

Organic material.—This kind of parent material occupies many scattered areas in this county. It consists mainly of the decomposed remains of trees, sedges, and grasses that have accumulated in potholes and in drainageways where the water table is high and where seepage water has kept the area permanently wet. This material is slightly acid to mildly alkaline in reaction. In it have formed the Carlisle, Edwards, and Linwood soils.

Relief

Champaign County lies wholly within the Till Plains section of the Central Lowlands physiographic province (7). The area is characterized by a surface that is in a fairly youthful state of dissection and by an incompletely developed, or youthful, drainage system. Because most of the county is covered by a thick layer of glacial drift, the relief is not influenced by bedrock to any appreciable extent.

The relief ranges from nearly level, on the outwash terraces where Lippincott and Fox soils are dominant, to rolling and hilly, on the end moraines where the Miami soils are dominant. It is undulating on the ground moraines where the Crosby soils are dominant. The highest elevation in the county, 1,350 feet, is on Cable moraine in the eastern part of the county. The lowest elevation, 950 feet, is on terraces along the Mad River at the point where Champaign County joins Clark County.

Slight differences in elevation can strongly influence the natural drainage of a soil. Homer soils, for example, are adjacent to Fox soils on low terraces, but they occur at elevations only a few feet lower than the Fox soils. As a result, the Homer soils are somewhat poorly drained and have a high water table, but the Fox soils are well drained. Also, nearly level Brookston soils are adjacent to nearly level to sloping Celina soils, but they are in depressions at a lower elevation than the Celina soils. As a result, the Brookston soils are very poorly drained and the Celina soils are moderately well drained.

Plant and animal life

In this county, as in most areas, plants appear to have had a much greater role in the development of the soils

Table 9.—*Analyses of till underlying the Miami, Celina, and Crosby soils in stated part of county, and physiographic position*

Part of county and physiographic position where samples were taken	Percentage of—						Calcium carbonate equivalent (percentage)	
	Sand		Silt		Clay			
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Western:								
Ground moraine [1]	36. 8	32. 0–41. 5	43. 1	41. 2–46. 0	20. 0	14. 6–26. 7	40. 6	38. 0–43. 4
End moraine [1]	36. 8	35. 4–42. 8	42. 7	40. 8–44. 0	18. 4	16. 4–20. 6	44. 6	41. 8–47. 9
Eastern:								
Ground moraine [2]	38. 0	37. 0–40. 6	44. 1	39. 2–46. 1	17. 8	16. 8–20. 2	48. 6	43. 2–51. 6
End moraine [3]	33. 6	27. 3–44. 1	45. 4	40. 8–48. 7	20. 9	15. 1–25. 1	41. 6	38. 7–46. 3

[1] 4 samples.
[2] 5 samples.
[3] 6 samples.

than animals. A dense forest, broken only in a few places by patches of prairie and by open spaces among the trees, made up the original cover of the area that is now Champaign County. This county lies wholly within the deciduous forest region of the Eastern Central States. The original vegetation can be classed as of three main kinds—oak-hickory, beech-maple, and oak-maple—and as of two less important kinds—swamp forest and grassland.

Trees of the oak-hickory forest originally covered most of the county. This kind of forest consisted mostly of white oak, black oak, and shagbark hickory, and it did not contain beech and sugar maple. Miami and Fox soils occupy a large acreage originally covered by trees of the oak-hickory forest.

The beech-maple forest consisted mostly of beech and sugar maple. It was generally in areas where Crosby and Brookston soils are predominant.

The oak-maple forest contained almost no beech, and it had a greater proportion of white, black, and red oaks than the beech-maple forest. The oak-maple forest generally was a transitional zone between the beech-maple and oak-hickory forests. It was in areas where the soils have slightly better drainage and are better aerated than those where the beech-maple forest occurred. Miami soils are the principal soils where this kind of forest was dominant.

The swamp forest was mainly on flood plains and in marshes, but it was also on upland terraces in places where the water table is high. Elm, ash, and soft maple were the major kinds of trees in this kind of forest. The Lippincott, Sloan, and Brookston are the main soils where this kind of forest was dominant.

The grassland is of two types—wet grassland and dry grassland. In this county the wet grassland type was the more extensive of the two. It was on nearly level, poorly drained soils of uplands between streams and around the headwaters of streams; in gently sloping areas well supplied with seepage water; and in former bogs and marshes. In this type reedgrass, sloughgrass, bluejoint, reed bentgrass, prairie dock, and Sullivant milkweed were the dominant kinds of vegetation. Lippincott, Patton, and Brookston soils make up the largest part of the acreage where this grassland type was dominant.

The dry grassland type occupied nearly level areas on gravelly terraces. In this type such species as side-oats grama and little bluestem are dominant. Warsaw soils occupy a large part of the acreage where this type of grassland occurred.

Climate

The climate of Champaign County is of a humid-temperate, continental type. The average annual precipitation is about 38 inches. Because of the uniformity of the climate throughout the county, this factor has not been responsible for differences among the soils.

According to estimates, frost sometimes penetrates to a depth of about 15 inches in open fields in this county (*16*). Soils in forested areas seldom freeze. When they do, the frost extends only to a depth of 2 to 3 inches. During most of the year, the subsoil in such well-drained soils as the Miami and Fox is moist to wet, but these soils generally dry out in summer.

Time

Time is an important factor of soil formation because it indicates the probable or relative duration of processes that have been active in developing a soil. The land surface of this county was exposed when the Late Wisconsin glacier receded from the area less than 15,000 years ago. This is considered to be a relatively short period in geologic history, but it is long enough for soils that have a moderately well developed profile, as the Fox and Miami soils, to have formed.

The moraines in this county probably represent different ages within the Wisconsin period of glaciation. No apparent differences between the solum of the Miami soils and the solum of other members of the same drainage sequence are apparent, however, irrespective of the relationship of the soils to the moraines.

The soils in a limited acreage are considered to be relatively young because they show only slight horizon differentiation and development of a soil profile. Among these soils are the Carlisle, formed in deposits of organic material, and the Genesee soils, formed in alluvium.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*3*) and later revised (*15*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965 (*18*). The current system is under continual study. Therefore, readers interested in the development of the system should search the latest literature available (*13*).

The current system of classification has six categories. Beginning with the most inclusive, these categories are the order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar origin are grouped together. The placement of some soil series in the current system of classification, especially in families, may change as more precise information becomes available.

Table 10 shows the classification of each soil series of Champaign County by family, subgroup, and order, according to the current system. It also shows one category —the great soil group—of the 1938 system. The classes in the current system are briefly defined in the following paragraphs.

ORDER.—Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate these soil orders are those that tend to give broad climatic groupings of soils. Three exceptions, the Entisols, Inceptisols, and Histosols, occur in many different kinds of climate. The five orders represented in Champaign County are Alfisols, Mollisols, Inceptisols, Entisols, and Histosols. Alfisols are the most extensive in this county, and Mollisols are the second most extensive.

Alfisols have a light-colored surface layer, a clay-enriched B horizon, and a base saturation of more than 35 percent.

Mollisols have a thick, dark-colored surface layer and a base saturation of more than 50 percent.

Inceptisols lack well-defined horizons. They have a slight accumulation of organic matter in the surface layer, and weak subangular blocky structure in the B2 horizon. The Inceptisols in Champaign County have formed in fairly recent alluvium.

Entisols are light-colored, young soils in which little or no development of horizons has taken place. The Entisols in this county have formed in fairly recent alluvial material.

Histosols are poorly drained, highly organic soils. In this county they have formed in depressions under swamp or marsh vegetation. This order has not been fully defined.

SUBORDER.—Each order is subdivided into groups (suborders), primarily on the basis of soil characteristics that produce classes having genetic similarity. A suborder has a narrower climatic range than an order. The criteria used to separate suborders reflect either the presence or the absence of waterlogging, or soil differences resulting from the effects of climate or vegetation.

GREAT GROUP.—Each suborder is separated into great groups on the basis of uniformity in the kind and sequence of genetic horizons. The great group is not shown separately in table 10, because it is the last word in the name of the subgroup.

SUBGROUP.—Great groups are divided into subgroups, one representing the central (typic) concept of the group, and others, called intergrades, made up of soils that mostly have properties of one great group but that also have one or more properties of another great group.

FAMILY.—Families are established within each subgroup, primarily on the basis of properties important to the growth of plants. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, consistence, and thickness of horizons.

SERIES.—The series has the narrowest range of characteristics of the categories in the classification system. It is defined in the section "How This Survey Was Made." A detailed description of each soil series in the county is given in the section "Descriptions of the Soils."

Laboratory Data

Representative profiles taken from soils of eight series in Champaign County (table 11) were analyzed in the laboratory of the Ohio Agricultural Research and Development Center (OARDC). Detailed descriptions of these soil profiles, identified by sample number, are given in the section "Descriptions of the Soils."

In addition to the data given in table 11, the results of physical analyses made by OARDC are available for the soils in the following series: Brookston, Casco, Celina, Crosby, Fox, Henshaw, Homer, Ionia, Kane, Lippincott, Miami, Ockley, Patton, Warsaw, and Wea. These data are on file at the Soils Department, Ohio State University; Ohio Department of Natural Resources, the Division of Lands and Soil; and the State Office of the Soil Conservation Service, Columbus, Ohio.

In making physical analysis, particle-size distribution was determined both by sieve analysis and by the pipette method outlined by Steele and Bradfield (*14*). This method was modified by substituting sodium hexametaphosphate for sodium oxalate as the dispersing agent. The amounts of fine silt, coarse clay, and fine clay were determined by sedimentation; the amount of fine clay was determined by sedimentation in a centrifuge.

The percentage of organic matter was determined by using a modification of the Walkley-Black wet combus-

TABLE 10.—*Classification of soil series into higher categories*

Series	Current classification			Great soil group of the 1938 classification
	Family	Subgroup	Order	
Algiers	Fine-loamy, mixed, nonacid, mesic.	Aquic Udifluvents	Entisols	Alluvial soils.
Brookston [1]	Fine-loamy, mixed, noncalcareous, mesic.	Typic Argiaquolls	Mollisols	Humic Gley soils.
Carlisle	Euic, mesic	Typic Medisaprists	Histosols	Organic soils.
Casco	Fine-loamy over sandy or sandy-skeletal, mixed, mesic.	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Celina	Fine, mixed, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Crosby	Fine, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Edwards	Marly, euic, mesic	Limnic Medisaprists	Histosols	Organic soils.
Eel	Fine-loamy, mixed, mesic	Aquic Fluventic Eutrochrepts.	Inceptisols	Alluvial soils.
Fox	Fine-loamy over sandy or sandy-skeletal, mixed, mesic.	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Genesee	Fine-loamy, mixed, mesic	Fluventic Eutrochrepts	Inceptisols	Alluvial soils.
Henshaw [2]	Fine-silty, mixed, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Homer [3]	Fine-loamy over sandy or sandy-skeletal, mixed, mesic.	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Ionia [4]	Fine-loamy over sandy or sandy-skeletal, mixed, mesic.	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Kane	Fine-loamy, mixed, mesic over sandy or sandy-skeletal.	Aquic Argiudolls	Mollisols	Brunizems intergrading toward Humic Gley soils.
Kendallville	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Lewisburg	Fine, illitic, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Linwood	Loamy, euic, mesic	Terric Medisaprists	Histosols	Organic soils.
Lippincott	Clayey over sandy or sandy-skeletal, mixed, noncalcareous, mesic.	Typic Argiaquolls	Mollisols	Humic Gley soils.
Miami [5]	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Ockley	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Patton	Fine-silty, mixed, noncalcareous, mesic.	Typic Haplaquolls	Mollisols	Humic Gley soils.
Rodman	Sandy-skeletal, mixed, mesic	Typic Hapludolls	Mollisols	Rendzina soils.
Ross	Fine-loamy, mixed, mesic	Cumulic Hapludolls	Mollisols	Alluvial soils.
Shoals	Fine-loamy, mixed, nonacid, mesic.	Aeric Fluventic Haplaquepts.	Inceptisols	Alluvial soils.
Sloan [6]	Fine-loamy, mixed, mesic	Fluventic Haplaquolls	Mollisols	Humic Gley soils.
Uniontown	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Wallkill	Fine-loamy, mixed, mesic	Thapto Histic Haplaquepts.	Inceptisols	Alluvial soils over Organic soils.
Warners	Fine-silty, mixed, calcareous, mesic.	Typic Haplaquolls	Mollisols	Humic Gley soils intergrading toward Organic soils.
Warsaw	Fine-loamy over sandy or sandy-skeletal, mixed, mesic.	Typic Argiudolls	Mollisols	Brunizems.
Wea	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols	Brunizems.

[1] The Brookston soils in this county are dominantly in a fine family.
[2] The Henshaw sols in this county are transitional to Aeric Ochraqualfs because they have grayish films in the Bt horizons.
[3] The Homer soils in this county have a higher clay content in the subsoil than is typical for the series.
[4] The Ionia soils in this county have mottles with a chroma of 2, and this indicates a wetter condition than is typical for the series.
[5] The soils correlated with the Miami series in this county have more clay in the subsoil than permitted by the present definition. For these soils having a higher content of clay, a new series, the Miamian series, was recognized after the correlation for Champaign County had been completed. The Miami series, as presently defined, is classified in a fine-loamy, mixed, mesic family, whereas the Miamian series is classified in a fine, mixed, mesic family.
[6] The Sloan series, gravelly subsoil variant, is in a fine-loamy over sandy or sandy-skeletal family.

tion method (*10*). The calcium carbonate equivalent was determined by measuring the volume of carbon dioxide emitted from soil samples treated with hydrochloric acid (*11*).

Exchangeable calcium, magnesium, and potassium were determined by using a neutral solution of ammonium acetate to extract these bases from the soil sample. The exchangeable calcium and magnesium in this extract were determined by using an EDTA Titration method (*4*). Exchangeable potassium in the ammonium acetate solution was determined by using a flame photometer. Exchangeable acidity was measured as described in USDA Circular 757 (*10*). The soil reaction was determined by a glass electrode, using a mixture of soil and water in a ratio of 1:1.

General Nature of the County

This section provides general information about Champaign County. It discusses water supply, climate, industries, and farming.

Water Supply

Champaign County lies entirely within the glaciated part of the State of Ohio (*8*). Two wide bands of morainal deposits cross the county in a north-south direction. The glacial drift, particularly in the morainic areas, furnishes ample water for most farms and rural homes. Limestone bedrock underlies the glacial drift and yields a fair amount of water in places.

Several buried valleys, relatively deep and filled with gravel, are in the county. These valleys are the best aquifers, and the most important of these is under the flood plain of the Mad River.

The aquifer under the flood plain of the Mad River is filled with sand and gravel to a depth of about 150 feet. Water is constantly replenished by infiltration from the stream, and supplies of water are adequate for all wells drilled in the area. The Mad River, which also flows through Clark County (*9*), has a great irrigation potential for farmers in the area. Nettle Creek, a main tributary of the Mad River, also has a potential supply of water for irrigation.

Springs located on the topographic breaks between outwash terraces and the moraines offer a source of water to some farms in the county. Farm ponds, ranging from one-fourth acre to 12 acres in size, furnish readily available water to livestock. Industries and inhabitants of Urbana obtain water from the city system.

Climate [6]

The climate of Champaign County is similar to that of the State of Ohio as a whole with respect both to temperature and precipitation. This is attributed to the fact that the county is in a median position within the ranges of latitude and elevation that prevail in the State. Elevation by itself makes relatively little difference in temperature, but it does influence the amount of rainfall and snowfall. Although precipitation has never been adequately sampled in Champaign County, it is believed to be slightly greater in the eastern and northern parts than elsewhere in the county. Moisture-bearing winds blow more frequently from a south-southwesterly direction than from any other direction. Where these winds are forced upward in crossing rising terrain, the amount of rainfall increases, and the opposite also is true. Mean temperature is generally higher on slopes that face south and west than on slopes that face north and east.

The temperature and precipitation data shown in table 12 are analyses of the records obtained in the city of Urbana, situated in the valley of the Mad River at an elevation of 1,055 feet. These values are considered to be representative for Champaign County as a whole. The monthly temperatures in this table are those that may be expected to occur in typical years rather than the extremes that have been recorded. In effect, they are a more realistic estimate of expected extremes than the highest and lowest temperatures of the past. Also, the amounts of precipitation shown under "One year in 10 will have—" are monthly totals for the lowest and highest rainfall likely to occur once in 10 years, or a probability of 10 percent.

Table 13 shows the probability of freezing temperatures in Champaign County on or after given dates in fall. The last column to the right is included in the table because light frost can occur when the temperature of the air is several degrees above freezing. In contrast, some kinds of plants are not damaged by frost unless the temperature falls 4 degrees or more below freezing.

On the average there are 101 clear, 114 partly cloudy, and 150 cloudy days per year in this county. Possible sunshine ranges from an average of 36 percent in December to 72 percent in July. Relative humidity, which falls as the temperature rises, generally is near 50 percent on midsummer afternoons. It is highest in winter, when it averages nearly 82 percent early in the morning.

Wind velocity averages 8 to 10 miles per hour throughout the year, but velocities in excess of 40 miles per hour are not uncommon in summer thunderstorms. Wind generally blows from a southerly direction. Tornadoes are not unknown in the county, but they are less frequent and cause less extensive damage than they do in States farther west and south.

The temperature in the top few inches of soil follows rather closely the changes in air temperature. On a given day, the average soil temperature at a depth of 2 to 4 inches can be estimated by averaging the highest and lowest air temperatures. Early in spring the surface layer of soil warms up nearly as fast as does the "weather" itself. In general the surface layer is warmest in valley bottoms and coolest on hilltops, but local exposure to sunshine and wind is the factor that influences soil temperature.

Soil moisture varies widely during the year. The recharge season is normally winter, and nearly all the soils are saturated with water by April 1. If rainfall is normal in spring, soil moisture in cropped fields is ample until the end of June. The chances are about 2 out of 5 that at least 1 inch of rain will fall each week in May and June. This amount of rainfall comes close to meeting the needs of growing crops, even meadow and small grains. In summer, crops use much more water than they do in spring, and all but 10 to 20 percent of the moisture available in the soil is exhausted by the end of August. An exceptionally large amount of rainfall is needed in summer for the supply of available moisture to be kept above 50 percent of field capacity.

Farming

According to the United States Census of Agriculture, Champaign County contained 1,286 farms, totaling 245,110 acres, in 1964. The average size of farm was 190.6 acres.

Dairy products, chiefly milk, accounted for about 25 percent of the value of all farm products sold in 1964. Livestock, mainly hogs, accounted for about 38 percent of the total value. The principal kinds and members of livestock on farms in 1964 were cattle and calves, 40,642; milk cows, 12,108; hogs and pigs, 42,283; sheep and lambs, 15,474; and chickens 4 months old and over, 94,622.

Field crops accounted for about 37 percent of the value of all farm products sold in 1964. Acreages of the main crops harvested in that year were corn, 65,241; wheat, 20,272; oats, 10,478; soybeans, 24,785; rye, 337; alfalfa and alfalfa mixtures cut for hay, 19,639; clover and mixtures of clover and timothy and of clover and grain cut for hay, 6,899; and Irish potatoes, 224.

[6] By L. T. PIERCE, State climatologist, U.S. Weather Bureau.

TABLE 11.—*Laboratory analyses*

[Analyses made by Ohio Agricultural Research and Development

Soil and sample number	Horizon	Depth from surface	Particle-size distribution			
			Very coarse sand (2 to 1 mm.)	Coarse sand (1 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)
		Inches	*Percent*	*Percent*	*Percent*	*Percent*
Brookston silty clay loam, CH-50.	Ap	0–9	1. 5	1. 5	1. 7	4. 5
	B21t	9–12	. 7	1. 5	1. 6	4. 0
	B22tg	12–19	. 8	1. 7	1. 6	3. 7
	B23tg	19–24	. 8	1. 6	1. 4	3. 5
	B23tg	24–30	. 7	1. 7	1. 4	3. 4
	B24g	30–39	. 9	2. 0	1. 9	4. 5
	C1	39–45	3. 3	4. 5	3. 6	9. 0
	C2	45–60	1. 3	2. 5	2. 1	5. 5
	C3	60–65	6. 6	8. 1	5. 1	10. 5
Celina silt loam, CH-27.	A1	0–3	3. 4	2. 3	3. 1	5. 8
	A2	3–8	. 5	2. 0	3. 2	5. 8
	B1	8–13	. 5	1. 8	2. 5	5. 4
	B21t	13–18	1. 2	2. 4	3. 1	5. 5
	B22t	18–23	1. 8	2. 4	2. 8	5. 4
	B23t	23–26	1. 4	2. 8	2. 6	5. 9
	B3t	26–30	1. 1	2. 3	2. 5	5. 5
	C1	30–40	5. 4	7. 2	5. 6	8. 7
	C2	40–60	5. 1	7. 1	5. 1	9. 6
Crosby silt loam, CH-40	A1	0–4	3. 0	2. 9	2. 4	5. 1
	A2	4–9	. 8	2. 8	2. 5	5. 1
	B1	9–13	. 6	2. 3	2. 3	5. 0
	B21t	13–16	1. 5	2. 0	2. 2	5. 2
	B22t	16–24	. 9	2. 2	2. 4	6. 2
	C1	24–35	3. 8	6. 6	4. 6	10. 2
	C2	35–60	4. 6	6. 7	4. 8	9. 9
Fox silt loam, CH-13.	Ap	0–9	. 6	1. 1	1. 6	3. 7
	B1	9–17	. 4	1. 3	1. 9	4. 8
	B21t	17–21	1. 1	2. 2	2. 8	6. 2
	IIB22t	21–26	4. 0	6. 0	5. 6	7. 4
	IIB23t	26–30	7. 2	9. 1	7. 2	5. 2
	IIB3t	30–36	9. 5	8. 8	4. 5	5. 5
	IIC	36–50	36. 4	23. 7	13. 9	5. 9
Kane silt loam, CH-39.	Ap	0–10	1. 3	1. 0	1. 0	2. 6
	A1	10–13	. 9	1. 2	1. 1	2. 9
	B1	13–17	. 6	1. 7	1. 4	3. 3
	B21t	17–22	. 7	1. 7	1. 8	5. 0
	B22t	22–27	3. 3	7. 0	4. 3	7. 7
	IIB3	27–36	1. 8	4. 1	1. 7	4. 5
	IIIC	36–40	31. 9	30. 7	4. 7	4. 5
Lippincott silty clay loam, CH-36.	Ap	0–7	2. 9	3. 9	3. 8	6. 0
	A3	7–12	1. 8	5. 0	3. 8	4. 7
	B21tg	12–16	2. 0	4. 8	3. 7	4. 3
	B22tg	16–27	2. 7	7. 3	4. 5	5. 0
	IIB3t	27–36	5. 0	7. 6	5. 2	6. 4
	IIC1	36–50	20. 7	26. 1	9. 5	10. 2
	IIC2	50+	34. 2	40. 2	10. 6	4. 7

of representative soils

Center. Dashes indicate that no determination was made]

Particle-size distribution—Continued					Reaction (1:1)	Organic matter	$CaCO_3$ equivalent	Exchangeable cations (milliequivalents per 100 grams of soil)						Base saturation
Very fine sand (0.10 to 0.05 mm.)	Total sand (2 to 0.05 mm.)	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)	Fine clay (less than 0.0002 mm.)				H	Ca	Mg	K	Sum of exchangeable cations	Total bases	
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*pH*	*Percent*	*Percent*							*Percent*
5.2	14.4	51.9	33.7	9.0	5.9	5.2	-----	11.8	19.3	5.4	0.3	36.8	25.0	68
5.0	12.8	48.0	39.2	17.8	6.4	1.9	-----	7.3	20.0	7.9	.3	35.5	28.2	79
4.3	12.1	49.0	38.9	18.2	6.6	1.4	-----	6.3	18.3	7.5	.3	32.4	26.1	81
4.2	11.5	52.2	36.3	17.2	7.1	.7	-----	4.6	16.4	7.8	.4	29.2	24.6	84
4.5	11.7	54.1	34.2	16.6	7.3	-----	-----	2.0	14.9	7.4	.3	24.6	22.6	92
5.5	14.8	53.4	31.8	14.0	7.5	-----	2.8	-----	-----	-----	-----	-----	-----	-----
10.4	30.8	51.2	18.0	6.7	7.8	-----	34.0	-----	-----	-----	-----	-----	-----	-----
8.9	20.3	54.9	24.8	8.6	7.9	-----	25.7	-----	-----	-----	-----	-----	-----	-----
11.1	41.4	44.0	14.6	4.8	8.0	-----	38.8	-----	-----	-----	-----	-----	-----	-----
6.1	20.7	70.1	9.2	1.7	5.3	-----	-----	10.0	5.3	1.8	.4	17.5	7.5	43
5.6	17.1	65.6	17.3	2.2	5.1	-----	-----	6.5	2.1	.9	.2	9.7	3.2	33
5.0	16.1	59.2	24.7	6.9	4.9	-----	-----	9.3	2.7	1.7	.2	13.9	4.6	33
5.5	17.7	47.9	34.4	13.2	4.9	-----	-----	12.1	4.9	3.9	.2	21.1	9.0	43
6.5	18.9	34.8	46.3	22.0	5.3	-----	-----	10.4	8.8	6.6	.3	26.1	15.7	60
6.3	19.0	31.7	49.3	21.7	7.1	-----	-----	5.0	12.3	9.0	.3	26.6	21.6	81
12.3	23.7	41.4	34.9	13.4	7.7	-----	17.5	-----	-----	-----	-----	-----	-----	-----
11.9	38.8	40.7	20.5	6.1	8.0	-----	41.6	-----	-----	-----	-----	-----	-----	-----
13.7	40.6	39.2	20.2	6.5	8.0	-----	43.2	-----	-----	-----	-----	-----	-----	-----
5.9	19.3	71.0	9.7	1.6	6.2	3.5	-----	4.9	5.6	2.3	0.2	13.0	8.1	62
5.3	16.5	65.1	18.4	4.5	4.9	.7	-----	5.9	2.2	1.4	.1	9.6	3.7	39
4.9	15.1	57.5	27.4	9.3	4.9	.6	-----	7.7	4.4	3.2	.2	15.5	7.8	50
5.3	16.2	39.5	44.3	20.9	4.7	-----	-----	10.2	8.6	6.0	.3	25.1	14.9	59
5.9	17.6	28.6	53.6	29.3	6.2	-----	-----	6.2	14.9	8.9	.3	30.3	24.1	80
9.6	34.8	43.0	22.2	8.4	7.8	-----	41.9	-----	-----	-----	-----	-----	-----	-----
9.4	35.4	44.0	20.6	7.4	7.8	-----	46.1	-----	-----	-----	-----	-----	-----	-----
4.6	11.6	72.9	15.5	3.0	6.9	1.8	-----	4.9	5.8	3.3	.2	14.2	9.3	65
5.3	13.7	61.6	24.7	9.8	5.1	.6	-----	7.9	5.0	2.6	.3	15.8	7.9	50
6.0	18.3	43.2	38.5	23.2	5.0	.4	-----	10.0	8.8	5.6	.5	24.9	14.9	60
5.0	28.0	26.0	46.0	30.4	5.1	-----	-----	12.8	10.6	7.5	.6	31.5	18.7	59
3.8	32.5	18.8	48.7	31.8	6.1	-----	-----	9.7	13.5	9.9	.6	33.7	24.0	71
7.8	36.1	44.9	19.0	8.0	7.8	-----	46.3	-----	-----	-----	-----	-----	-----	-----
2.3	82.2	13.8	4.0	1.5	8.1	-----	63.2	-----	-----	-----	-----	-----	-----	-----
4.4	10.3	69.7	20.0	3.8	6.0	5.0	-----	8.9	12.4	4.1	.5	25.9	17.0	66
4.7	10.8	72.0	17.2	5.2	6.2	3.9	-----	6.8	11.4	4.2	.3	22.7	15.9	70
5.9	12.9	62.0	25.1	10.1	5.9	1.4	-----	7.0	7.3	4.2	.2	18.7	11.7	63
7.5	16.7	54.4	28.9	14.6	5.7	-----	-----	6.6	8.3	4.9	.3	20.1	13.5	67
7.3	29.6	29.3	41.1	22.2	6.1	-----	-----	5.2	13.1	7.0	.3	25.0	20.4	80
12.4	24.5	60.3	15.2	8.0	7.6	-----	48.1	-----	-----	-----	-----	-----	-----	-----
4.7	76.5	18.0	5.5	2.1	7.7	-----	61.4	-----	-----	-----	-----	-----	-----	-----
4.5	21.1	46.7	32.2	9.0	6.6	8.4	-----	8.8	27.2	8.4	0.3	44.7	35.9	80
3.6	18.9	41.8	39.3	16.6	7.0	3.5	-----	4.8	20.7	7.8	.2	33.5	28.7	86
3.3	18.1	41.3	40.6	19.3	7.3	1.2	.9	3.2	15.2	6.6	.2	25.2	22.0	87
1.3	20.8	42.8	36.4	19.0	7.3	-----	.9	1.9	13.4	6.3	.2	21.8	19.9	91
10.0	34.2	52.1	13.7	6.4	7.5	-----	47.9	-----	-----	-----	-----	-----	-----	-----
6.6	73.1	21.1	5.8	1.8	7.3	-----	45.2	-----	-----	-----	-----	-----	-----	-----
1.6	91.3	6.1	2.6	1.2	7.9	-----	53.2	-----	-----	-----	-----	-----	-----	-----

TABLE 11.—*Laboratory analyses of*

Soil and sample number	Horizon	Depth from surface	Particle-size distribution: Very coarse sand (2 to 1 mm.)	Coarse sand (1 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)
		Inches	*Percent*	*Percent*	*Percent*	*Percent*
Miami silt loam, CH-47.	Ap	0-7	1. 8	2. 9	3. 2	7. 9
	B1	7-12	1. 0	2. 9	3. 0	7. 4
	B21t	12-19	2. 0	3. 7	3. 5	8. 9
	B22t	19-25	2. 8	4. 6	4. 1	9. 6
	C1	25-42	4. 8	7. 8	6. 0	12. 7
	C2	42-60	5. 6	7. 2	5. 4	12. 7
Warsaw silt loam, CH-34.	Ap	0-7	1. 4	1. 8	2. 0	3. 1
	A1	7-13	. 6	2. 1	1. 8	2. 4
	B1	13-19	. 8	2. 0	2. 0	3. 1
	B21t	19-25	2. 2	4. 0	3. 6	5. 6
	IIB22t	25-30	9. 0	12. 6	9. 0	11. 6
	IIB23t	30-36	15. 5	22. 8	9. 4	5. 5
	IIB24	36-39	4. 6	20. 8	20. 3	14. 3
	IIC	39-50	25. 4	47. 1	17. 2	5. 2

TABLE 12.—*Temperature and precipitation for Champaign County*

[Based on records obtained in city of Urbana]

Month	Temperature					Precipitation				
	Average daily maximum [1]	Average daily minimum [1]	Average [1]	2 years in 10 will have at least 4 days with[2]— Maximum temperature equal to or higher than—	2 years in 10 will have at least 4 days with[2]— Minimum temperature equal to or lower than—	Average monthly total [2]	1 year in 10 will have[3]— Less than—	1 year in 10 will have[3]— More than—	Average number of days with snow on ground [3]	Average depth of snow on days with snow on ground [3]
	° F.	*° F.*	*° F.*	*° F.*	*° F.*	*Inches*	*Inches*	*Inches*		*Inches*
January	39	21	30	55	0	3. 20	1. 20	5. 75	17	1. 0
February	40	22	31	56	5	2. 36	. 99	3. 97	12	. 9
March	49	29	39	68	13	3. 20	1. 27	5. 71	8	. 7
April	61	39	50	78	26	3. 61	1. 69	5. 42	1	. 1
May	73	49	61	85	35	3. 89	1. 77	6. 02	0	0
June	82	59	70	91	46	4. 16	1. 04	6. 33	0	0
July	86	63	74	93	50	3. 69	1. 96	6. 53	0	0
August	83	61	72	92	48	3. 40	1. 23	5. 48	0	0
September	76	54	65	89	38	2. 89	1. 03	5. 15	0	0
October	65	43	54	81	28	2. 43	. 77	4. 03	0	0
November	50	32	41	67	17	2. 55	1. 20	4. 51	3	. 8
December	39	24	31	57	1	2. 36	1. 24	4. 09	16	1. 5
Year	62	42	52			37. 74	31. 87	46. 04	57	

[1] Period of record: 1931-60.
[2] Period of record: 1943-60.
[3] Period of record: 1852-1962.

representative soils—Continued

Particle-size distribution—Continued					Reaction (1:1)	Organic matter	$CaCO_3$ equivalent	Exchangeable cations (milliequivalents per 100 grams of soil)						Base saturation
Very fine sand (0.10 to 0.05 mm.)	Total sand (2 to 0.05 mm.)	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)	Fine clay (less than 0.0002 mm.)				H	Ca	Mg	K	Sum of exchangeable cations	Total bases	
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*pH*	*Percent*	*Percent*							*Percent*
6.7	22.5	59.3	18.2	3.0	5.8	2.2	---	9.5	4.8	1.7	0.4	16.4	6.9	42
6.1	20.4	49.8	29.8	9.4	5.8	.7	---	8.2	5.9	2.5	.3	16.9	8.7	51
6.8	24.9	33.8	41.3	18.4	5.1	.6	---	11.2	7.2	4.0	.4	22.8	11.6	51
7.5	28.6	32.0	40.0	18.3	6.2	---	---	7.9	8.8	6.3	.3	23.3	15.4	66
10.6	41.9	40.9	17.2	5.1	8.0	---	37.2	---	---	---	---	---	---	---
10.6	41.5	41.2	17.3	5.1	8.0	---	38.0	---	---	---	---	---	---	---
3.6	11.9	67.7	20.4	4.6	6.2	3.9	---	8.2	10.0	2.5	.4	21.1	12.9	61
3.0	9.9	65.9	24.2	7.1	5.1	2.3	---	11.2	6.3	2.1	.3	19.9	8.7	44
3.4	11.3	61.1	27.6	9.4	5.0	1.5	---	10.4	7.2	2.5	.3	20.4	10.0	49
4.6	20.0	46.8	33.2	14.8	5.0	1.1	---	9.7	8.6	3.7	.3	22.3	12.6	57
5.1	47.3	21.5	31.2	18.2	5.0	1.2	---	10.4	7.6	3.8	.3	22.1	11.7	53
2.5	55.7	10.7	33.6	21.1	5.0	1.2	---	10.8	7.4	4.4	.4	23.0	12.2	53
2.5	62.5	7.4	30.1	18.9	6.0	1.1	---	5.2	8.8	5.3	.3	19.6	14.4	73
1.5	96.4	1.9	1.7	1.0	8.1	---	47.5	---	---	---	---	---	---	---

TABLE 13.—*Probabilities of last freezing temperatures in spring and first in fall for Champaign County*

Probability	Dates for given probability and temperature					
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower	36° F. or lower
Spring:						
1 year in 10 later than	March 26	April 6	April 19	May 5	May 19	May 31
2 years in 10 later than	March 20	March 31	April 13	April 30	May 13	May 25
5 years in 10 later than	March 10	March 21	April 2	April 18	May 2	May 15
Fall:						
1 year in 10 earlier than	November 16	November 4	October 24	October 10	September 27	September 15
2 years in 10 earlier than	November 21	November 9	October 29	October 15	October 2	September 20
5 years in 10 earlier than	November 30	November 18	November 7	October 24	October 11	September 29

Industries

Most of the industrial activity in the county is around and in the city of Urbana. A number of highly diversified industries manufacture aircraft lighting equipment, plastic products, paper and pulpboard, tool and die equipment, electrical control and distribution equipment, chemicals, and concrete products for local, national, and international markets.

Large deposits of sand and gravel represent the most important mineral resources in the county known at the present time. The most extensive and well-sorted deposits underlie soils of the Fox-Lippincott association. (See General Soil Map.) Other less extensive deposits of sand and gravel underlie soils of the Miami-Fox-Casco association. One large processor operates several sand and gravel pits in the county.

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Glossary

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available moisture capacity. The difference between the amount of water in a soil at field capacity and the amount in the same soil at the permanent wilting point of plants. Commonly expressed as inches of water per inch depth of soil.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, magnesium, sodium, potassium, and hydrogen.

Cation-exchange capacity. A measure of the total amount of exchangeable cations that can be held by the soil. It is expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7) or at some other stated pH value. The term as applied to soils is synonymous with base exchange capacity but is more precise in its meaning.

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.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A mapping unit consisting of different kinds of soils that occur in such small individual areas or in such an intricate pattern that they cannot be shown separately on a publishable soil map.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; will not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Drainage, soil. The relative rapidity and extent of removal of water, under natural conditions, from on and within the soil.

Eluviation. The movement of material from one place to another within the soil, either in true solution or colloidal suspension. Soil horizons that have lost material through eluviation are said to be eluvial; those that have received material are illuvial.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has been allowed to drain away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. Nearly level land, consisting of stream sediment, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle, subsurface horizon that is very low in content of organic matter and clay but is rich in silt or very fine sand. The layer is seemingly cemented when dry, has a hard or very hard consistence, and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur 15 to 40 inches below the surface.

Glacial drift. Rock material transported by glacial ice and then deposited; also includes the assorted and unassorted material deposited by streams flowing from glaciers.

Glacial outwash. Crossbedded gravel, sand, and silt deposited by melt water as it flowed from glacial ice.

Glacial till. Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gravelly soil. From 15 to 50 percent of material, by volume, consists of rounded or angular fragments of rock that are not prominently flattened and are up to 3 inches in diameter.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons.

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residue.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active, and it is therefore marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused by accumulation of clay, sesquioxides, humus, or some combination of these; prismatic or blocky structure; redder or stronger colors; or some combination of these craracteristics. The combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. This layer, commonly called the soil parent material, is presumed to be like that from which the overlying horizons were formed in most soils.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Roman numerals are prefixed to the master horizon or layer designations (O, A, B, C, R) to indicate lithologic discontinuities either within or below the solum. The first, or uppermost, material is not numbered, for the Roman numeral I is understood; the second, or contrasting, material is numbered II; and others are numbered III, IV, and so on, consecutively downward. Thus for example, a sequence from the surface downward might be A2, B1, IIB2, IIB3, IIC1, IIC2.

Following are the symbols used in this soil survey with those letters that designate the master horizons:

g—strong gleying.
p—plow layer.
t—illuvial clay.

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. Since part of the fine clay in the B horizon (or subsoil) of many soils has moved into the B horizon from the A horizon above, the B horizon is called an illuvial horizon.

Inclusion. A kind of soil that has been included in mapping a soil of a different kind because the area was too small to be mapped separately on a map of the scale used.

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.

Kame. An irregular, short ridge, or hill, of stratified glacial drift

Lacustrine. Material deposited in lake water and exposed by lowering of the water level or elevation of the land.

Leaching, soil. The removal of material in solution by percolating water.

Mapping unit. Any soil, miscellaneous land type, soil complex, or undifferentiated soil group shown on the detailed soil map and identified by a letter symbol.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Muck. An organic soil consisting of fairly well decomposed organic material that is relatively high in mineral content, finely divided, and dark in color.

Outwash, glacial. Crossbedded gravel, sand, and silt deposited by melt water as it flowed from the ice.

Parent material. The horizon of weathered rock or partly weathered soil material from which soil has formed; horizon C in the soil profile.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeabiilty are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

pH. See Reaction, soil.

Phase, soil. A subdivision of a soil type, series, or other unit in the soil classification system made because of differences in the soil that affect its management but do not affect its classification in the natural landscape. A soil type, for example, may be divided into phases because of differences in slope, stoniness, thickness, or some other characteristic that affects management.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soils includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stony. Used to describe soils that contain stones in numbers that interfere with or prevent tillage.

Stratified. Composed of, or arranged in, strata, or layers, such as stratified alluvium. The term is confined to geological material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer lying beneath the solum, or true soil; the C or D horizon.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. (See also Clay, Sand, and Silt.) The basic textural classes, in order of increasing proportions of fine particles, are as follows: Sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, 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."

Till (or glacial till). An unstratified deposit of earth, sand, gravel, and boulders transported by glaciers.

Till plain. A level or undulating land surface that was formed when glaciers deposited their till.

Topsoil. A presumed fertile soil or soil material, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Type, soil. A subdivision of the soil series that is made on the basis of differences in the texture of the surface layer.

Upland (geology). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

Variant, soil. A soil whose properties are believed sufficiently different from other known soils to justify a new series name but whose geographic area is so limited that creation of a new series is not believed to be justified.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering, soil. All physical and chemical changes produced in rocks at or near the earth's surface by atmospheric agents. These changes result in more or less complete disintegration and decomposition of the rock.