SOIL SURVEY

Fayette 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
Issued December 1973

Major fieldwork for this soil survey was done in the period 1954–1962. Soil names and descriptions were approved in 1969. Unless otherwise indicated, statements in this publication refer to conditions in the county in 1965. This survey was made cooperatively by the Soil Conservation Service, the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center. It is part of the technical assistance furnished to the Fayette Soil and Water 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, and other structures; and in judging the suitability of tracts of land for agriculture, industry, and recreation.

Locating Soils

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

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. 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. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page where the capability unit is described.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. 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 groups of soils.

Foresters and others can refer to the section "Woodland," where soil suitability for trees is discussed.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Soils and Wildlife Habitat."

Community planners and others can read about soil properties that affect the choice of sites for town and country uses, including recreation areas, in the section "Town and Country Planning."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

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

Newcomers in Fayette 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 information about the county given in the section "General Nature of the County."

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SOIL SURVEY OF FAYETTE COUNTY, OHIO

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

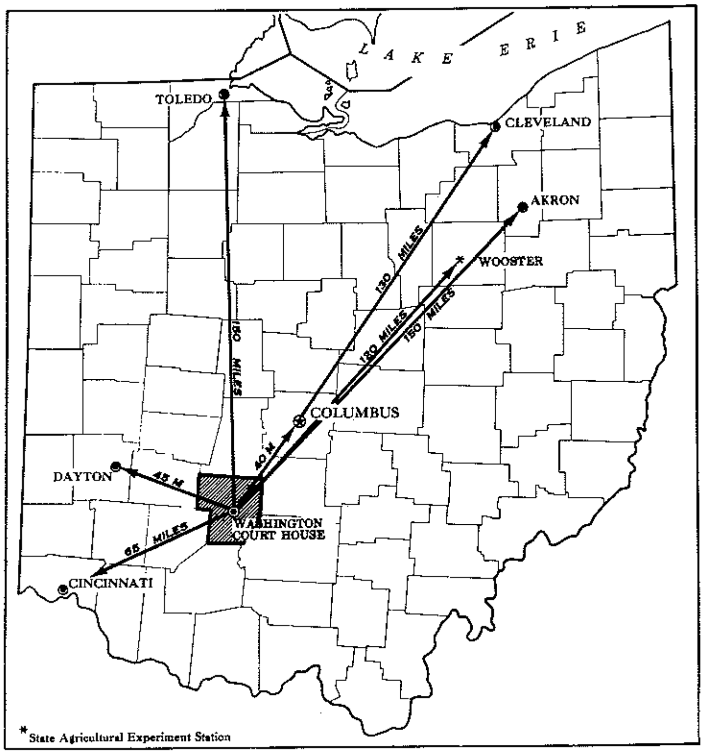

Figure 1.—**Location of Fayette County in Ohio.**

FAYETTE COUNTY is in the southwestern part of Ohio (fig. 1). It occupies about 406 square miles, or 259,840 acres. The county lies entirely in the Indiana and Ohio till plain of the Central Lowlands. It is within the old Virginia Military District in Ohio in which the original land surveys were made by metes and bounds rather than by townships and sections.

The population of the county in 1960 was 24,775. About half of this population lives in Washington Court House, the county seat and also the largest city of Fayette County.

Fayette County was entirely glaciated during the Wisconsin age. The major soils in the county formed in loamy calcareous glacial till. A favorable combination of climate and productive soils resulted in the development of intensive farming, which is the dominant industry in the county. Corn and soybeans are the major crops, and swine is the dominant livestock.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Fayette County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the 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 the action of plant roots (*7*).[2]

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. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that 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. Kendallville and Miamian, 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 use and behavior.

[1] E. CECIL FLESHER, WILLIAM SHUMATE, and WILLIAM H. BRUG assisted in the fieldwork.

[2] Italic numbers in parentheses refer to Literature Cited, page 80.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, degree of erosion, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Westland silty clay loam, overwash, is one of two phases within the Westland series.

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 soil boundaries accurately. The soil map in the back of this publication 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 the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. 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 phase.

Some mapping units are made up of soils of different series, or of different phases within one series. One such kind of mapping unit is shown on the soil map of Fayette County, the undifferentiated group.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Ritchey and Romeo silt loams, 2 to 12 percent slopes, is an example.

In most areas surveyed there are places where the soil material is so rocky, so disturbed, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Quarries is a land type in Fayette County.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. 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 as to be readily useful to different groups of users, among them farmers, managers of woodland and wildlife, land use planners, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then 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 at the back of this survey shows, in color, the soil associations in Fayette County. A soil association is a landscape that has a distinctive pattern of soils. It normally consists of one or more major soils and at least one other 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 land use. Such a map is a useful general guide in planning for overall land use such as managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management. The general soil map does not show locations of individual soils in the associations.

The four soil associations in Fayette County are discussed in the following pages.

1. Miamian-Celina association

Well drained and moderately well drained, gently sloping to steep soils that have a moderately fine textured or fine textured subsoil; formed in glacial till

This association consists mainly of gently sloping to steep soils on glacial moraines and in areas dissected by streams. It makes up about 10 percent of the county. About 60 percent of this is Miamian soils, 30 percent is Celina soils, and the remaining 10 percent is other soils.

The Miamian soils are steep, well drained, and light colored. They formed in calcareous glacial till of loam texture.

The Celina soils are gently sloping, light colored, and moderately well drained. They also formed in calcareous glacial till of loam texture.

Among the other soils are well-drained Hennepin soils and somewhat poorly drained Crosby soils. Hennepin soils are steep and occur in areas near Miamian soils. Crosby soils are nearly level or gently sloping and are adjacent to or within areas of Celina soils.

The dominant soils in this association have moderately slow permeability, generally low organic-matter content, and medium fertility. Slope, surface runoff, and an erosion hazard are the main soil limitations for cultivated crops. Management to reduce erosion is needed throughout the association.

Much of the association is used for crops, but steeper areas are used mostly for pasture. This association has many good potential building sites, but the dominant soils have limitations for disposing of effluent from septic tanks because of slopes and moderately slow permeability.

2. *Brookston-Crosby-Celina association*

Very poorly drained to moderately well drained, nearly level to gently sloping soils that have a moderately fine textured or fine textured subsoil; formed in glacial till

This association is mostly a nearly level till plain that has low convex and broad undulating rises. It makes up about 79 percent of Fayette County. About 40 percent of this is Brookston soils, 20 percent is Crosby soils, 15 percent is Celina soils, and the remaining 25 percent is other included soils.

The Brookston soils occupy broad areas and are very poorly drained, dark colored, and nearly level to depressional. The lighter colored Crosby soils occur on the rises and are somewhat poorly drained and nearly level to gently sloping. The light-colored, moderately well drained Celina soils occupy the highest part of the rises. The soils of all three series are in a natural drainage sequence in this association. All of them formed in compact loamy glacial till.

Among the other soils in this association are the Miamian, Hennepin, Corwin, Odell, Patton, and Kendallville soils. Miamian soils are along stream breaks, and undifferentiated Miamian and Hennepin soils are on the steeper breaks. In addition, there are small areas of Corwin, Odell, Patton, and Kendallville soils on the till plain.

The extensive Brookston soils are extremely important to farming. They have a seasonal high water table, but most areas are artificially drained by ditches and tile lines. The somewhat poorly drained Crosby soils also have a seasonal high water table and, like the Brookston soils, are mostly drained by ditches and tile. The Celina soils generally do not need artificial drainage. The Celina, Miamian, and Kendallville soils generally have steeper slopes than Brookston and Crosby soils and are more subject to erosion.

Corn and soybeans are the main crops grown in this association. Maintenance of artificial drainage is the major concern in farm management. Locally, flooding is a hazard on some of the lower lying areas of Brookston soils adjacent to streams.

A seasonal high water table and moderately slow permeability are soil limitations for many nonfarm uses in the association. Brookston and Patton soils are the wettest in the association, and they can be readily identified by their dark surface layer and grayish subsoil colors.

3. *Milton-Millsdale association*

Well-drained and very poorly drained, nearly level to sloping soils that have a moderately fine textured or fine textured subsoil and are moderately deep over limestone; formed in glacial till and in material weathered from underlying limestone

This association occupies a small area in the southeastern part of the county where the glacial till is relatively thin over limestone. The soils in this association range from depressional to sloping.

This association makes up less than 0.5 percent of the county. About 40 percent of this is Milton soils, 30 percent is Millsdale soils, and the remaining 30 percent is Randolph, Miamian, Hennepin, Cana, Thackery, Celina, and other soils.

The dominant soils in this association are well-drained Milton soils and darker colored, very poorly drained Millsdale soils. These soils together with somewhat poorly drained Randolph soils make up a natural drainage sequence of soils that formed in 20 to 40 inches of glacial till overlying limestone.

The Milton soils in this association are light colored in contrast to the dark-colored, very poorly drained Millsdale soils. Milton soils generally are in higher areas and have brighter colors in the subsoil. Millsdale soils are nearly level to depressional.

On the Milton soils erosion is a hazard in farmed areas. Millsdale soils have a seasonal high water table and are seasonally wet. They can be drained by tile, but the underlying bedrock interferes with its installation in many places.

Most of this association is used for general farm crops. Also, the potential for obtaining limestone suited to farm use is good. The moderate depth to limestone is a limitation to many nonfarm uses of the dominant soils.

4. *Westland-Fox-Ross association*

Very poorly drained and well-drained, nearly level soils that have a medium-textured to fine-textured subsoil; on flood plains and glacial outwash terraces

This soil association consists of narrow bottom lands and fairly broad, low-lying terraces that are adjacent to the bottom lands along the major streams in the county. The streams in this association have low gradients, particularly in the northern half of the county. Flooding is a hazard to the soils on the bottom lands and on the low-lying terraces.

This association makes up about 10 percent of the county. About 35 percent of this is Westland soils, 15 percent is Fox soils, 10 percent is Ross soils and included areas of Genesee and Medway soils, and the remaining 40 percent is other soils.

The Westland soils are very poorly drained and dark colored. They occur on low terraces that are subject to flooding. The lighter colored Fox soils are well drained. They are on terraces that are high enough generally to escape flooding, though some of their lowest areas may be flooded occasionally. The Ross soils are well drained. These nearly level soils are on the bottom lands along the major streams and are readily flooded.

Occurring with the Fox soils on the terraces above flood level are areas of Warsaw, Wea, Thackery, and Sleeth soils. The very poorly drained, overwashed Patton soils occur in some areas of this association. As their name suggests, these Patton soils are subject to flooding.

The dominant soils in this association are highly productive soils that are important to farming, though their acreage is relatively small. The wet Westland soils can be drained by tile, and they are well suited to summer row crops. The Fox soils dry out and warm up early in spring and are more droughty than the other soils in the association. They are well suited to irrigation and have a good potential for truck crops or specialty crops. The well-drained Ross soils are well suited to summer row crops. If winter grain and alfalfa are grown on the bottom lands, damage by flooding is likely.

Flooding is the dominant hazard or limitation to the use of soils in this association. For many uses, however, the Fox, Warsaw, Wea, and Thackery soils have few limitations.

Use and Management of the Soils

This section discusses the use and management of the soils for farming, woodland, wildlife, engineering, and town and country planning. Also in this section are estimated crop yields for the various soils. The section on wildlife gives information about the suitability of the soils for elements of wildlife habitat and for various kinds of wildlife. The engineering section gives test data for selected soils, as well as estimated engineering properties for most of the soils. It also gives interpretations for selected engineering uses. The section on town and country planning gives estimated degrees of limitation and kinds of limitations of the soils for selected uses.

Management of the Soils for Crops

The soils in Fayette County differ in their suitability for different uses and in their management needs. Some general management needs, however, are common to all or to many soils. The emphasis in this soil survey is on optimum management because this level of management results in the best crop growth currently obtainable. In the following paragraphs, general management practices are discussed.

The effects of *tillage* on soils in Fayette County vary with differences in soil texture, moisture content, organic-matter content, and the kind and amount of tillage. The Cana, Celina, Crosby, Henshaw, Milton, Miamian, and most other light-colored soils are subject to surface crusting. Such soils generally are low in organic-matter content and have a silt loam surface layer that typically has weak or medium structure. These soils form a fairly hard crust after heavy rains. The soils require sufficient tillage for soil aeration and the establishment of plants. Excessive tillage should be avoided because it tends to break down soil structure. Regardless of whether chemical or mechanical weed control is used, shallow cultivation generally is necessary to help control crusting on these light-colored soils. The Brookston, Millsdale, Patton, Wea, Westland, and other dark-colored soils are less subject to damaging crusting than the light-colored soils because the dark-colored soils contain more organic matter and clay in the plow layer. Except for controlling weeds, dark-colored soils require less tillage for good crop growth than many farmers use.

For soils that have an appreciable clay content in the plow layer, tillage is best at optimum moisture content. The proper timing of tillage is difficult in wet spring periods on soils such as Brookston silty clay loam, Millsdale silty clay loam, Kendallville clay loam, Westland silty clay loam, Patton silty clay loam, and Miamian clay loam. If these soils are tilled while they are too wet, compaction is excessive. If the soils are plowed when they are too dry, they are likely to be hard and cloddy.

The *maintenance of adequate fertility* depends on the kind of crop to be grown, the present fertility of the soil, and the crop growth expected. Testing by a competent laboratory is the most reliable method to determine the present fertility of a soil. The following summary of major plant nutrients in the soils in Fayette County was made from July 1956 to July 1959. This summary was made from the results of tests on samples at the Ohio Cooperative Extension Service Soil Testing Laboratory, Columbus, Ohio.

Lime is needed for most crops grown on most of the light-colored soils in the county because the soils are naturally acid to a depth of 2 feet. The dark-colored, poorly drained soils typically are slightly acid to neutral and generally require little or no lime. Lime requirements summarized for the county as a whole indicate a need of about 2 tons per acre. In Fayette County many of the soils have relatively small lime needs. An exception is the Cana soils, which are strongly acid to extremely acid unless limed.

About 85 percent of the samples tested were either medium or low in phosphorus content. This indicates that crops on many of the soils respond to added phosphorus.

About 52 percent of the samples tested were high in potassium content, and 42 percent were medium. This indicates that potassium deficiencies are *not* so likely to be widespread in the county as phosphorus deficiencies.

No tests were made to determine the nitrogen content. The organic-matter content is a general indicator of nitrogen levels. About 79 percent of the samples tested had 1½ to 3 percent organic matter. Laboratory data indicated 1 to 3 percent organic matter for the Miamian soils and 3 to 7 percent for the Brookston soils. The dark-colored soils generally have an organic-matter content two to three times that of the light-colored soils and, therefore, are likely to need smaller amounts of applied nitrogen for optimum crop growth.

Lime and fertilizer should be applied as indicated by the results of the soil tests, the crop to be grown, and the expected yield. The reader should refer to the Ohio Cooperative Extension Service for soil test procedures and recommended grades and analyses of fertilizers.

Crop residue should be returned to the light-colored soils that have small amounts of organic matter. It is important that organic matter be added to these soils regularly. All crop residue should be mixed into the soil. Soybeans and similar row crops that supply small amounts of crop residue should be supplemented with sod crops.

Erosion is a hazard on many of the light-colored soils in the county. The erosion hazard is slight on the dark-colored soils and many of the lighter colored, somewhat poorly drained soils because they are mostly nearly level. The erodibility of a soil depends in part on its physical properties. The light-colored soils in this county have a silt loam surface layer and are susceptible to erosion, the degree depending on slope, the kind and amount of plant cover, and other factors. The erosion hazard increases with increasing intensity of soil use. For example, cultivated areas are more susceptible to erosion than pastured areas. On about 38 percent of the acreage in the county, erosion is a hazard. Used for effective erosion control are terraces, diversions, grassed waterways, contour strips, contour tillage, minimum tillage, utilization of crop residue, and cover and sod crops.

Drainage is needed on many of the extensive soils in Fayette County because they are very poorly drained or somewhat poorly drained. About 59 percent of the acreage in the county is limited by wetness that slows crop growth unless the limitation is lessened by artificial drainage. All of the soils needing drainage can be drained by tile if outlets can be established. In some places limestone bedrock interferes with the installation of tile in the Randolph and Millsdale soils. Surface ditches, land smoothing, and bedding also are used in the county to lessen ponding and to improve surface drainage. The well drained and moderately well drained soils generally do not need artificial drainage for crop production.

Cropping systems can be defined as the growing of crops and the application of needed cultural and management measures. Cropping systems include the use of rotations that contain grasses and legumes and the use of crop sequences that give the desired benefits without the use of grasses and legumes.

A satisfactory cropping system improves or maintains the soil in good physical condition, protects the soil during critical periods of erosion susceptibility, aids in controlling weeds, insects, and diseases, and encourages good crop growth. As the proportion of row crops is increased in the cropping system, the need for conservation measures increases accordingly.

Listing all of the possible cropping systems for any particular soil is not practical. An example of a cropping system that may be satisfactory is stripcropping on a sloping soil and a 4-year rotation of 1 year each of a row crop and small grain and 2 years of meadow. The contour strips are needed to help control erosion and permit satisfactory growth of the row crop.

The common *field crops* in the county are corn, soybeans, wheat, and oats. The common pasture and hay plants are alfalfa, red clover, timothy, orchardgrass, and brome.

For specific information regarding erosion control, drainage, use of suitable crops, or other management practices, the reader should consult the nearest Soil Conservation Service office or the Ohio Cooperative Extension Service.

Management of the Soils for Pasture

Some of the pasture in the county is on soils susceptible to erosion. These soils generally are already eroded, are low in natural fertility, and commonly have poor tilth. Most of the pasture is on soils that need artificial drainage for optimum growth of row crops or pasture. The following practices for general management of pasture apply to all or many soils in the county.

Erosion control is particularly important because some of the soils used for pasture are already eroded. Control of erosion is needed at all times, but it is particularly needed during seeding. Mulch seeding or the use of a nurse crop can help prevent further erosion.

Artificial drainage, if needed, must be as well established for pasture as for row crops.

Lime and fertilizer needs should be determined by soil tests, and adequate amounts of these amendments supplied to meet the requirements of the pasture plants grown and the needs of the farmer.

Soil compaction is caused by grazing when the soils are wet and results in decreased growth of pasture plants. When the soils are wet, the use of hay, silage, or soilage crops reduces soil compaction.

Pasture management includes using practices that increase the growth of pasture plants to provide surface protection of the soils. The protection needed is influenced by the number of livestock, the length of time they graze, the season they graze, and the availability of water. Practices that contribute to good pasture management are proper stocking rates to maintain key forage species, pasture rotation and deferred grazing, grazing at the proper time, and ample water supplies strategically located.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to horticultural crops or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of the soils for commercial trees, wildlife, or engineering.

In the capability system, all kinds of soil are grouped at three levels, the capability class, subclass, and 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 that 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 reduce the choice of plants, require very careful management, or both.
- Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife. (None in Fayette 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.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife. (None in Fayette County.)

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes. (None in Fayette 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, but not in Fayette County, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations.

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 an Arabic numeral to the subclass symbol, for example, IIe-3 or IIIe-1. 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 within each subclass.

In the following pages the capability units in Fayette County are described, and suggestions for the use and management of the soils are given.

Management by capability units

This section describes the capability units used in Fayette County. The descriptions give the general characteristics, properties, and qualities of the soils in each unit. In some units there may be one or two soils that differ slightly from the rest of the soils in the group. These exceptions are included because they have a small acreage that does not justify a separate capability unit description, or because they are similar in many important properties to the other soils in the unit. This is done to keep to a practical minimum the number of capability units. The exceptions have a relationship to use and management.

Reference in the descriptions to low, medium, or high available moisture capacity is related to the normal depth of rooting of commonly grown field crops, for example, corn and soybeans. The depth of the root zone refers to a layer that restricts root growth, such as dense clay, compact till, or bedrock.

These descriptions also point out soil features that limit the use of soils for crops or pasture. No specific recommendations for overcoming these limitations are given. Many methods or combinations of practices are suitable for controlling erosion, or for draining a field of any kind of soil. For specific information on erosion control, artificial drainage, or other management practices, the farmer should contact the nearest Soil Conservation Service office or the Ohio Cooperative Extension Service.

The names of the soil series represented are mentioned in the description of each capability unit, but this does not mean that all the soils of a given series appear in the unit. To find the names of all the soils in any given capability unit, refer to the "Guide to Mapping Units" at the back of this survey.

CAPABILITY UNIT I-1

This capability unit consists of moderately well drained or well drained soils in the Celina, Thackery, and Wea series. The Celina and Wea soils have slopes that range from 0 to 2 percent, and the Thackery soil, from 1 to 4 percent. These soils occupy uplands or stream terraces that are high enough to escape normal flooding.

All of the soils have moderate or moderately slow permeability and medium or high capacity to store and release plant nutrients. The root zone of the Thackery and Wea soils is generally deep, and that of the Celina soil is moderately deep. In the upper part of the root zone, these soils normally are medium or strongly acid. But at greater depth, where they are underlain either with calcareous glacial till or calcareous sand and gravel, they are less alkaline.

The soils in this unit have no features that limit their use for field crops or pasture. The erosion hazard is slight or none if the soils are cultivated, except in the few areas where slopes are more than 2 percent. The structure of the surface layer is likely to deteriorate if management is only average, but this is not a major limitation. The dark-colored Wea soil is less subject to surface crusting than the other lighter colored soils.

The soils in this unit are suited to the field crops and hay or pasture plants that are commonly grown in the county. They can be used for adapted special crops, and the Thackery and Wea soils are well suited to these crops. These soils can be continuously cultivated if well managed, and they are well suited to irrigation.

CAPABILITY UNIT IIe-1

This capability unit consists of well drained and moderately well drained soils of the Celina, Corwin, Kendallville, and Miamian series. These soils are deep to moderately deep over compact, calcareous glacial till. They occur on uplands. Slopes range from 2 to 6 percent.

The soils in this unit have moderately slow permeability, medium available moisture capacity, and a medium capacity to store and release plant nutrients. The root zone is moderately deep. Within the root zone, these soils are normally medium or strongly acid, but they are less acid at greater depth.

A moderate erosion hazard is the major limitation to the use of these soils for cultivated crops. Maintaining soil fertility and good soil structure also is a problem where these soils are intensively cultivated. Some of the soils are moderately eroded and have lower available moisture capacity and poorer tilth.

These soils are suited to all the field crops, specialty crops, and hay or pasture crops commonly grown in the county. Areas having slopes of less than 4 percent are suited to continuous cultivation if well managed. Areas having slopes of more than 4 percent are suited to frequent cultivation. Management is needed to reduce erosion in areas used for field crops. A thick plant cover on pasture and hayland helps to control erosion.

CAPABILITY UNIT IIe-2

The soils in this capability unit are deep or moderately deep and are well drained or moderately well drained. They are in the Cana and Milton series. These soils are on uplands and have 2 to 6 percent slopes. Some of the soils are moderately eroded. The Milton soils are 20 to 40 inches deep over limestone. The Cana soils generally have shale bedrock within 50 to 60 inches of the surface. As a result, the soils in this unit have a moderately deep or deep root zone, mostly a medium available moisture capacity, and a medium capacity to store and release plant nutrients. They have moderately slow permeability. The Milton soils are normally medium acid to strongly acid in the root zone. They are less acid than the very strongly acid to extremely acid Cana soils. The Cana soils are seasonally wet, and they dry out more slowly in spring than the Milton soils.

A moderate erosion hazard is the main limitation to the use of these soils for cultivated crops. Where cultivation is intensive, maintaining soil fertility and good soil structure are concerns.

These soils are suited to all field crops, specialty crops, and hay or pasture plants that are commonly grown in the county. They are suited to crops cultivated year after year if slopes are not more than 4 percent and if management is optimum. Where management is less than optimum, excessive erosion is likely unless erosion control is stressed. These soils are suited to irrigation, but they crust fairly readily. A thick plant cover in areas of pasture and hay helps to control erosion.

CAPABILITY UNIT IIe-3

This capability unit consists of well-drained soils of the Fox and Warsaw series. These soils are mostly moderately deep to sandy and gravelly material. Slopes range from 2 to 6 percent. Some areas are moderately eroded. These soils occupy stream terraces that normally are above flood stage.

These soils have moderate permeability, medium to low available moisture capacity, and a medium capacity to store and release plant nutrients. Their root zone is mostly moderately deep and in the upper part of the zone, these soils are normally medium acid.

The main limitation to the use of these soils for row crops is a moderate erosion hazard. If erosion is controlled, however, these soils are well suited to irrigation. The soils tend to be droughty in dry periods because they have medium to low available moisture capacity. The Fox soil is more susceptible to surface crusting than the darker colored Warsaw soil.

The soils in this unit are suited to all of the field crops, specialty crops, and hay or pasture plants that are commonly grown in the county. Because of the drought hazard, crops that mature early are better suited to these soils than those that mature late in summer. The soils having slopes up to about 4 percent can be used for continuous row crops if optimally managed. But if management is less than optimum, soil losses are likely to be excessive unless erosion control is stressed. Crop growth generally is satisfactory with improved management, assuming that erosion is controlled and good soil structure is maintained. A thick plant cover on pastures and hayland helps to control erosion.

CAPABILITY UNIT IIs-1

Fox silt loam, 0 to 2 percent slopes, is the only soil in this capability unit. This soil is well drained, is underlain by sand and gravel at depths of 24 to 40 inches, and is on stream terraces. Slope range is 0 to 2 percent.

The root zone of this Fox soil is mostly moderately deep. It has moderate permeability, medium to low moisture capacity, and a medium capacity to store and release plant nutrients. The root zone is mostly medium acid.

The major limitation to the use of this soil is a limited available moisture capacity; the available moisture is readily depleted by growing crops. Also, full-season crops are damaged by drought during seasons of subnormal rainfall. This soil, however, is well suited to irrigation, even though it is susceptible to surface crusting. Tilth is generally good.

This soil is well suited to the field crops, specialty crops, and hay and pasture plants commonly grown in the county. It dries out and warms up early in spring. Hence, it is an important soil for truck crops that mature early. It can be cultivated continuously if optimum management is used. Deep-rooted pasture and meadow plants are well adapted to this soil. During periods of subnormal rainfall, shallow-rooted legumes and grasses grow poorly.

CAPABILITY UNIT IIw-1

Algiers silt loam is the only soil in this capability unit. It occurs on bottom lands. Slopes range from 0 to 2 percent.

This soil has a seasonal high water table, and flooding is a hazard. It is moderately permeable in the upper 10 to 20 inches of the profile and moderately slowly permeable below this depth. This soil stays wet until late in spring unless it is artificially drained. It has a high available moisture capacity and a high capacity to store and release plant nutrients. The soil is neutral to mildly alkaline.

Seasonal wetness and a flooding hazard are the main limitations to use of this soil for row crops. The soil is likely to puddle and clod if it is tilled when wet. It must be artificially drained before optimum crop growth can be obtained. Tile drains work well.

This soil is suited to most of the commonly grown field crops and hay or pasture plants that can tolerate some soil wetness. In local areas, flooding is so frequent that this soil is better suited to grass, trees, or other permanent vegetation than to row crops. The soil can be continuously cultivated under optimum management.

CAPABILITY UNIT IIw-2

This capability unit consists of very poorly drained, deep, dark-colored soils in the Brookston, Patton, and Westland series. The Brookston soil occupies nearly level to depressional areas on the uplands. The nearly level Patton and Westland soils are on low stream terraces. The Westland soils are loamy and are underlain by sand and gravel. The Patton soils are more silty than the Westland and formed in limy, silty and clayey sediments. Areas of overwashed Patton and Westland soils are subject to flooding.

The soils in this unit have a high available moisture capacity, moderate to moderately slow permeability, and a high to very high capacity to store and release plant nutrients. They have a seasonal high water table and are slow to dry out in the spring unless artificially drained. The root zone is neutral, and in the summer it is deep when the water table is low.

The main limitation to the use of these soils for crops or pasture is the seasonal high water table. Tile drains work well in these soils if outlets can be established. Little or no hazard of surface crusting occurs on these dark-colored soils.

These soils are suited to all crops commonly grown in the county if they are artificially drained. They are poorly suited to crops if they are not drained or are only partially drained. The drained soils can be used for continuous cultivation. Crop growth is generally satisfactory even if management is less than optimum. Compacted soils and slower crop growth commonly result if these soils are tilled or pastured while they are wet. Winter and spring flooding are hazards to spring grain on the overwashed Patton and Westland soils.

CAPABILITY UNIT IIw-3

This capability unit consists of poorly drained soils in the Crosby, Henshaw, Odell, and Sleeth series. These soils formed in various limy materials—glacial till, silty lacustrine material, or glacial outwash. Slopes range from 0 to 6 percent.

The soils in this unit have a moderately slow permeability, medium or high available moisture capacity, and a medium capacity for storage and release of plant nutrients. The root zone of these soils is moderately deep to deep when the seasonal high water table is low in summer. In the upper part of the root zone, these soils are normally strongly or medium acid, but in the lower part they are slightly acid to alkaline. The Crosby and Odell soils have a root zone that is mostly moderately deep. Their root zone is limited by depth to relatively firm, calcareous glacial till.

A seasonal high water table during winter and spring is the main limitation of these soils for crop and pasture use. The soils need to be artificially drained before optimum growth can be obtained. Artificial drainage also is needed because the soils are slow to warm up and dry out in spring without it. Tile drains work well. These soils are susceptible to surface crusting. The gently sloping Crosby soil also is subject to erosion.

These soils are well suited to field crops and most hay and pasture crops commonly grown in the county if they are adequately drained. Undrained areas are generally too wet for good growth of alfalfa. If the soils are tilled or pastured while wet, compacted soil and slower crop growth can result. These soils can be cultivated continuously if optimally managed, but without optimum management good surface tilth is difficult to maintain.

CAPABILITY UNIT IIw-4

This capability unit consists of well drained or moderately well drained soils of the Genesee, Medway, and Ross series. They occur on flood plains. Slopes range from 0 to 2 percent.

The soils in this unit have moderate permeability, high available moisture capacity, and a high to very high capacity to store and release plant nutrients. The root zone is deep. Within the root zone, these soils are normally neutral.

The main limitation to the use of these soils for crops or pasture is a flooding hazard. Flooding most commonly occurs during winter or early in spring so that late-summer crops generally fare better than early crops.

These soils are generally well suited to the row crops and specialty crops that are commonly grown in the county. Optimum management is needed for continuous cultivation of these soils and to assure optimum crop yields. These soils are well suited to irrigation.

CAPABILITY UNIT IIIe-1

Fox silt loam, 6 to 12 percent slopes, moderately eroded, is the only soil in this capability unit. This soil is well drained and underlain at a moderate depth by stratified sand and gravel. It is more gravelly than less eroded Fox soils, and it occurs on stream terraces.

The soil has moderate permeability, a medium to low available moisture capacity, and a medium capacity to store and release plant nutrients. The root zone is mostly moderately deep and it is mostly medium acid.

The erosion hazard is severe where this soil is cultivated. Erosion control practices generally are difficult to apply because the slopes are short and irregular. Runoff from this soil is rapid, and summer crops commonly lack sufficient moisture for optimum crop growth. The soil is well suited to irrigation if erosion is controlled.

This soil is suited to field crops, specialty crops, and hay crops commonly grown in the county. It can be frequently cultivated if management is optimum. This soil is well suited to deep-rooted legumes and grasses for hay or pasture. Shallow-rooted legumes and grasses grow poorly on this soil during periods of less than normal rainfall. A thick plant cover helps to control erosion.

CAPABILITY UNIT IIIe-2

This capability unit consists of well-drained soils on uplands. These soils are in the Kendallville and Miamian series. Most of them have slopes of 6 to 12 percent and are slightly eroded or moderately eroded. The severely eroded Miamian clay loam has slopes of 2 to 6 percent.

The soils in this unit have moderately slow permeability, medium to low available moisture capacity, and a medium capacity to store and release plant nutrients. The root zone of these soils is normally medium acid to strongly acid and mostly moderately deep. It is limited by compact limy glacial till. This till is at the surface in parts of the severely eroded Miamian soil.

The main limitation to the use of these soils is a severe erosion hazard in cultivated areas. Surface runoff is rapid. The severely eroded Miamian soil is less subject to continuing high erosion losses than the other soils. But on this soil, good tilth is very difficult to maintain.

These soils are suited to field crops and are well suited to the hay or pasture plants commonly grown in the county. They can be cultivated often if management is optimum. Without optimum management, erosion control is difficult on the soils that have slopes of 6 to 12 percent. A thick plant cover on pasture and hayland helps to control erosion.

CAPABILITY UNIT IIIe-3

This capability unit consists of a moderately well drained Cana soil and a well drained Milton soil. Slopes range from 6 to 12 percent. These soils are moderately eroded. The Cana soil is underlain at a depth of about 40 to 50 inches by shale; the Milton soil is underlain by limestone at about 20 to 40 inches.

These soils have moderately slow permeability, medium to low available moisture capacity, and a medium capacity to store and release plant nutrients. The Cana soil is strongly acid to extremely acid, particularly above the shale. The Milton soil is mostly medium acid within the root zone.

The erosion hazard is severe where these soils are cultivated. Runoff is rapid. The Cana soil has a lower capacity to store and release plant nutrients than the Milton soil. Both soils tend to be droughty. They have a low organic-matter content and, as a result, are subject to surface crusting. The Cana soil is slower to dry out in spring than the Milton soil.

These soils are suited to field crops and hay and pasture plants commonly grown in the county. They are better suited to early crops than late crops because of danger of drought. They can be frequently cultivated if management is optimum. Erosion losses on these soils are generally excessive without optimum management. A thick plant cover on pasture and hayland helps to control erosion.

CAPABILITY UNIT IIIw-1

This capability unit consists of somewhat poorly drained or very poorly drained soils of the Randolph and Millsdale series. They occupy upland areas that are underlain by limestone at a depth of 20 to 40 inches. Slopes range from 0 to 6 percent.

These soils have moderately slow permeability, medium available moisture capacity, and a seasonal high water table that restricts root growth until the water table is low in summer. The dark-colored Millsdale soil is dominantly neutral and has a high capacity to store and release plant nutrients. It is less subject to surface crusting than the Randolph soil. The lighter colored Randolph soil, which occupies only a small acreage in the county, is strongly acid to neutral, and it has a medium capacity to store and release plant nutrients.

Seasonal wetness is the main limitation of these soils for farming. For optimum crop growth, both soils need to be artificially drained. Tile drains work well. Bedrock, however, interferes with installation of the tile lines in some places. Also, since the Randolph soil is gently sloping, erosion is a hazard.

If drained, these soils are suited to field crops commonly grown in the county. The Millsdale soil can be cultivated continuously if management is optimum, and so can the Randolph soil if erosion is controlled. In both soils, optimum tillage can be obtained only within a narrow range of moisture content. The Randolph soil, drained or undrained, is suited to adapted grasses and legumes grown for hay and pasture. The Millsdale soil is much better suited to adapted grasses and legumes if it is drained. Pastures are improved on both soils if they are drained. Both soils are likely to be extremely compact if livestock graze when the soils are wet. A thick cover on pasture and hayland helps control erosion on the Randolph soil.

CAPABILITY UNIT IVe-1

This capability unit consists of well-drained soils in the Kendallville and Miamian series. Some of these soils are sloping and severely eroded, and others are moderately steep and moderately eroded. These soils occur on uplands and commonly are underlain by limy glacial till. On some of the severely eroded areas, however, the till is at the surface.

These soils have moderately slow permeability, medium to low available moisture capacity, and a moderately deep to shallow root zone. In some of the severely eroded areas, the root zone is very shallow and the available moisture is very low.

A very severe erosion hazard is a main limitation to the use of these soils for cultivated crops. Runoff from these soils is rapid, and this contributes to a continuing erosion problem. These soils commonly are droughty because of past erosion and rapid surface runoff. Because these soils are low in organic-matter content, the physical condition of their surface layer generally is unfavorable for seedling emergence and plant growth. The plow layer is difficult to till properly.

These soils are best suited to small grains and to hay or pasture that are able to withstand periods of dry weather. They are not well suited to row crops. These crops can be cultivated safely occasionally, but erosion is difficult to control. If the soils are used for pasture or hay, a thick plant cover helps to control erosion.

CAPABILITY UNIT IVe-2

This capability unit consists of light- and dark-colored soils that are well drained, gently sloping or sloping, and mostly moderately eroded or severely eroded. They are in the Casco, Fox, Ritchey, Rodman, and Romeo series. These soils are shallow to very shallow to limestone bedrock or to gravelly material. Their root zone is shallow to very shallow and has low to very low available moisture capacity.

Because of a continuing erosion hazard, these soils have limited suitability for farming. Also, their shallowness and low available moisture capacity limit their use for row crops.

These soils are poorly suited to row crops, but they are suited to small grains and hay or pasture. The small grains can be grown only occasionally because erosion is difficult to control. Because hay and pasture can withstand dry periods in summer, they are better suited to these soils than small grains. These soils can be irrigated, but they are not well suited to it, because of their shallowness and the continuing erosion hazard. Intensive management is needed for the successful growth of any crops on these soils. A thick plant cover on pasture and hayland helps to control erosion.

CAPABILITY UNIT IVw-1

Warners muck is the only soil in this capability unit. It occurs on low swampy areas and has a thin muck layer overlying highly calcareous mineral material (marl).

This soil has a continually high water table unless it is artificially drained. When drained, the root zone of this soil is shallow because of the highly calcareous underlying material.

The total acreage and individual areas of this soil are small. If artificially drained, this soil can be cultivated occasionally, but installing drainage outlets is difficult. Undrained areas generally are swampy and too wet for any farming.

CAPABILITY UNIT VIe-1

This capability unit consists of light-colored soils that are moderately steep, steep, or very steep and moderately or severely eroded. These soils are in the Kendallville, Miamian, and Hennepin series. They are well drained and occupy uplands on glacial till plains. They are relatively shallow to limy glacial till. On the severely eroded soils, however, the till is at the surface in many places.

These soils have moderately slow permeability, a shallow to moderately deep root zone, and low available moisture capacity. Runoff from these soils is rapid, and there is a continuing severe erosion hazard. The physical condition of the severely eroded soils is very unfavorable for seedling emergence and plant growth.

Because of the steep slopes, past erosion, a continuing hazard of erosion, and physical characteristics, such as low available moisture capacity, these soils are not suited to cultivated crops. They are suited to pasture or hay. A thick plant cover helps to control erosion.

CAPABILITY UNIT VIe-2

This capability unit consists of soils that are essentially shallow to limestone or calcareous sandy and gravelly material. These soils are in the Fox, Casco, Ritchey, Rodman, and Romeo series. They range from moderately steep to very steep, and they are moderately or severely eroded. They have a shallow to very shallow root zone and low to very low available moisture capacity.

The erosion hazard is continuous because of slope and rapid surface runoff. Because these soils are shallow and have low available moisture capacity, they have limited use for farming.

These soils are not suited to cultivation, because they are eroded and shallow. They can be used, however, for permanent pasture, but pasture plants grow slowly on these soils. A thick plant cover on pasture and hayland helps to control erosion.

Estimated Yields

Table 1 shows for each soil in the county the estimated average acre yields of principal crops that can be expected over a period of years under two levels of management, optimum and improved.

In columns A of table 1 are estimates of yields obtained under the improved management practices commonly used in the county in 1971. In columns B are estimates of yields obtained under optimum management or the application of the best information available. Irrigation is not considered in these estimates. The following management practices must be carried out near the highest level to obtain the yields given for optimum management:

1. Water relationship within the soil is maintained at the optimum level for crop growth. Measures are used to increase water intake and the available moisture capacity of the soil. An excess water problem is corrected by appropriate practices, including installation of tile drains or surface drains, land smoothing, or a combination of these practices.
2. If erosion is a hazard, appropriate erosion control practices are used.
3. Appropriate tillage practices, including the time of tillage, plowing, seedbed preparation, and weed and insect control, are adapted to the soil conditions and the specific crops.
4. The fertility and pH of the soil are at an optimum level. Trace elements are applied as needed.
5. Practices are applied at a time when they contribute most toward efficient production.
6. Adapted high-yielding crop varieties are used.

These estimated yields are not static values, but they are designed to indicate the productive ability of the soil. The yield level is influenced by soil characteristics and indicates how these characteristics may affect crop production. Consequently, relative productivity of any soil is evident when its yield level is compared to that of other soils in the county. The yield level may change as research opens new areas in production technology, but the relative position of a soil in relation to the other soils is not likely to change.

The estimated yields in table 1 are based primarily on observations and field trials of the county cooperative extension agent and on interviews with farmers and the district conservationist of the Soil Conservation Service. Also used are experimental results of the Ohio Agricultural Research and Development Center and direct observations by members of the soil survey party. The estimated yields on different kinds of soil are the average yields over a period of years according to the two broadly defined levels of management.

These yields may not apply directly to any specific field for any particular year because the same kind of soil varies from place to place and management practices differ from farm to farm. Also the weather varies from year to year. The estimates are intended only as a general guide to the relative productivity of the soils and as an indication of how the soils respond to improved and optimum management.

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

[Estimates in columns A are based on improved management, and those in columns B are based on optimum management. See the text for definitions of those levels of management. Absence of a yield indicates the soil is not suited to the crop or that the crop is not commonly grown on that soil. Mixed hay as listed indicates any meadow mixture that has less than 75 percent alfalfa. Cut and fill land, Gravel pits, and Quarries are not rated for crop production]

Soil	Corn		Oats		Wheat		Soybeans		Mixed hay [1]	
	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu*	*Bu.*	*Tons*	*Tons*
Algiers silt loam	80	130	60	80	35	45	30	40	3. 0	5. 0
Brookston silty clay loam	80	130	55	80	35	45	28	40	3. 0	5. 0
Cana silt loam, 2 to 6 percent slopes, moderately eroded	50	80	42	68	20	32	24	30	2. 0	3. 5
Cana silt loam, 6 to 12 percent slopes, moderately eroded	50	70	36	54	20	28	18	26	2. 0	3. 5
Casco and Rodman soils, 2 to 12 percent slopes, moderately eroded	---	65	32	64	22	32	16	24	2. 0	3. 0
Celina silt loam, 0 to 2 percent slopes	85	115	60	80	35	45	30	40	3. 5	5. 0
Celina silt loam, 2 to 6 percent slopes	80	110	55	75	30	45	30	40	3. 5	5. 0
Celina silt loam, 2 to 6 percent slopes, moderately eroded	80	105	55	75	30	40	25	35	3. 0	4. 5
Corwin silt loam, 2 to 6 percent slopes	75	120	60	80	35	45	30	40	3. 0	5. 0
Crosby silt loam, 0 to 2 percent slopes	70	110	50	75	25	40	30	40	3. 0	5. 0
Crosby silt loam, 2 to 6 percent slopes	90	115	45	80	25	40	25	35	3. 0	5. 0
Fox silt loam, 0 to 2 percent slopes	60	95	50	75	25	40	25	35	3. 0	4. 5
Fox silt loam, 2 to 6 percent slopes	55	95	50	75	25	40	20	30	2. 5	4. 0
Fox silt loam, 2 to 6 percent slopes, moderately eroded	50	90	45	70	25	35	20	30	2. 5	3. 5
Fox silt loam, 6 to 12 percent slopes, moderately eroded	50	80	40	65	20	35	15	25	2. 0	3. 0
Fox and Casco soils, 6 to 12 percent slopes, severely eroded	---	---	30	50	20	30	---	---	1. 5	2. 5
Fox, Casco and Rodman soils, 12 to 25 percent slopes, moderately eroded	---	---	30	48	18	28	---	---	1. 5	2. 5
Genesee silt loam	80	125	50	80	30	45	30	45	3. 0	5. 0
Henshaw silt loam, 0 to 2 percent slopes	70	110	45	75	25	40	25	40	3. 0	5. 0
Henshaw silt loam, dark variant, 0 to 2 percent slopes	75	115	50	75	25	45	25	45	2. 5	4. 5
Kendallville silt loam, 2 to 6 percent slopes	80	110	50	75	35	45	25	35	3. 0	4. 5
Kendallville silt loam, 2 to 6 percent slopes, moderately eroded	80	110	50	70	35	45	25	35	3. 0	4. 5
Kendallville silt loam, 6 to 12 percent slopes, moderately eroded	75	105	50	65	30	40	25	35	3. 0	4. 0
Kendallville clay loam, 6 to 12 percent slopes, severely eroded	---	---	30	45	20	30	---	---	2. 0	3. 0
Kendallville clay loam, 12 to 18 percent slopes, severely eroded	---	---	25	45	---	---	---	---	1. 5	2. 5
Medway silt loam	80	125	50	80	30	40	30	45	3. 0	5. 0
Medway silt loam, moderately shallow variant	75	105	50	76	30	38	30	40	3. 0	4. 5
Miamian silt loam, 2 to 6 percent slopes	80	110	55	85	35	45	25	40	3. 5	5. 0
Miamian silt loam, 2 to 6 percent slopes, moderately eroded	80	110	55	75	35	45	20	35	3. 0	4. 5
Miamian silt loam, 6 to 12 percent slopes	65	100	50	70	30	40	20	30	3. 0	4. 5
Miamian silt loam, 6 to 12 percent slopes, moderately eroded	65	95	45	70	30	35	20	30	2. 5	4. 0
Miamian silt loam, 12 to 18 percent slopes, moderately eroded	50	75	40	60	20	30	15	25	2. 5	3. 5
Miamian clay loam, 2 to 6 percent slopes, severely eroded	50	70	28	45	18	25	12	30	2. 0	3. 0
Miamian clay loam, 6 to 12 percent slopes, severely eroded	---	---	28	45	18	24	10	18	1. 5	2. 5
Miamian clay loam, 12 to 18 percent slopes, severely eroded	---	---	25	45	---	---	---	---	2. 0	2. 5
Miamian and Hennepin silt loams, 18 to 25 percent slopes, moderately eroded	---	---	20	40	---	---	---	---	1. 5	2. 5
Miamian and Hennepin silt loams, 25 to 35 percent slopes, moderately eroded	---	---	---	---	---	---	---	---	1. 0	2. 0
Miamian and Hennepin soils, 18 to 35 percent slopes, severely eroded	---	---	---	---	---	---	---	---	1. 0	1. 8
Millsdale silty clay loam	70	100	60	80	28	45	24	40	3. 0	4. 5
Milton silt loam, 2 to 6 percent slopes	65	85	50	75	25	40	22	30	2. 0	4. 0
Milton silt loam, 2 to 6 percent slopes, moderately eroded	50	80	50	70	25	35	20	30	2. 0	3. 0
Milton silt loam, 6 to 12 percent slopes, moderately eroded	40	70	40	55	22	34	16	24	1. 5	2. 5
Odell silt loam, 0 to 2 percent slopes	80	115	50	75	25	40	30	40	3. 0	5. 0
Patton silty clay loam	85	130	60	85	30	42	26	40	3. 0	5. 0
Patton silty clay loam, overwash	85	130	60	85	30	42	26	40	3. 0	5. 0
Randolph silt loam, 2 to 6 percent slopes	75	105	50	70	25	35	20	30	2. 0	3. 5
Ritchey and Romeo silt loams, 2 to 12 percent slopes	---	---	---	---	---	---	---	---	1. 5	2. 5
Ritchey and Romeo silt loams, 12 to 35 percent slopes, moderately eroded	---	---	---	---	---	---	---	---	1. 5	2. 5
Ross silt loam	90	130	55	80	30	45	30	40	3. 0	5. 0
Sleeth silt loam, 0 to 2 percent slopes	80	115	60	75	25	40	30	40	2. 5	4. 5
Thackery silt loam, 1 to 4 percent slopes	75	115	50	75	30	40	25	40	2. 5	4. 0
Warners muck	50	85	50	70	25	35	20	35	3. 0	4. 0
Warsaw silt loam, 1 to 4 percent slopes	70	100	50	70	30	40	20	35	3. 0	4. 5
Wea silt loam, 0 to 2 percent slopes	85	120	55	80	30	45	30	40	3. 5	5. 0
Westland silty clay loam	85	130	50	75	25	40	28	38	3. 0	5. 0
Westland silty clay loam, overwash	85	130	50	75	25	35	28	38	3. 0	5. 0

[1] See text for formula that can be used to convert tons of mixed hay to cow-acre-days of pasture.

Pasture yields in cow-acre-days are not given in table 1. Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre, multiplied by the number of days the pasture can be grazed without damage during one season. An animal unit is one cow, steer, or horse; five hogs; or seven sheep or goats. An acre of pasture that provides 30 days of grazing for two cows has a carrying capacity of 60 cow-acre-days.

Cow-acre-days can be determined by using the yield indicated in the table for mixed hay. Tons of mixed hay are multiplied by 2,000, and the product is divided by 40. An example is 5 times 2,000 equals 10,000, and this divided by 40 equals 250 cow-acre-days of pasture.

Woodland

Before the early settlers arrived, Fayette County was almost completely covered with a hardwood forest. Today, after more than 140 years of woodland clearing and development for farming, only about 4 percent of its total area is woodland.

Table 2 gives the site index and the potential productivity in annual growth in volume for wetland oaks and upland oaks on some of the major soils in Fayette County (*4*). The site index is the total height, in feet, attained at 50 years of age by the dominant species. The average site index and average annual growth given in table 2 indicate that much of Fayette County has a good potential for commercial trees.

TABLE 2.—*Site index and estimated yearly growth of wetland and upland oaks for some major soil series*

Soil series	Species of trees	Number of plots	Average site index	Average yearly growth per acre
				Board feet
Brookston	Wetland oaks	2	75–85	330
Celina	Upland oaks	2	85–95	420
Crosby	Upland oaks	5	75–85	330
Fox	Upland oaks	3	75–85	330
Genesee	Upland oaks	(1)	85–95	420
Kendallville	Upland oaks	(1)	85–95	420
Miamian	Upland oaks	7	75–85	330
Thackery	Upland oaks	(1)	75–85	330

[1] No plot data.

The woodlands remaining occur as small woodlots widely scattered throughout the county. These remnant woodlots typically are at remote corners of the farms. They are mostly on the most poorly drained soils or on flood plains. The woodland has been damaged through the years by destructive harvests in which the best trees were cut at each harvest. These selective harvests left an increasing accumulation of low-grade and cull trees.

Wooded soils, therefore, are scarce in Fayette County. Dependent somewhat on the character of its trees and on such factors as accessibility, a given woodlot may be more valuable for uses other than producing trees. Some of these uses are crop production, outdoor recreation, and nature study areas.

Nevertheless, those who control these wooded tracts in Fayette County are well advised to improve the composition of the woodlots. Planting or encouraging superior trees, while gradually suppressing the inferior ones, is a good practice.

Trees that are likely to have economic value at maturity are as valuable for esthetics and erosion control while growing as are the uneconomic trees. Advice and assistance on woodland management can be obtained from any of the following agencies in Fayette County: county cooperative extension agent; State service forester; or the Fayette Soil and Water Conservation District.

Soils and Wildlife Habitat

Wildlife is an important natural resource in Fayette County. The original wildlife population included many small game animals and some larger animals, such as deer. Since the early settlement of the land, the kind, distribution, and quantity of wildlife have changed.

Information in this subsection can be used to aid in—

1. Planning land use for wildlife on a broad scale as for parks, wildlife refuges, nature study areas, and other recreational areas.
2. Selecting sites that are good for creating, improving, or maintaining specific kinds of wildlife habitat elements.
3. Determining the relative degree of management intensity required for individual habitat elements.
4. Eliminating sites that are difficult or not feasible to manage for specific kinds of wildlife.
5. Determining areas suitable for acquisition for wildlife land use.

Table 3 lists the soils in the county and rates their suitability for eight elements of wildlife habitat and for three classes, or groups of wildlife (*1*). The ratings are 1, 2, 3, and 4, each number indicating relative suitability. A rating of 1 denotes well suited; 2, suited; 3, poorly suited; and 4, not suited. Soils that are well suited have few limitations; those that are suited have moderate limitations, and those that are poorly suited have severe limitations. Not considered in the ratings are present land use, the location of a soil in relation to other soils, and the mobility of wildlife.

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

Each soil is rated in table 3 according to its suitability for various kinds of plants and other elements that make up wildlife habitat.

Grain and seed crops include such seed-producing annuals as corn, wheat, barley, oats, and rye. Soils well suited to these plants are deep, nearly level or very gently sloping, medium textured, well drained, and free or nearly free of stones. They have a high available moisture capacity and are not subject to frequent flooding. These soils can be safely planted to grain and seed crops each year, but the soils that are not so well suited require more intensive management.

TABLE 3.—*Estimated degree of limitations of soils for wildlife habitat and kinds of wildlife*

[Cut and fill land (Cw), Gravel pits (Gp), and Quarries (Qu) are not rated in this table]

Soil series and map symbols	Wildlife habitat elements								Kinds of wildlife		
	Grain and seed crops	Grass and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Algiers: Ag	4	3	3	1	1	1	1	1	3	1	1
Brookston: Bs	4	3	3	1	1	1	1	1	3	1	1
Cana:											
CaB2	2	1	1	1	3	4	4	4	1	2	4
CaC2	2	1	1	1	3	4	4	4	1	2	4
Casco and Rodman: CdC2. Ratings apply to both Casco and Rodman parts of CdC2.	3	3	1	2	2	4	4	4	3	2	4
Celina:											
CeA	1	1	1	1	3	3	3	3	1	1	3
CeB, CeB2	1	1	1	1	3	3	4	4	1	1	4
Corwin: CoB	1	1	1	1	3	3	4	4	1	1	4
Crosby:											
CrA	2	2	1	1	3	2	2	2	1	2	2
CrB	2	2	1	1	3	3	3	3	1	2	3
Fox:											
FnA	2	1	1	1	3	4	4	4	1	1	4
FnB, FnB2	2	1	1	1	3	4	4	4	1	1	4
FnC2	2	1	1	1	3	4	4	4	1	1	4
FoC3	3	1	1	1	3	4	4	4	2	1	4
FrE2	3	2	2	2	2	4	4	4	2	2	4
For Casco part of FoC3 and Casco and Rodman parts of FrE2, see Casco and Rodman.											
Genesee: Gn	1	1	1	1	3	4	4	4	1	1	4
Henshaw: HeA	2	2	1	1	3	2	2	2	1	2	2
Henshaw, dark variant: HkA	2	2	1	1	3	2	2	2	1	2	2
Kendallville:											
KeB, KeB2	1	1	1	1	3	4	4	4	1	1	4
KeC2	2	2	2	1	3	4	4	4	2	2	4
KlC3	3	2	2	1	3	4	4	4	2	2	4
KlD3	4	3	2	1	3	4	4	4	3	3	4
Medway: Md	2	1	1	1	3	3	3	3	1	1	3
Medway, shallow variant: Me	2	1	1	1	3	4	4	4	1	1	4
Miamian:											
MlB, MlB2	1	1	1	1	3	4	4	4	1	1	4
MlC, MlC2	1	1	1	1	3	4	4	4	1	1	4
MlD2	2	2	2	1	3	4	4	4	2	2	4
MmB3	2	2	2	1	3	4	4	4	2	2	4
MmC3	2	2	2	1	3	4	4	4	2	2	4
MmD3	3	2	2	2	3	4	4	4	3	2	4

TABLE 3.—*Estimated degree of limitations of soils for wildlife habitat and kinds of wildlife*—Continued

Soil series and map symbols	Wildlife habitat elements								Kinds of wildlife		
	Grain and seed crops	Grass and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Miamian and Hennepin: MpE2, MpF2, MrF3	4	2	1	1	3	4	4	4	2	2	4
Ratings apply to both Miamian and Hennepin parts of these mapping units.											
Millsdale: Ms	4	3	3	1	1	1	1	4	3	1	2
Milton:											
MtB, MtB2	2	1	1	1	3	4	4	4	1	1	4
MtC2	3	2	1	1	3	4	4	4	2	2	4
Odell: OdA	2	2	1	1	3	2	2	2	1	2	2
Patton: Pa, Pc	4	3	3	1	1	1	1	1	3	1	1
Randolph: RcB	2	2	1	1	3	2	2	4	1	2	2
Ritchey and Romeo:											
RmC	3	2	2	2	1	4	4	4	2	2	4
RmF2	4	3	2	2	1	4	4	4	3	3	4
Ratings apply to both Ritchey and Romeo parts of RmC.											
Ross: Rs	1	1	1	1	3	4	4	4	1	1	4
Sleeth: SlA	2	2	1	1	3	2	2	2	1	2	2
Thackery: ThB	1	1	1	1	3	4	3	3	1	1	4
Warners: We	4	4	4	4	4	1	1	1	4	4	1
Warsaw: 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
Westland: Wu, Wv	4	3	3	1	1	1	1	1	3	1	1

Grasses and legumes are domestic grasses and legumes that are planted. Among these plants are bluegrass, fescue, brome, timothy, redtop, orchardgrass, reed canarygrass, clover, trefoil, and alfalfa. On soils that are rated well suited, many kinds of plants that are suited to the climate can be maintained in adequate stands for at least 10 years. These soils have slopes of 0 to 15 percent, are well drained or moderately well drained, and have a moderately high or high available moisture capacity. Occasional flooding and surface stones are not serious concerns, for the soils are seldom tilled.

Wild herbaceous upland plants are perennial grasses and weeds that generally are established naturally. They include switchgrass, milkweed, daisies, goldenrod, strawberries, nightshade, and dandelion. Soils that are well suited to these plants vary widely in texture, drainage, and slope. If drainage ranges from good to somewhat poor, slope is not limiting. Stoniness and occasional flooding are not serious concerns.

Hardwood woody plants are nonconiferous trees, shrubs, and woody vines that produce nuts or other fruits, buds, catkins, twigs, or foliage that wildlife eat. They generally are established naturally but may be planted. Among the native plants are oak, beech, cherry, maple, hickory, poplar, aspen, walnut, dogwood, roses, and briers. Soils well suited to these plants are deep or moderately deep, medium textured or moderately fine textured, and moderately well drained to somewhat excessively drained. Slope and surface stoniness are of little significance.

Also in this group are several varieties of fruiting shrubs that are raised commercially for planting. Some of them are autumn-olive, amur honeysuckle, tatarian honeysuckle, crab apple, multiflora rose, several species of viburnum, and dogwood. These shrubs generally are available and can be planted on soils that are rated well suited. Hardwoods that are not available commercially commonly can be transplanted successfully.

Coniferous woody plants are cone-bearing evergreen trees and shrubs that are used by wildlife mainly as cover, though they also provide browse and seeds. Among them are Norway spruce, white pine, Austrian pine, arborvitae, redcedar, and juniper. The soils that are well suited for coniferous wildlife habitat are those on which plants grow slowly and delay closure of the canopy. It is important that branches be maintained close to the ground so that food and cover are readily available to rabbits, pheasants, and other small animals. If the trees quickly form a dense canopy that shuts out the light, the lower branches and natural ground cover die.

On soils rated poorly for coniferous wildlife habitat, widely spaced plants may quickly but temporarily have desired growth. Establishment or maintenance, however, is difficult because these soils are well suited to competing hardwoods. Unless the stand is carefully managed, hardwoods then invade and commonly overtop the conifers.

Wetland food and cover plants are wild, herbaceous, annual and perennial plants that grow on moist to wet sites. They include smartweed, wild millet, rushes, sedges, bulrush, spikerush, burreed, buttonbush, rice cutgrass, and cattails. Soils rated well suited are nearly level and poorly drained or very poorly drained. Soils rated suited are nearly level and somewhat poorly drained or frequently flooded. Depth, stoniness, and texture of the surface layer are of little concern.

Shallow water developments are impoundments or excavations that provide areas of shallow water near food and cover for wetland wildlife. Examples of such developments are shallow dugouts, level ditches, blasted potholes, and devices that keep the water 6 to 24 inches deep in marshes. Soils rated well suited to this use are nearly level (0 to 1 percent slopes), more than 36 inches deep to bedrock, and poorly drained or very poorly drained. Soils rated suited are nearly level and somewhat poorly drained.

Excavated impoundments are dug-out water areas, or a combination of these and impoundments behind low dikes. The water is at a depth suitable for the production of fish or wildlife. If fish are produced, part of the pond should be at least 8 feet deep. Soils rated well suited are nearly level, more than 72 inches deep, and poorly drained. In constructing an excavated impoundment, the difficulty or degree of limitation increases with increasing slope, which also reduces the size of pond that is feasible.

Table 3 also rates the soils according to their suitability for the kinds of wildlife in the county—openland, woodland, and wetland.

Examples of openland wildlife are pheasants, quail, meadowlarks, field sparrows, doves, cottontail rabbits, red foxes, and woodchucks. These birds and mammals normally make their homes in areas of cropland, pasture, meadow, and lawns and in areas overgrown with grasses, herbs, and shrubs.

Woodland wildlife consists of the birds and mammals that prefer woodland. Among them are ruffed grouse, woodcock, thrushes, vireos, scarlet tanagers, woodpeckers, gray and fox squirrels, gray fox, white-tailed deer, raccoons, and opossum. They obtain food and cover in stands of hardwoods, coniferous trees, shrubs, or a mixture of these plants.

Examples of wetland wildlife are ducks, geese, rails, herons, shore birds, mink, and muskrat. These birds and mammals normally make their homes in wet areas, such as ponds, marshes, and swamps.

Each rating under "Kinds of wildlife" in table 3 is based on the ratings listed for the habitat elements near the beginning of the section. For *openland wildlife* the rating is based on the ratings shown for grain and seed crops, grasses and legumes, wild herbaceous upland plants, hardwood plants, and coniferous wildlife habitat. The rating for *woodland wildlife* is based on the ratings listed for all the elements except grain and seed crops. For *wetland wildlife* the rating is based on the ratings shown for wetland food and cover plants, shallow water developments, and excavated ponds.

Engineering Uses of the Soils [3]

During the course of a soil survey, much information is discovered about the properties of soils in the survey area and their relation to the overall landscape. When properly interpreted, much of this information is useful to agricultural and civil engineers, and others whose work involves the use of soil mechanics or soil engineering data.

This section has been prepared specifically for the purpose of interpreting the characteristics of the soils of the county for soil engineering uses. Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, facilities for water storage, erosion control structures, drainage systems, and sewage disposal systems. Among the properties most important to the engineer are permeability to water, compaction characteristics, soil drainage, shrink-swell characteristics, grain size, plasticity, and pH. Depth to water table, depth to bedrock, and topography also are important.

Information in this survey can be used as a guide to help:

1. Make soil and land use studies that will aid in selecting and developing small industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils in the planning of artificial drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting highway, airport, pipeline, and cable locations and in planning detailed investigations at the selected locations.
4. Locate probable sources of gravel and other construction materials.

[3] LLOYD E. GILLOGLY, construction engineer, Soil Conservation Service, helped prepare this section.

5. Correlate performance of engineering structures with soil mapping units to develop information for overall planning that will be useful in designing and maintaining certain engineering practices and structures.
6. Determine the suitability of soil mapping units for cross-country movement of vehicles and construction equipment.
7. Supplement the information obtained from other published maps and reports and aerial photographs to make maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

It is not intended that the engineering interpretations in this section will eliminate the need for onsite sampling and testing of sites for design and construction of specific engineering works and uses. The interpretations, together with use of the soil map to locate and identify the soils, do give information from which sites most likely to be favorable for the planned structure can be selected, and from which sites having severe hazards may be eliminated from further consideration.

The interpretations given in this section generally apply to a depth of 5 feet, or 60 inches. Some of the soils, however, are rated to a depth of only 50 inches. These soils commonly have a variable substratum. Soils having bedrock within a depth of 60 inches are rated to the depth to bedrock. These are the normal observations made during the course of a soil survey.

Also, similar or contrasting soils may be present within any mapping unit. Such inclusions are noted in the mapping unit description if they were observed during the course of the survey.

Most of the information in this section is in tables 4, 5, and 6. Table 4 lists test data for two selected soils in the county. In table 5 are estimated engineering properties of the soils. Table 6 gives engineering interpretations of the soils.

Some of the terms used by the soil scientists may be unfamiliar to the engineer, and some words—for example, soil, sand, silt, clay, topsoil, subsoil, and solum—may have special meanings in soil science. These and other terms used in the survey are defined in the Glossary near the back of this publication.

Soil test data

Samples of two soils in Fayette County were tested according to standard AASHO procedures to help evaluate the soils for engineering purposes. The results of these tests are shown in table 4. The following paragraphs discuss the columns listed in table 4.

Moisture density: If a soil material is compacted at increasing moisture content, assuming that the compaction effort remains constant, the density of the compacted material will increase until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed "maximum dry density." Moisture-density data are important in earthwork, for as a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

TABLE 4.—*Engineering test data for soil*

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

Soil name and location	Parent material	Ohio report number	Depth from surface	Moisture density: Maximum dry density	Moisture density: Optimum moisture	Mechanical analysis[1] Percentage passing sieve—: 2-in.	1-in.	¾-in.	⅜-in.
			Inches	*Lb./cu. ft.*	*Percent*				
Brookston silty clay loam: 3.75 miles northwest of Eber and 0.75 mile south-southeast of Parrott Station Rd. and 1,000 feet east-northeast of Route 70; Jefferson Township.	Wisconsin glacial till	38026	0–9	84	30	-----	-----	-----	-----
		38027	21–27	106	19	-----	-----	-----	-----
		38028	59–77	127	10	100	96	94	81
Miamian silt loam: 300 yards east of Bunker Hill-Glendon Road. 0.7 mile south of Snow hill Road; 6 miles southwest of Washington Court House.	Wisconsin glacial till	96674	0–6	-----	-----	-----	-----	-----	100
		96675	6–20	-----	-----	-----	-----	100	98
		96676	20–40	-----	-----	-----	-----	100	97

[1] Mechanical analyses according to the AASHO Designation T 88 (*2*). 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 millimeters in diameter. The mechanical analyses used in this table are not suitable for use in naming textural classes for soils.

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

Mechanical analyses: These analyses were made by combined sieve and hydrometer methods. Percentages of clay obtained by the hydrometer method are not used in naming the USDA textural class for soil classification.

Liquid limit and plasticity index: These values measure the effect of water on the consistence of the soil material. As the moisture content of a soil increases from a very dry state, the material changes from a semisolid to a plastic state. As the moisture is further increased, the material changes from a plastic state to a liquid state. 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. Some silty and sandy soils are nonplastic; that is, they will not become plastic at any moisture content.

Classification: Two engineering classifications are shown—AASHO and Unified. The modified AASHO classification used by the Ohio Department of Highways Testing Laboratory also is shown. The AASHO and Unified systems are briefly defined under the heading "Engineering Classification Systems."

Engineering classification systems

Two engineering classification systems are used in this soil survey. One is the system adopted by the American Association of State Highway Officials (AASHO) (*2*). In this system soil materials are classified into seven groups based on load capacity and service. The best soil materials for road subgrades are classified as A–1. The poorest soil materials are classified as A–7. A within-group index ranging from 0 to 20 is a part of the system. The best subgrades within a group are indicated by (0), the poorest by (20). The indexes are shown in table 4.

Some engineers prefer to use the Unified Soil Classification System (*9*). In this system, soil materials are classified on the basis of particle size distribution and their Atterburg limits—plasticity index and liquid index. Soil materials are classified into one of 15 classes: eight classes represent coarse grained material, six classes represent fine grained material, and one class represents highly organic soils. In this system, an approximate classification of soils can be made in the field.

Table 4 shows laboratory determined classifications for soils tested in the county. Table 5 shows the estimated engineering classifications for all of the soils in the county.

Engineering properties of the soils

Table 5 lists the soil series and map symbols of the soils in Fayette County. This table shows estimated engineering properties of the soils in addition to engineering and USDA texture classification. Additional information about the soils is given in the section, "Descriptions of the Soils." Some reference to geology is given in the "Formation and Classification of the Soils" section and in the general section at the back of this soil survey.

samples taken from two soil profiles

procedures of the American Association of State Highway Officials (AASHO (*2*)]

Mechanical analysis [1]—Continued					Liquid limit	Plasticity index	Classification		
Percentage passing sieve—Continued				Percentage smaller than 0.005 mm.			AASHO [2]	Ohio [3] (modified AASHO)	Unified [4]
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)						
----------	100	99	94	47	55	16	A–7–5(13)	A–7–5	MH
----------	100	98	91	56	50	28	A–7–6(17)	A–7–6	CL
79	72	62	48	18	20	2	A–4(3)	A–4a	SM
97	96	91	77	28	----------	[5] NP	A–4(8)	A–4a	ML
97	94	90	78	46	44	20	A–7–6(13)	A–7–6	CL
89	83	74	59	25	24	4	A–4(5)	A–4a	ML–CL

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

[4] Based on the Unified Soil Classification System (*9*). The Soil Conservation Service (SCS) and Bureau of Public Roads (BPR) have agreed that all soils having a plasticity index within two points from A-line are to be given a borderline classification. An example of a borderline classification is ML–CL.

[5] NP=Nonplastic.

The estimated data shown in table 5 are based on the soil test data in table 4 and on experience with test data from the same kinds of soil in other counties. The following paragraphs briefly describe the columns shown in table 5.

Depth to seasonally high water table: The shallowest depth is given at which the soil is saturated during winter and spring because of a perched or other type of ground water table. Soil conditions immediately after heavy precipitation are not considered. In all soils, particularly in sloping soils on uplands, the depth to the water table generally is greater late in spring and in summer and fall than indicated in table 5.

Depth to bedrock: The estimated depth to bedrock is based on observations made during the course of the survey. From place to place, however, the depth to bedrock may vary considerably.

Depth from surface: In this column of table 5, the depths given for each soil correspond to significant changes in texture in the typical profile described for each soil. It should be pointed out that the estimated data given are for the typical soil in each series. Soils different from the typical soil can have properties that vary from those shown.

Percentage passing sieve: These columns of table 5 show estimated particle size distribution by weight according to standard size sieves.

USDA texture: Textures indicated correspond to the textures given in the technical description of each soil.

Engineering classification: The estimated classifications are based on actual test data from this county and other survey areas. See "Engineering Classification Systems" for an explanation of these headings.

Range in permeability: Permeability values are estimates of the range in rates of downward water movement in the major soil horizons when they are saturated above a true water table, but are allowed to drain freely. These values are estimates based on soil texture, soil structure and porosity, and on permeability and infiltration tests. On any given soil, infiltration into or percolation through the surface layer varies considerably according to land use and management as well as initial moisture content.

Available moisture capacity: The available moisture capacity, expressed in inches of water per inch of soil, is the capacity of soils to hold water available for use by most plants. It is defined as the difference between the amount of soil water at field capacity and the amount at wilting point. The estimated values listed are based on the difference in percent moisture retained at 1/3 and 15 atmospheres of tension for medium- and fine-textured soils. For sandy soils, the estimated values are based on the difference between 1/10 and 15 atmospheres of tension. The available moisture capacity in compact glacial till is rated at a lower figure than normal for the given textures because of increased bulk density that greatly reduces the penetration of plant roots. Thus some of the water stored is not available to plant roots.

Reaction: The pH ranges given in this column represent a summary of the many field pH determinations taken during the survey on each of the soils in the county. See "Reaction" in the Glossary for definition.

Shrink-swell potential: The estimated shrink-swell potential is an indication of the volume change to be expected of the soil material with changes in moisture content. The soil materials rated high have serious limitations for engineering uses, such as backfill for building foundations, highway locations, and others.

Corrosion potential: The corrosion potential indicated for uncoated steel is based on soil texture, soil drainage, and total acidity. Electrical resistivity is not considered in this rating. The corrosion potential for concrete is based on soil texture and pH values. The rating given is for average concrete. The ratings do not

TABLE 5.—*Estimated engineering*

[Cut and fill land (Cw), Gravel pits (Gp), and Quarries (Qu) are so variable that no estimate can be made. An asterisk in the first column different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring to other series

Soil series and map symbol	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Classification: Dominant USDA texture	Classification: Unified	Classification: AASHO	Coarse fraction larger than 3 inches
	Feet	*Feet*	*Inches*				*Percent*
Algiers: Ag	[1] 1/2–1 1/2	>5	0–18	Silt loam	CL, ML	A–4, A–6	
			18–48	Silty clay loam to clay	CL, ML–CL	A–6, A–7	
			48–60	Gravelly loam	SM	A–2, A–4	
Brookston: Bs	0–1	>5	0–7	Silty clay loam to clay loam.	ML–CL, MH	A–7	
			7–40	Clay loam	CL, MH–CH	A–6, A–7	
			40–60	Loam	SM, CL, ML–CL.	A–4, A–6	5–15
Cana: CaB2, CaC2	2–3	3 1/2–5	0–12	Silt loam	ML, ML–CL	A–4, A–6	
			12–37	Silty clay loam	CL, ML–CL	A–6, A–7	
			37–50	Weathered shale			

See footnotes at end of table.

apply to concrete mixed specifically for corrosion resistance.

Engineering interpretations

Table 6 gives interpretations of engineering properties of the soils based on the actual soil test data given in table 4, on the estimated engineering properties of soils in table 5, and on experience gained in surveying the soils. All of the soil series in the county are listed in table 6. It rates and describes selected characteristics of the soils that might affect their engineering usage. Explanation of the column headings in table 6 follows.

Suitability for winter grading: Because of wetness, plasticity, or susceptibility to frost action, many of the soils are not adapted to grading during parts of the winter season. Such soils are rated as poor.

Susceptibility to frost action: Silty and fine sandy soils that are wet most of the winter and that have a readily available source of water are the ones that are most susceptible to frost action. Such soils and others are rated high.

Suitability as source of topsoil: The thickness, texture, and inherent fertility of the surface layer of a soil determine its suitability for use as a topdressing for roadbanks and embankments to promote the growth of vegetation. Only the surface layer of the soil is considered in its rating, except as noted otherwise in table 6.

Sand and gravel: Some of the soils in Fayette County are a very good potential source of sand and gravel for construction purposes. A soil rated good, as shown in table 6, has better possibilities for sand or gravel than soils rated poor or fair. But it cannot be assumed that where a soil is rated good, that all areas of that soil can be used for commercial development of sand or gravel.

Highway location: Soil features that affect highway location include shallowness to rock, a high water table, steep slopes, slippage, and flood hazard. Because most of the streams in the county have only a slight gradient, nearby soils on uplands may be subject to flooding. Some areas of Brookston soils are flooded when the flood level is high.

Pipeline construction and maintenance: Soil features that affect pipelines are depth to hard bedrock, soil stability, and natural drainage. Characteristics of each soil series that relate to pipe construction and maintenance are given in table 6. Corrosion potential of pipeline materials as related to the soil series was rated in table 5.

Farm ponds: Under the "Reservoir area" subheading, the sealing potential of the reservoir is given primary consideration. Also, shallowness to bedrock and the susceptibility to overflow in flood plains are considered. Under the "Embankment" subheading, the soils are rated according to the stability and permeability of the material where used in the construction of pond embankments. The permeability is for the soil material where compacted at optimum moisture. The information given for the "Reservoir area" also is pertinent to low dikes and levees.

Agricultural drainage: The soil features are described relative to their natural drainage, their inplace permeability, and the presence of a high seasonal water table.

Irrigation: The relative ease with which water normally infiltrates into, percolates through, and drains from each of the soils is given, and so is the available moisture capacity of the soils.

Terraces and diversions: Slope and the relative erodibility of the soil material are the main considerations. Other soil features considered are depth to rock and the presence of seasonal high water tables. Nearly level soils need no terracing; steep soils are not well adapted to terracing. Highly erodible soils require special care in the construction of diversions.

Waterways: Slope and erodibility of the soil material are the main considerations. Depth to rock and high water table are noted where applicable.

properties of the soils

indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such mapping units may have that appear in the first column of this table. The symbol >means more than]

Percentage passing sieve—				Range in permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Uncoated steel	Concrete
				Inches per hour	*Inches per inch of depth*	*pH*			
85–100	80–100	80–95	55–75	0. 63–2. 0	0. 18–0. 23	6. 6–7. 3	Low	High	Low.
90–100	80–100	75–85	70–80	0. 2–0. 63	0. 18–0. 21	6. 6–7. 8	Moderate	High	Low.
70–80	60–70	50–60	30–40	0. 63–2. 0	0. 08–0. 12	[2] 7. 4–8. 4	Low	High	Low.
--------	100	90–100	85–95	0. 63–2. 0	0. 17–0. 23	6. 1–7. 3	Moderate to high	High	Low.
100	90–100	90–100	80–95	0. 63–2. 0	0. 15–0. 19	6. 1–7. 3	High	High	Low.
75–100	70–95	75–90	45–75	0. 2–0. 63	0. 06–0. 10	[2] 7. 4–8. 4	Low	High	Low.
--------	100	90–100	80–90	0. 63–2. 0	0. 16–0. 19	5. 1–6. 0	Low	High	Moderate.
90–100	75–85	70–85	65–75	0. 22–0. 63	0. 16–0. 19	4. 1–5. 5	Moderate	High	High.
--------	--------	--------	--------	--------	--------	4. 1–5. 0	Low	High	High.

TABLE 5.—*Estimated engineering*

Soil series and map symbol	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Classification: Dominant USDA texture	Classification: Unified	Classification: AASHO	Coarse fraction larger than 3 inches
	Feet	*Feet*	*Inches*				*Percent*
*Casco: CdC2. For Rodman part, see Rodman series.	>3	>5	0–5	Loam	ML, ML–CL	A–4	
			5–19	Gravelly clay loam	SC, CL	A–6	
			19–50	Sand and gravel	GW, SW, GM, SM.	A–1	10
Celina: CeA, CeB, CeB2	1½–3	>5	0–10	Silt loam	ML, ML–CL	A–4	
			10–22	Clay	ML–CL, CH	A–6, A–7	
			22–60	Loam	CL, ML–CL	A–4, A–6	5–15
Corwin: CoB	1½–3	>5	0–12	Silt loam	ML, ML–CL	A–4	
			12–34	Clay loam	CL, ML–CL	A–6, A–7	
			34–60	Loam	CL, ML–CL	A–4, A–6	5–15
Crosby: CrA, CrB	½–1½	>5	0–8	Silt loam	ML, ML–CL	A–4	
			8–23	Clay loam to clay	CL, CH, ML–CL.	A–7, A–6	
			23–60	Loam	CL, ML–CL	A–4, A–6	5–15
*Fox: FnA, FnB, FnB2, FnC2, FoC3, FrE2. For Casco and Rodman parts of FoC3 and FrE2, see Casco and Rodman series.	>3	>5	0–8	Silt loam	ML–CL or ML.	A–4	
			8–29	Clay loam to clay	CL, SC	A–6, A–7	
			29–36	Gravelly loam	SM	A–1, A–2	
			36–60	Sand and gravel	GW, GP, GM.	A–1	10–20
Genesee: Gn	[1] >3	>5	0–7	Silt loam	ML, ML–CL	A–4	
			7–28	Loam	ML, CL	A–4, A–6	
			28–54	Silt loam	ML	A–4	
Hennepin. Mapped only in undifferentiated units with Miamian soils.	>3	>5	0–9	Silt loam	ML, ML–CL	A–4	
			9–20	Loam	CL	A–6	
			20–60	Loam	CL or ML–CL	A–4, A–6	5–15
Henshaw:							
HeA	½–1½	>5	0–14	Silt loam	ML, ML–CL	A–4	
			14–34	Silty clay loam and silt loam.	CL, ML–CL	A–6	
			34–60	Stratified silt loam, fine sandy loam.	ML, CL	A–4, A–6	
HkA	0–1	>5	0–12	Silt loam	ML, ML–CL	A–4	
			12–40	Silty clay loam	CL, ML–CL	A–6	
			40–60	Silt loam	ML, CL	A–4, A–6	
Kendallville: KeB, KeB2, KeC2, KlC3, KlD3.	>3	>5	0–8	Silt loam	ML, ML–CL	A–4	
			8–26	Clay loam	CL, ML–CL	A–7, A–6	
			26–34	Sandy clay loam	SC, CL	A–6	
			34–60	Loam	CL or ML–CL	A–4, A–6	5–15
Medway:							
Md	[1]1½–3	>5	0–25	Silt loam	CL, ML	A–4, A–6	
			25–55	Loam	ML	A–4	
			55–60	Gravelly loam	SM	A–1, A–2	
Me	[1]1½–3	2–3	0–10	Silt loam	ML, CL	A–4, A–6	
			10–34	Loam	ML	A–4	
			34–40	Limestone.			

See footnotes at end of table.

properties of the soils—Continued

Percentage passing sieve—				Range in permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Uncoated steel	Concrete
				Inches per hour	*Inches per inch of depth*	*pH*			
90–100	90–100	70–85	50–65	0.63–2.0	0.14–0.18	6.1–7.8	Low	Low	Low.
70–80	60–70	50–65	40–55	0.63–2.0	0.12–0.16	[2] 5.6–7.8	Moderate	Low	Low.
40–60	20–35	5–15	4–15	6.3–12+	0.03–0.05	[2] 7.4–8.4	Low	Low	Low.
100	90–100	85–95	70–85	0.63–2.0	0.17–0.20	5.6–7.3	Low	High	Moderate to low.
95–100	85–100	80–95	70–90	0.2–0.63	0.13–0.16	5.1–7.3	Moderate to high	High	Moderate to low.
85–95	75–95	60–70	55–65	0.2–0.63	0.06–0.10	[2] 7.4–8.4	Low	Moderate	Low.
100	90–100	85–95	80–95	0.63–2.0	0.17–0.20	5.1–6.5	Low	High	Moderate to low.
95–100	90–100	90–95	80–95	0.2–0.63	0.15–0.18	5.6–7.3	Moderate to high	High	Moderate to low.
80–95	70–90	60–85	55–65	0.2–0.63	.06–0.10	[2] 7.4–8.4	Low	Moderate	Low.
100	90–100	90–100	80–95	0.63–2.0	0.17–0.20	5.6–6.5	Low to moderate	High	Moderate to low.
95–100	90–100	90–100	80–95	0.2–0.63	0.13–0.18	5.6–7.3	High	High	Moderate to low.
80–95	70–90	60–85	55–65	0.2–0.63	0.06–0.10	[2] 7.4–8.4	Low	High	Low.
85–95	80–90	65–90	60–75	0.63–2.0	0.17–0.20	5.6–6.6	Low	Low	Low.
80–95	65–90	55–85	45–80	0.63–2.0	0.16–0.19	5.1–6.6	Moderate to high	Moderate	Low to moderate.
75–90	50–75	25–50	20–35	0.63–6.3	0.12–0.15	[2] 7.4–8.4	Low	Low	Low.
25–55	20–35	5–15	4–15	6.3–12+	0.03–0.05	[2] 6.6–7.8	Low	Low	Low.
100	90–100	90–100	80–95	0.63–2.0	0.17–0.22	[2] 6.6–7.8	Low	Low	Low.
100	90–100	85–100	50–65	0.63–2.0	0.17–0.20	[2] 6.6–7.8	Low	Moderate	Low.
100	90–100	80–100	80–95	0.63–2.0	0.17–0.20	[2] 7.4–8.4	Low	Moderate	Low.
90–100	90–100	80–95	75–80	0.63–2.0	0.17–0.20	6.1–7.8	Low	Low	Low.
90–100	90–100	75–90	65–75	0.63–2.0	0.16–0.19	6.1–7.8	Low to moderate	Low	Low.
90–100	80–90	60–85	55–65	0.2–0.63	0.06–0.10	[2] 7.4–8.4	Low	Low	Low.
100	95–100	90–100	85–95	0.63–2.0	0.17–0.22	5.1–6.5	Low	High	Moderate.
100	95–100	90–100	80–90	0.2–0.63	0.16–0.20	5.6–7.8	Moderate	High	Moderate.
100	95–100	90–100	55–90	0.2–0.63	0.15–0.18	[2] 7.4–8.4	Low	High	Low.
100	95–100	90–100	85–95	0.63–2.0	0.17–0.22	5.1–6.5	Low	High	Moderate.
100	95–100	90–100	80–90	0.2–0.63	0.16–0.20	5.6–7.8	Moderate	High	Moderate.
100	95–100	90–100	70–90	0.2–0.63	0.15–0.18	[2] 7.4–8.4	Low	High	Low.
100	95–100	85–95	70–80	0.63–2.0	0.17–0.20	5.6–6.5	Low to moderate	Moderate	Moderate to low.
100	95–100	80–95	65–75	0.63–2.0	0.16–0.19	5.1–6.5	Moderate to high	Moderate	Moderate to low.
80–90	70–80	60–75	45–55	0.63–2.0	0.14–0.17	6.6–7.8	Moderate	Moderate	Low.
90–100	85–95	60–75	55–65	0.2–0.63	0.06–0.10	[2] 7.4–8.4	Low	Low	Low.
100	100	90–100	70–80	0.63–2.0	0.17–0.22	6.6–7.3	Low	Moderate	Low.
95–100	80–95	75–90	60–90	0.63–2.0	0.16–0.20	6.6–7.3	Low	Moderate	Low.
75–90	50–75	25–50	20–35	6.3–12+	0.05–0.12	6.6–7.8	Low	Moderate	Low.
100	90–100	90–100	80–95	0.63–2.0	0.17–0.22	6.6–7.3	Low	Moderate	Low.
100	90–95	85–95	60–90	0.63–2.0	0.16–0.20	6.6–7.8	Low	Moderate	Low.

TABLE 5.—*Estimated engineering*

Soil series and map symbol	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Classification: Dominant USDA texture	Classification: Unified	Classification: AASHO	Coarse fraction larger than 3 inches
	Feet	*Feet*	*Inches*				*Percent*
*Miamian: MIB, MIB2, MIC, MIC2, MID2, MmB3, MmC3, MmD3, MpE2, MpF2, MrF3. For Hennepin part of MpE2, MpF2, and MrF3, see Hennepin series.	>3	>5	0–9	Silt loam	ML or ML-CL	A–4	
			9–23	Clay loam to clay	CL	A–6, A–7	
			23–60	Loam	CL or ML-CL	A–4	5–15
Millsdale: Ms	0–1	1½–3½	0–17	Silty clay loam	CL, ML-CL	A–6, A–7	
			17–34	Clay	CL, CH, MH	A–6, A–7	
			34–40	Limestone.			
Milton: MtB, MtB2, MtC2	>3	1½–3½	0–8	Silt loam	ML, ML-CL	A–4	
			8–17	Clay loam	CL, ML-CL	A–6, A–7	
			17–29	Clay	CL, CH, MH	A–6, A–7	
			29–32	Limestone.			
Odell: OdA	0–1	>5	0–16	Silt loam	ML, ML-CL	A–4	
			16–30	Clay loam to clay	CL, CH, ML-CL	A–6, A–7	
			30–60	Silt loam or loam	CL or ML	A–4, A–6	
Patton: Pa, Pc	0–1	>5	0–12	Silty clay loam	CL, ML-CL	A–6	
			12–31	Silty clay loam	CL, ML-CL	A–7, A–6	
			31–76	Silt loam	ML, CL	A–4, A–6	
Randolph: RcB	0–1	1½–3½	0–12	Silt loam	ML, ML-CL	A–4	
			12–26	Clay	CH, ML-CL	A–6, A–7	
			26–30	Limestone.			
*Ritchey: RmC, RmF2. For the Romeo part of RmC and RmF2, see Romeo series.	>3	1–2	0–6	Silt loam	ML, ML-CL	A–4	
			6–18	Silty clay loam	CL, CH, MH	A–6, A–7	
			18–22	Limestone.			
Rodman. Mapped only in undifferentiated units with Casco and Fox and Casco soils.	>3	>5	0–16	Gravelly loam and gravelly sandy loam.	SM	A–1, A–2	
			16–50	Sand and gravel	GW, GP, or GM	A–1	10–20
Romeo. Mapped only in undifferentiated units with Ritchey soils.	>3	0–1	0–7	Silt loam	ML, CL	A–4, A–6	
			7–10	Limestone.			
Ross: Rs	[1]>3	>5	0–20	Silt loam	CL, ML	A–4, A–6	
			20–60	Loam	CL, ML	A–4, A–6	
Sleeth: SlA	0–1	>5	0–13	Silt loam	ML, ML-CL	A–4	
			13–39	Clay loam	CL, ML-CL	A–6	
			39–58	Gravelly loam	SM	A–2, A–4	
			58–60	Sand and gravel	GW, GP, or GM	A–1	10–20
Thackery: ThB	2–3	>5	0–18	Silt loam	ML, ML-CL	A–4	
			18–39	Clay loam	CL, ML-CL	A–6	
			39–56	Very gravelly loam	GM	A–1, A–2	
			56–72	Sand and gravel	GW, GP, or GM	A–1	10–20

See footnotes at end of table.

properties of the soils—Continued

Percentage passing sieve—				Range in permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Uncoated steel	Concrete
				Inches per hour	*Inches per inch of depth*	*pH*			
95–010	95–100	90–100	75–95	0.63–2.0	0.17–0.20	5.1–6.5	Low to moderate	Moderate	Moderate.
90–100	85–95	80–95	70–85	0.2–0.63	0.15–0.18	4.5–6.0	Moderate	Moderate	Moderate to high.
85–95	70–90	60–75	55–65	0.2–0.63	0.06–0.10	[2] 7.4–8.4	Low	Low	Low.
100	100	90–100	85–95	0.63–2.0	0.17–0.24	6.1–7.3	High	High	Low.
100	100	90–100	85–95	0.2–0.63	0.13–0.18	[2] 6.6–7.8	High	High	Low.
100	100	80–90	65–90	0.63–2.0	0.17–0.20	5.1–7.3	Low	Moderate	Low to moderate.
90–100	90–100	75–90	65–75	0.63–2.0	0.16–0.19	5.6–6.0	Moderate	Moderate	Moderate.
95–100	90–95	85–95	80–90	0.2–0.63	0.13–0.16	6.1–7.3	High	Moderate	Low.
100	100	90–100	80–90	0.63–2.0	0.17–0.20	5.6–6.5	Low	High	Moderate to low.
100	90–100	90–100	85–95	0.63–2.0	0.16–0.19	5.6–7.3	High	High	Moderate to low.
85–95	80–90	60–85	55–65	0.2–0.63	0.06–0.10	[2] 7.4–8.4	Low	High	Low.
100	100	90–100	80–100	0.63–2.0	0.18–0.22	6.1–7.3	Moderate	High	Low.
100	100	90–100	85–100	0.63–2.0	0.16–0.19	6.6–7.3	High	High	Low.
100	90–100	--------	80–95	0.2–0.63	0.16–0.19	[2] 7.4–7.8	Moderate	High	Low.
100	100	90–100	75–85	0.63–2.0	0.17–0.22	5–6–6.0	Moderate	High	Moderate.
100	100	85–100	80–90	0.2–0.63	0.13–0.16	5.1–7.8	High	High	Moderate to low.
100	95–100	85–100	75–85	0.63–2.0	0.17–0.22	5.6–6.5	Moderate	Moderate	Low to moderate.
100	90–100	85–100	85–95	0.63–2.0	0.13–0.16	6.1–7.8	High	Moderate	Low.
60–90	50–75	20–45	15–35	2.0–6.3+	0.08–0.14	[2] 6.6–7.8	Low	Low	Low.
25–55	20–35	5–15	4–15	6.3–12+	0.02–0.06	[2] 7.4–7.8	Low	Low	Low.
100	90–100	85–100	70–90	0.63–2.0	0.16–0.20	[2] 6.1–7.8	Moderate	Low	Low.
90–100	90–100	80–90	75–85	0.63–2.0	0.18–0.24	6.6–7.3	Low	Low	Low.
95–100	80–90	80–90	60–70	0.63–2.0	0.16–0.20	6.6–7.3	Low	Moderate	Low.
100	95–100	80–90	70–80	0.63–2.0	0.17–0.22	6.1–6.5	Moderate	--------	Moderate.
100	85–100	80–90	70–85	0.2–0.63	0.15–0.19	5.6–7.8	Moderate	High	Moderate to low.
70–80	60–70	50–60	30–40	0.63–2.0	0.12–0.15	[2] 6.6–8.4	Low	High	Low.
30–50	20–30	5–15	4–15	6.3–12+	0.02–0.06	[2] 7.4–8.4	Low	Low	Low.
100	90–100	80–95	75–85	0.63–2.0	0.17–0.22	5.1–6.5	Low	Low	Low to moderate.
100	75–85	70–80	65–75	0.63–2.0	0.16–0.19	6.1–7.3	Moderate	Moderate	Low.
55–65	35–45	30–40	20–30	2.0–6.3	0.04–0.07	[2] 7.4–8.4	Low	Moderate to low	Low.
30–50	25–30	5–15	4–15	6.3–12+	0.02–0.06	[2] 7.4–8.4	Low	Low	Low.

TABLE 5.—*Estimated engineering*

Soil series and map symbol	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Classification: Dominant USDA texture	Classification: Unified	Classification: AASHO	Coarse fraction larger than 3 inches
	Feet	*Feet*	*Inches*				*Percent*
Warners: We	0–1	>5	0–9	Silty muck	OL, ML	A-4, A-6	
			9–15	Silty clay loam	CL	A-6	
			15–50	Silt loam	ML	A-4	
Warsaw: WrB	>3	>5	0–15	Silt loam	ML, ML-CL	A-4	
			15–35	Clay loam and loam	CL, ML-CL	A-6, A-7	
			35–60	Sand and gravel	GW, GP, or GM	A-1	10–20
Wea: WsA	>3	>5	0–17	Silt loam	ML, ML-CL	A-4	
			17–41	Clay loam to clay	CL, ML-CL	A-6, A-7	
			41–55	Gravelly loam	SM	A-1, A-2	
			55–60	Sand and gravel	GW, GP or GM	A-1	10–20
Westland: Wu, Wv	0–1	>5	0–15	Silty clay loam	CL, ML-CL	A-6	
			15–32	Silty clay loam	CL, CH	A-6, A-7	
			32–48	Gravelly clay loam	SM	A-4, A-2	
			48–60	Sand and gravel	GW, GP or GM	A-1	10–20

[1] Subject to flooding.

TABLE 6.—*Interpretations of*

[Cut and fill land (Cw), Gravel pits (Gp), and Quarries (Qu) not rated. An asterisk in the first column indicates that at least one limitations, and for this reason it is necessary to follow carefully the instructions

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Suitability as source of— Sand and gravel	Road fill: Solum	Road fill: Substratum	Soil features affecting— Highway location [1]
Algiers: Ag	Poor: seasonal high water table.	High	Good	Not suited	Poor: soft compressible material.	Locally fair to good: seasonal high water table.	Subject to flooding; somewhat poorly drained; seasonal high water table.
Brookston: Bs	Poor: seasonal high water table; sticky when wet.	High	Fair: excessive clay content.	Not suited	Poor: moderately fine textured material.	Fair: loam till.	Very poorly drained; seasonal high water table; moderately slow permeability; some areas subject to flooding.

See footnotes at end of table.

properties of the soils—Continued

Percentage passing sieve—				Range in permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Uncoated steel	Concrete
				Inches per hour	*Inches per inch of depth*	*pH*			
100	100	90–100	90–100	0. 2–6. 3	0. 20–0. 25	[2] 6. 6–8. 4	Moderate	High	Low.
100	80–100	75–95	70–90	0. 2–2. 0	0. 17–0. 22	[2] 7. 4–8. 4	Moderate	High	Low.
100	90–100	80–100	75–90	0. 06–0. 20	0. 15–0. 20	[2] 7. 4–8. 4	Moderate	High	Low.
100	95–100	85–95	70–80	0. 63–2. 0	0. 18–0. 23	6. 1–7. 3	Low to moderate	Moderate	Low.
100	95–100	90–100	70–80	0. 63–2. 0	0. 16–0. 19	5. 6–7. 3	Low to moderate	Moderate	Low.
30–50	25–30	5–15	4–15	6. 3–12+	0. 02–0. 06	[2] 7. 4–8. 4	Low	Low	Low.
100	90–100	85–95	80–90	0. 63–2. 0	0. 17–0. 20	5. 6–7. 3	Low to moderate	Low	Low.
100	95–100	80–90	70–80	0. 63–2. 0	0. 16–0. 19	5. 6–7. 3	Moderate	Moderate	Low.
75–90	50–75	25–50	20–35	6. 3–12+	0. 06–0. 09	[2] 7. 4–8. 4	Low	Moderate	Low.
30–50	25–30	5–15	4–15	6. 3–12+	0. 03–0. 06	[2] 7. 4–8. 4	Low	Moderate	Low.
100	100	90–100	85–95	0. 63–2. 0	0. 18–0. 24	5. 6–7. 3	Moderate	High	Low.
100	90–100	85–95	80–90	0. 63–2. 0	0. 16–0. 19	6. 1–7. 3	Moderate	High	Low.
70–80	60–70	40–60	35–45	0. 63–2. 0	0. 12–0. 16	6. 6–7. 8	Moderate	High	Low.
30–50	25–30	5–15	4–15	6. 3–12+	0. 02–0. 06	[2] 7. 4–8. 4	Low	High	Low.

[2] Calcareous.

engineering properties of soil

mapping unit in this series is made up of two or more kinds of soil. The soils in such mapping units may have different properties and for referring to other series that appear in the first column of this table]

Soil features affecting—Continued						
Pipeline construction and maintenance [2]	Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
	Reservoir area	Embankment [3]				
Subject to flooding; somewhat poorly drained.	Subject to flooding; susceptible to seepage where substratum contains sand and gravel layers.	Fair compaction and stability; slow permeability.	Subject to flooding; seasonal high water table; somewhat poorly drained; moderately slowly permeable.	Moderately slow infiltration and permeability; high available moisture capacity; subject to flooding.	Nearly level; subject to flooding.	Nearly level; seasonally wet; subject to flooding.
Very poorly drained; moderately fine textured material; loam till below depth of 3 feet.	Moderately slow seepage; some areas subject to flooding.	Fair to poor compaction and stability; slow permeability; medium to high compressibility; high volume change.	Very poorly drained; moderate permeability to depth of 3 feet; seasonal high water table.	Moderate infiltration and permeability to depth of 3 feet; very poorly drained; high available moisture capacity; seasonal high water table.	Nearly level; seasonally wet.	Nearly level; moderately erodible channels; soil material seasonally wet and sticky.

TABLE 6.—*Interpretations of*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Suitability as source of— Sand and gravel	Suitability as source of— Road fill: Solum	Suitability as source of— Road fill: Substratum	Soil features affecting— Highway location [1]
Cana: CaB2, CaC2	Poor: seasonal high water table.	High	Good to fair: moderately fine textured below 12 inches.	Not suited	Poor: moderately fine textured material.	Poor: shale below depth of 40 inches.	Shale below depth of 40 inches; seasonal high water table; cut slopes shaly and droughty; subject to seepage.
*Casco: CdC2. For Rodman part, see Rodman series.	Good: well drained and gravelly.	Low	Fair to poor: high gravel content.	Good below depth of 20 inches: well-graded material with minimum fines.	Fair to poor: gravelly material that has high content of fines.	Good: sandy and gravelly material.	Cut slopes gravelly and droughty; well drained; steep slopes in FrE2 mapping unit.
Celina: CeA, CeB, CeB2.	Poor: seasonally wet; sticky, clayey subsoil.	High	Good to depth of 1 foot, subsoil poor: clayey material.	Not suited	Fair to poor: clayey material in subsoil.	Fair: loam till.	Moderately well drained; seasonally wet for short periods; clayey subsoil.
Corwin: CoB	Poor: seasonally wet; moderately fine textured.	High	Good: high organic-matter content in uppermost 1 foot.	Not suited	Fair to poor: moderately fine textured material.	Fair: loam till.	Moderately well drained; seasonally wet for short periods.
Crosby: CrA, CrB	Poor: seasonal high water table; clayey subsoil.	High	Fair: low organic-matter content; limited suitable material.	Not suited	Poor: clay loam material in subsoil.	Fair: loam till.	Seasonal high water table; somewhat poorly drained; clayey subsoil.
*Fox: FnA, FnB, FnB2, FnC2, FoC3, FrE2. For Casco part of FoC3 and FrE2, see Casco series and for Rodman part of FrE2, see Rodman series.	Fair in subsoil: well drained; moderately fine textured to fine textured; good in substratum: sandy and gravelly.	Low	Fair: limited suitable material.	Good below depth of 20 to 40 inches: well-graded material; high content of carbonates.	Fair to poor: moderately fine to fine material.	Good: sandy and gravelly material.	Well drained; cut slopes are gravelly and droughty; locally, limestone is within 40 inches of the surface; some steep slopes.
Genesee: Gn	Fair to good: subject to flooding but well drained.	Low to moderate.	Good to depth of 2 to 3 feet.	Not suited	Fair to poor: loamy material.	Fair: loam till.	Subject to flooding.

See footnotes at end of table.

engineering properties of soil—Continued

Soil features affecting—Continued							
Pipeline construction and maintenance [2]	Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
	Reservoir area	Embankment [3]				
Acid shale below depth of 40 inches; seasonally wet.	Shale below depth of 40 inches.	Shale below depth of 40 inches; limited material.	Shale below depth of 40 inches; moderately well drained; moderately slow permeability.	Moderately slow infiltration and permeability; medium available moisture capacity.	Gently sloping to sloping; erodible; seepy in spring; shaly material below depth of 40 inches.	Gently sloping to sloping; shale below depth of 40 inches.
Well drained; sandy and gravelly material.	Pervious material; high seepage losses.	Permeable material; high seepage losses; subject to piping.	Well drained	Moderate infiltration and permeability; low available moisture capacity.	Slopes irregular in shape; cut channels droughty.	Low available moisture capacity; difficult to grow needed vegetation.
Seasonally wet; moderately well drained; dense loam till at depth of 24 to 36 inches.	Moderately slow seepage.	Good stability and compaction; slowly permeable material; fair resistance to piping.	Moderately well drained; moderately slow permeability.	Moderately slow infiltration and permeability; medium available moisture capacity.	Nearly level to gently sloping.	Nearly level to gently sloping; erodible.
Seasonally wet; moderately well drained; loam till at depth of 24 to 36 inches.	Slow seepage	Good stability and compaction; slowly permeable material; fair resistance to piping.	Moderate well drained; moderately slow permeability.	Moderately slow infiltration and permeability; medium available moisture capacity.	Gently sloping	Gently sloping; erodible.
Clayey material: seasonally wet; dense till at depth of 24 to 36 inches.	Slow seepage; seasonal high water table.	Fair compaction and stability; slowly permeable material; good resistance to piping.	Somewhat poorly drained; moderately slow permeability.	Moderately slow infiltration and permeability; medium available moisture capacity.	Seasonally wet; nearly level to gently sloping; clayey subsoil.	Seasonally wet; nearly level to gently sloping; clayey subsoil.
Well drained; sand and gravel below depth of 20 to 40 inches; locally limestone is within 40 inches of the surface.	Permeable material; high seepage losses.	Permeable material in substratum; high seepage losses; fair to good compaction and stability.	Well drained	Moderate infiltration and permeability; medium to low available moisture capacity.	Slopes of FrE2 are short, steep, and irregular in shape; channels gravelly in some places.	Subject to erosion; channels likely to be droughty.
Subject to flooding; deep loamy material.	Subject to flooding; susceptible to excessive seepage where substratum contains sandy layers.	Fair to poor compaction and stability; slow permeability; susceptible to piping.	Well drained	Moderate infiltration and permeability; high available moisture capacity; nearly level.	Nearly level; subject to flooding.	Nearly level; subject to flooding.

TABLE 6.—*Interpretations of*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Sand and gravel	Road fill: Solum	Road fill: Substratum	Soil features affecting— Highway location [1]
Hennepin. Mapped only in undifferentiated units with Miamian soils.	Fair to good: well drained.	Low to moderate.	Poor: steep slopes; eroded.	Not suited.	Fair to poor: loamy material.	Fair: loam till.	Steep slopes; cuts are droughty; well drained.
Henshaw: HeA	Poor: seasonal high water table; somewhat poorly drained.	High.	Good to depth of about 14 inches.	Not suited.	Poor: high silt content; soft and compressible material.	Poor: high silt content; soft and compressible material.	Nearly level; seasonal high water table; somewhat poorly drained; soft and compressible; slow permeability.
HkA	Poor: high water table; somewhat poorly drained.	High.	Good: high organic-matter content.	Not suited.	Poor: relatively high silt content; soft and compressible material.	Poor: relatively high silt content; soft and compressible material.	Nearly level; seasonal high water table; somewhat poorly drained; soft and compressible; moderately slow permeability.
Kendallville: KeB, KeB2, KeC2, KlC3, KlD3.	Fair to good: well drained; moderately fine textured.	Low to moderate.	Fair: limited suitable material.	Not suited.	Fair: subsoil sticky and moderately fine textured.	Fair: loam till.	Droughty cut slopes; well drained; some moderately steep slopes.
Medway: Md	Poor: subject to flooding; generally wet in winter.	High.	Good to depth of 2 to 3 feet.	Generally not suited but locally fair.	Fair: loamy compressible material.	Fair to good: loamy to gravelly material below depth of 50 inches.	Subject to flooding; nearly level.
Medway, moderately shallow variant: Me.	Poor: limestone at depth of 20 to 40 inches.	High.	Good.	Not suited: source of limestone in some places.	Fair: loamy material.	Not suited: limestone.	Limestone at depth of 20 to 40 inches; subject to flooding.
*Miamian: MlB, MlB2, MlC, MlC2, MlD2, MmB3, MmC3, MmD3, MpE2, MpF2, MrF3. For the Hennepin part of MpE2, MpF2, and MrF3, see Hennepin series.	Poor: well drained; clayey material in subsoil.	Moderate.	Fair: limited suitable material; poor in eroded soils.	Not suited.	Fair to poor: clayey, plastic subsoil.	Fair: compact loam till.	Some steep slopes; well drained; calcareous till in cuts; moderately slow permeability.

See footnotes at end of table.

engineering properties of soil—Continued

Soil features affecting—Continued						
Pipeline construction and maintenance [2]	Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
	Reservoir area	Embankment [3]				
Well drained; steep slopes; loam till at shallow depth.	Slow seepage; slopes limit storage capacity.	Fair compaction and stability; medium compressibility; steep slopes.	Well drained.	Steep slopes; low available moisture capacity.	Steep; droughty soil.	Steep; droughty soil.
Seasonal high water table; somewhat poorly drained; slow permeability.	Slow seepage; seasonal high water table.	Fair to poor compaction and stability; susceptible to piping; high compressibility; moderately slow permeability.	Somewhat poorly drained; moderately slow permeability.	Moderately slow infiltration and permeability; medium to high available moisture capacity; nearly level.	Nearly level; seasonally wet.	Nearly level; seasonally wet.
Seasonal high water table; somewhat poorly drained; moderately slow permeability.	Slow seepage; seasonal high water table.	Fair to poor compaction and stability; susceptible to piping; high compressibility; moderately slow permeability.	Somewhat poorly drained; moderately slow permeability.	Moderately slow infiltration and permeability; medium to high available moisture capacity; nearly level.	Nearly level; seasonally wet.	Nearly level; seasonally wet.
Some moderately steep slopes; well drained; loam till within 40 inches of the surface.	Excessive seepage in some areas.	Fair to good compaction and stability; fair resistance to piping; medium compressibility; slow permeability.	Well drained.	Moderate infiltration and permeability in upper 2 to 3 feet; medium available moisture capacity.	Some slopes irregular in shape; eroded areas difficult to vegetate.	Difficult to vegetate on eroded areas; moderately steep in some places.
Subject to flooding; nearly level.	Subject to flooding; susceptible to seepage where substratum contains sandy and gravelly layers.	Fair compaction and stability; moderate to slow permeability; susceptible to piping.	Moderately well drained; moderate permeability; deep soil; subject to flooding.	Moderate infiltration and permeability; high available moisture capacity.	Nearly level; subject to flooding.	Nearly level; subject to flooding.
Limestone at depth of 20 to 40 inches; subject to flooding.	Limestone at depth of 20 to 40 inches; subject to flooding.	Fair compaction and stability; slow permeability; limited material.	Limestone at depth of 20 to 40 inches; moderately well drained.	Moderate rate of infiltration and permeability; medium available mositure capacity.	Nearly level; limestone at depth of 20 to 40 inches; subject to flooding.	Nearly level; limestone at depth of 20 to 40 inches; subject to flooding.
Some steep slopes; dense, compact calcareous till.	Slow seepage; some steep slopes.	Fair compaction and stability; slow permeability; good resistance to piping.	Well drained.	Moderately slow infiltration and permeability; medium available moisture capacity; some steep slopes.	Gently sloping to very steep; difficult to grow plants on eroded or cut areas.	Gently sloping to very steep; difficult to grow plants on eroded or cut areas.

TABLE 6.—*Interpretations of*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Sand and gravel	Road fill: Solum	Road fill: Substratum	Soil features affecting— Highway location [1]
Millsdale: Ms	Poor: limestone at depth of 20 to 40 inches; very poorly drained.	High	Fair: moderately fine textured; high organic-matter content.	Not suited: source of limestone in some places.	Poor: clayey subsoil.	Not suited: limestone at depth of 20 to 40 inches.	Limestone at depth of 20 to 40 inches; seasonal high water table; very poorly drained.
Milton: MtB, MtB2, MtC2.	Poor: limestone at depth of 20 to 40 inches.	Low to moderate.	Fair: limited suitable material.	Not suited: source of limestone in some places.	Poor: subsoil is clayey.	Not suited: limestone at depth of 20 to 40 inches.	Limestone at depth of 20 to 40 inches; well drained.
Odell: OdA	Poor: high water table.	High	Fair to good: seasonal high water table.	Not suited	Poor: clayey subsoil material.	Fair: compact loam till.	Nearly level; seasonal high water table; somewhat poorly drained.
Patton: Pa	Poor: seasonal high water table.	High	Fair: excessive clay content.	Not suited	Poor: compressible material in solum and substratum.	Poor: compressible material in solum and substratum.	Very poorly drained; seasonal high water table; soft and unstable.
Pc	Poor: seasonal high water table.	High	Fair: excessive clay content.	Not suited	Poor: compressible material in solum and substratum.	Poor: compressible material in solum and substratum.	Very poorly drained; seasonal high water table; soft and unstable; subject to flooding.
Randolph: RcB	Poor: limestone at depth of 20 to 40 inches.	High	Fair: low organic-matter content.	Not suited: source of limestone in some places.	Poor: clayey subsoil.	Not suited: limestone at depth of 20 to 40 inches.	Somewhat poorly drained; seasonal high water table; moderately slow permeability; limestone at depth of 20 to 40 inches.

See footnotes at end of table.

engineering properties of soil—Continued

Soil features affecting—Continued						
Pipeline construction and maintenance [2]	Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
	Reservoir area	Embankment [3]				
Limestone at depth of 20 to 40 inches; very poorly drained.	Limestone at depth of 20 to 40 inches.	Fair to poor compaction and stability; slow permeability; limestone at depth of 20 to 40 inches; limited material.	Very poorly drained; moderately slow permeability; limestone at depth of 20 to 40 inches.	Moderately slow permeability; medium available moisture capacity; very poorly drained; seasonal high water table.	Nearly level; limestone at depth of 20 to 40 inches.	Nearly level; limestone at depth of 20 to 40 inches.
Limestone at depth of 20 to 40 inches.	Limestone at depth of 20 to 40 inches.	Soil material has fair stability and compaction; slow permeability; limestone at depth of 20 to 40 inches; limited material.	Well drained	Moderately slow permeability; medium available moisture capacity.	Gently sloping to sloping; limestone at depth of 20 to 40 inches; difficult to grow plants on eroded or cut areas.	Gently sloping to sloping; limestone at depth of 20 to 40 inches; difficult to grow plants on eroded or cut areas.
Nearly level; seasonal high water table; somewhat poorly drained; calcareous till at depth of 24 to 36 inches.	Slow seepage	Fair compaction and stability; slow permeability.	Somewhat poorly drained; moderately slow permeability.	Moderately slow infiltration and permeability; medium available moisture capacity.	Nearly level; seasonally wet; somewhat poorly drained.	Nearly level; seasonally wet; clayey subsoil.
Very poorly drained; seasonal high water table.	Very poorly drained; slow seepage.	Poor compaction and fair stability; slow permeability; susceptible to piping.	Very poorly drained; moderately slow permeability; seasonal high water table.	Moderately slow infiltration and permeability; high available moisture capacity.	Nearly level	Nearly level; susceptible to excessive silting; seasonally wet.
Very poorly drained; seasonal high water table; subject to flooding.	Very poorly drained; slow seepage; subject to flooding.	Poor compaction and fair stability; slow permeability; susceptible to piping.	Very poorly drained; moderately slow permeability; seasonal high water table; subject to flooding.	Moderately slow infiltration and permeability; high available moisture capacity; subject to flooding.	Nearly level; subject to flooding.	Nearly level; susceptible to excessive silting; seasonally wet; subject to flooding.
Seasonal high water table; limestone at depth of 20 to 40 inches.	Limestone at depth of 20 to 40 inches.	Fair compaction and stability; slow permeability; limestone at depth of 20 to 40 inches; limited material.	Somewhat poorly drained; moderately slow permeability; limestone at depth of 20 to 40 inches.	Somewhat poorly drained; moderately slow permeability; seasonal high water table.	Gently sloping; limestone at depth of 20 to 40 inches.	Gently sloping; limestone at depth of 20 to 40 inches.

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TABLE 6.—*Interpretations of*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Sand and gravel	Road fill: Solum	Road fill: Substratum	Soil features affecting— Highway location [1]
*Ritchey: RmC, RmF2. For Romeo part of RmC and RmF2, refer to Romeo series.	Poor: limestone at depth of 10 to 20 inches.	Moderate to low.	Poor: limestone at depth of 10 to 20 inches.	Not suited: source of limestone in some places.	Poor: moderately fine textured material.	Poor: limestone at depth of 10 to 20 inches.	Limestone at depth of 10 to 20 inches; some steep slopes; well drained.
Rodman. Mapped only with Casco and Fox soils.	Good	Low	Poor: sandy and gravelly material.	Good: well-graded sand and gravel.	Good: well drained; sandy and gravelly.	Good: well drained; sandy and gravelly.	Some steep slopes; cut slopes are gravelly, droughty, and loose.
Romeo. Mapped only with Ritchey soils.	Poor: limestone at depth of less than 10 inches.	Moderate to low.	Unsuited: limestone at depth of less than 10 inches.	Not suited: source of limestone in some places.	Unsuited: limestone at depth of less than 10 inches.	Unsuited: limestone at depth of less than 10 inches.	Limestone at depth of less than 10 inches; some steep slopes.
Ross: Rs	Poor: subject to flooding; generally wet in winter.	Moderate	Good	Not suited	Fair: loamy material.	Fair: loamy material.	Nearly level; subject to flooding; well drained.
Sleeth: SlA	Poor: seasonal high water table.	High	Good	Good below depth of 4 feet: sand, gravel, and some fine material.	Fair to poor: moderately fine textured material.	Good: sandy and gravelly material.	Seasonal high water table; somewhat poorly drained; nearly level.
Thackery: ThB	Poor: generally wet in winter; moderately well drained.	High	Good	Good below depth of 4 feet: well-graded and some fine material.	Fair to poor: moderately fine textured material.	Good: sandy and gravelly material.	Moderately well drained; gently sloping.

See footnotes at end of table.

engineering properties of soil—Continued

Soil features affecting—Continued						
Pipeline construction and maintenance [2]	Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
	Reservoir area	Embankment [3]				
Well drained; limestone at depth of 10 to 20 inches.	Limestone at depth of 10 to 20 inches; limited material.	Limestone at depth of 10 to 20 inches; limited material.	Well drained	Very low available moisture capacity; moderate permeability.	Limestone at depth of 10 to 20 inches; difficult to grow plants on eroded areas.	Limestone at depth of 10 to 20 inches; difficult to grow plants on eroded areas.
Well drained; gravelly.	Permeable; excessive seepage losses.	Permeable material.	Well drained	Rapid infiltration and permeability; very low available moisture capacity.	Some slopes are irregular in shape; very low available moisture capacity; difficult to grow needed plants.	Very low available moisture capacity; difficult to grow needed plants.
Limestone at depth of 10 inches.	Limestone at depth of less than 10 inches.	Limestone at depth of less than 10 inches; limited material.	Well drained	Very low available moisture capacity.	Limestone at depth of less than 10 inches.	Limestone at depth of less than 10 inches; very low available moisture capacity.
Subject to flooding; well drained.	Subject to flooding; susceptible to excessive seepage where substratum contains sandy layers.	Fair to poor compaction and stability; moderately permeable; susceptible to piping.	Well drained; subject to flooding.	Moderate infiltration and permeability; high available moisture capacity.	Nearly level; subject to flooding.	Nearly level; subject to flooding.
Seasonal high water table; somewhat poorly drained; sandy and gravelly substratum.	Susceptible to excessive seepage; seasonal high water table.	Fair compaction and stability; susceptible to piping; permeable substratum.	Somewhat poorly drained; moderately slow permeability.	Moderately slow infiltration and permeability; high available moisture capacity.	Nearly level; somewhat poorly drained.	Nearly level; seasonally wet.
Moderately well drained; sandy and gravelly below depth of 40 inches.	Susceptible to excessive seepage in substratum.	Fair compaction and stability; susceptible to piping; permeable substratum.	Moderately well drained; moderately permeable.	Moderate infiltration and permeability; high available moisture capacity.	Gently sloping; moderately well drained.	Gently sloping; moderately well drained.

TABLE 6.—*Interpretations of*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—				Soil features affecting
			Topsoil	Sand and gravel	Road fill		Highway location [1]
					Solum	Substratum	
Warners: We	Not suited: high water table.	High	Fair: good if mixed with suitable mineral soil; high organic-matter content.	Not suited	Poor: high organic-matter content; soft and unstable.	Poor: soft marly material.	High water table; subject to flooding; soft and compressible.
Warsaw: WrB	Fair: well drained; moderately fine textured material; substratum is good.	Low	Good: high organic-matter content.	Good: well-graded sand and gravel below depth of 20 to 40 inches.	Fair: moderately fine textured material.	Good: sandy and gravelly material.	Well drained; cut slopes gravelly and droughty in some places.
Wea: WsA	Fair: well drained but moderately fine textured; substratum is good.	Low	Good: high organic-matter content.	Good below depth of 4 feet: well-graded sand and gravel.	Fair: moderately fine textured material.	Good: sandy and gravelly material.	Well drained; nearly level.
Westland:							
Wu	Poor: seasonal high water table; very poorly drained.	High	Good	Good below depth of 4 feet: sand, gravel, and some fine material.	Fair to poor: moderately fine textured material.	Good: sandy and gravelly material with some fine material.	Seasonal high water table; very poorly drained.
Wv	Poor: high water table; subject to flooding.	High	Good	Good below depth of 4 feet: sand, gravel, and some fine material.	Fair to poor: moderately fine textured material.	Good: sandy and gravelly material.	Seasonal high water table; very poorly drained; subject to flooding.

[1] Also see "Susceptibility to frost action" in this table and "Shrink-swell potential" in table 5.
[2] See "Corrosion potential" in table 5.

engineering properties of soil—Continued

Soil features affecting—Continued						
Pipeline construction and maintenance [2]	Farm ponds		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
	Reservoir area	Embankment [3]				
High water table; unstable silt and marl.	High water table; variable seepage in underlying marl.	Soft compressible material; subject to piping.	Very poorly drained; moderately permeable above marl.	Moderate permeability and infiltration; medium available moisture capacity.	Nearly level; very poorly drained.	Nearly level; high water table.
Well drained; sand and gravel at depth of 20 to 40 inches.	Excessive seepage in substratum.	Both subsoil and substratum consist of permeable material.	Well drained	Moderate infiltration and permeability; medium available moisture capacity.	Gently sloping; well drained.	Gently sloping; well drained.
Well drained; sand and gravel at depth of 4 feet.	Excessive seepage in substratum.	Fair compaction and stability; permeable substratum; good resistance to piping.	Well drained	Moderate infiltration and permeability; high available moisture capacity.	Nearly level; well drained.	Nearly level; well drained.
Seasonal high water table; very poorly drained.	Susceptible to excessive seepage; seasonal high water table.	Fair compaction and stability; permeable substratum.	Very poorly drained; moderate permeability.	Moderate infiltration and permeability; high available moisture capacity.	Nearly level; very poorly drained.	Nearly level; seasonally wet.
Subject to flooding; very poorly drained.	Susceptible to excessive seepage; subject to flooding.	Fair compaction and stability; permeable substratum.	Very poorly drained; moderate permeability; subject to flooding.	Moderate infiltration and permeability; high available moisture capacity.	Nearly level; very poorly drained.	Nearly level; seasonally wet; subject to flooding.

[3] Features also apply to low dikes or levees.

Town and Country Planning

Fayette County lies within easy driving distances of such urban centers as Columbus, Chillicothe, Springfield, and Dayton, Ohio. Population and industry within Fayette County are increasing, particularly in Washington Court House. Therefore, there is an increasing need for town and country planning due to increasing competition for use of soils in the county. In Fayette County, farming is still the dominant land use. But farmlands now are being reduced as residential, industrial, transportation, and recreational facilities are developed.

The expansion of nonfarm uses of soils can remove many acres from farm use in a short period. Freeways and superhighways can displace up to about 50 acres per mile. Shopping centers easily can replace 50 to 100 acres. These uses tend to permanently remove land from farm use.

Land use planners and industrial users of land generally look for areas having soil conditions that are least costly to develop. In this section, information is given on the properties of the soils and their effect on selected town and country uses of the land that can be useful as a tool or guide for overall land use planning. For example, this section permits comparing all the soils to see which ones are the most suitable for any particular land use planning. Land use planners and others can find other useful information on the soil maps and in other parts of this soil survey. Table 7 gives the estimated degree and kinds of limitation of soils for some selected land uses. Thus, alternatives can be developed as a basis for long-range planning and zoning.

Extensive manipulation of the soil alters some of its natural properties. Therefore, in areas where cutting and filling operations have been extensive, the ratings for some uses no longer apply.

Any one particular soil property may impose a degree of limitation for a specified land use. This same soil property can be more or less limiting when considering some other specified land use. Therefore, to provide a comparative scale, the estimated degree of limitation for each soil and specified land use is rated *slight*, *moderate*, and *severe*. A rating of *slight* indicates that the soil presents no important limitation to the specified use. A rating of *moderate* indicates that the soil has some limitations to the specified use. These limitations present serious problems to the specific use that should be recognized, but they generally can be overcome or corrected. A rating of *severe* indicates that the soil has serious limitations that are generally difficult and costly to overcome. A rating of severe does not mean that the soil cannot be used for the specific use. The limitation is more restrictive for a specified use than a slight or moderate rating for the same use.

Farming

Currently most of the rural land in Fayette County is in farm use. Most land use changes in the county involve the conversion of farmland to nonfarm uses. Such land use changes tend to be irreversible.

In table 7, the soils have been rated for the growing of cultivated crops. The degree of limitation is based on the hazards that exist for this use. Hazards to cropping, such as slope, erosion, wetness, droughtiness, and stoniness, are considered in these ratings.

Farming is rated in this table to aid land-use planners who are considering farming as a sound land use in a town and country environment.

Sewage effluent disposal

Soil properties important to the installation and operation of septic tank disposal fields include permeability, depth to rock, slope, natural drainage, level of the water table, and hazards of flooding. Use of a soil for the disposal of effluent is severely limited by flooding, by very poor natural drainage, or by moderately slow to very slow permeability. Permeability of each soil in the county has been estimated and is shown in table 5.

If filter fields for septic tanks are located on slopes, erosion and seepage downslope can be problems, or the soil may become unstable when saturated. Limitations are 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 movement of the effluent through the soil.

Some soils in the county have a gravelly and sandy substratum or are underlain by creviced bedrock, through which effluent that is inadequately filtered can contaminate 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 the limitations of the soil and other related site factors.

Sewage lagoons are shallow ponds built to dispose of sewage through oxidation. They may be needed in an area if septic tanks 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.

Homesites

These locations are for homes of three stories or less that have a basement, but the ratings also apply to sites for small industrial, commercial, and institutional buildings.

Most of the acreage taken from farm use is being converted to new residential developments. These areas generally surround present urban areas. In addition, individual houses or small groups of houses are being built throughout the county.

Soil properties and some related site characteristics that are used to make the ratings include depth to bedrock, slope, natural drainage, flood hazard, and surface stoniness or rockiness. The method of sewage disposal is not considered in the homesite column (table 7).

Soils subject to flooding have *severe* limitations for permanently used structures. Although flooding may be infrequent, it is costly and damaging when it does occur. Homes on naturally wet soils are likely to have wet basements if adequate drainage is not provided. The Brookston, Crosby, Millsdale, Randolph, and Patton soils are of this kind. In many areas in the county, well-developed systems of tile and open ditch drains have been installed for farm use. Excavations in these areas for structures, such as houses, can disrupt the established drainage system and change it back to its natural condition of wetness.

Some of the soils, such as Patton silty clay loam, have a high silt content. These soils are not so favorable for supporting structural foundations as soils that are coarser textured. Soils having high shrink-swell properties are likely to heave and crack foundations unless special precautions are observed. Also, high shrink-swell properties affect the alignment of sidewalks, patios, floors, and rock walls. To minimize this effect, a subgrade or layers of sandy or gravelly material directly below the structure should be used.

Excavating basements and installation of underground utility lines are difficult and expensive in soils that have bedrock near the surface. On soils having slopes steeper than 12 percent, there is an erosion hazard as well as problems in excavating and leveling.

Lawns, landscaping, and golf fairways

Some soils in the county are suitable sources of topsoil. This is pointed out in the "Engineering interpretations" section (table 6) of this soil survey. During construction, the uppermost foot of natural surface soil can be scalped and pushed aside into a stockpile. It then can be distributed back over the area after grading has been completed. Thus, the area will have a good root zone for lawns, flowers, shrubs, and trees. The natural surface layer in areas being developed for streets can be scalped in a like manner and used to improve adjacent areas where it is most needed.

Among the soil properties that determine whether a good lawn or golf fairway can be established are natural drainage, degree of slope, depth of suitable material, texture of the surface layer, stoniness and rockiness, and hazard of flooding.

Streets and parking lots

This column rates the use of soils for streets and parking lots in subdivisions. The ratings apply to streets and parking lots not subject to continual heavy traffic. Soil characteristics that affect this use include natural drainage, slope, depth to rock, flooding hazard, and stoniness or rockiness. Tables 5 and 6 in the engineering section give other information about the soils that are important for streets and parking lots. The degree of slope that should be designed for the side of cuts and fills depends partially on the erodibility of the soil and its capacity to support close growing vegetation. Many of the soils have a high susceptibility to frost action. Proper street design on these soils is critical to minimize winter damage.

Recreation

Recreation is becoming increasingly important in Fayette County. All the soils of the county are suitable for one or more kinds of recreational development. Soils on flood plains are suited to extensive play areas because they generally occur in long, winding areas along streams and adjacent scenic hills. Extensive play areas can be developed on flood plains. They also are suitable for intensive play areas, such as ball diamonds, football fields, and tennis courts, that are not used during normal periods of flooding. The potential damage to intensive play areas should be evaluated onsite before construction of such facilities. Locally, flooding may be more or less severe than in other places. The ratings indicated in table 7 should be evaluated against the local flood frequency and duration.

Athletic fields and other intensive play areas.—These fairly small tracts are used for baseball, football, tennis, volleyball, badminton, and other sports. Because the areas must be nearly level, considerable shaping may be needed and thus soil slope is important. Also important are the depth to the seasonal high water table, permeability, texture of the surface layer, and flooding hazard.

Parks and play areas.—These areas can be located on many kinds of soils. Areas consisting of several different soils provide a variety of wildlife and natural vegetation. Considered in rating the soils for picnicking, hiking, nature study, and similar uses are degree of slope, texture of the surface layer, natural drainage, stoniness, and hazard of flooding. Paths in picnic and play areas should be constructed and maintained to help control erosion.

Campsites.—For tents, campsites should be located in areas where the landscape is attractive, the trafficability is good, and the productivity for grasses and trees is medium or high. Soils that are well drained or moderately well drained have less serious limitations than wetter soils. Other properties considered in the ratings are flood hazard, permeability, slope, and texture of the surface layer.

Sanitary landfill

In considering the use of soils for sanitary landfills (trench method only), the depth to underlying rock is especially important. The most favorable soils for the trench method of sanitary landfills are well drained, nearly level, and are relatively slowly permeable. Very few soils meet all these requirements. On slowly permeable or naturally wet soils, there generally are some trafficability limitations, but these can be reduced by proper grading of entrance roads, installation of surface drainage, and the like. Soil properties considered in ratings for sanitary landfill include texture, natural drainage, depth, slope, permeability, and hazard of flooding.

Cemeteries

For use as cemeteries, limitations are least on soils that are deep, are well drained or moderately well drained, and have moderate slopes. Depth to bedrock and depth to a seasonally high water table are important in planning of cemeteries. 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 that is near the surface, but it is only slightly or moderately restricted if the underlying materials are soft or rippable. At all periods of the year, ease of excavation is most favorable in the coarser textured soils. Shoring the sides of excavations is necessary if caving is a problem. Preserving the original surface layer is important, and liming and fertilizing are needed for maintaining sod.

TABLE 7.—*Estimated degree and kinds of*

[Cut and fill land (Cw), Gravel pits (Gp), and Quarries (Qu) not rated in this table. An asterisk in the first column indicates that at least limitations, and for this reason it is necessary to follow carefully the instructions

Soil series and map symbol	Farming	Onsite disposal of sewage effluent	Sewage lagoons	Homesites [1] (buildings of three stories or less)	Lawns, landscaping, golf fairways
Algiers: Ag	Slight	Severe: subject to flooding; moderately slow permeability.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Brookston: Bs	Slight	Severe: seasonal high water table; locally subject to flooding; moderately slow permeability.	Slight: severe where subject to flooding.	Severe: seasonal high water table; locally subject to flooding.	Severe: very poorly drained; locally subject to flooding.
Cana:					
CaB2	Slight	Severe: moderately slow permeability.	Moderate: shale at depth of 3½ to 5 feet; slope.	Moderate: shale at depth of 3½ to 5 feet.	Slight
CaC2	Moderate: erosion hazard.	Severe: moderately slow permeability.	Severe: slope	Moderate: shale at depth of 3½ to 5 feet; slope.	Moderate: slope
Casco: CdC2 Rodman part of this unit rated same as Casco.	Severe: erosion hazard.	Moderate:[2] slope.	Severe:[2] rapidly permeable substratum; slope.	Moderate: slope	Severe: droughty
Celina:					
CeA	Slight	Severe: moderately slow permeability.	Slight	Slight	Slight
CeB, CeB2	Slight	Severe: moderately slow permeability.	Moderate: slope	Slight	Slight
Corwin: CoB	Slight	Severe: moderately slow permeability.	Moderate: slope	Slight	Slight

See footnotes at end of table.

limitations of soils for town and country uses

one mapping unit in this series is made up of two or more kinds of soil. The soils in such mapping units may have different properties and for referring to other series that appear in the first column of this table]

Streets and parking lots	Recreational facilities: Athletic fields	Recreational facilities: Parks and play areas	Recreational facilities: Campsites: Tents	Recreational facilities: Campsites: Trailers	Sanitary land-fill (trench method)	Cemeteries
Severe: subject to flooding.	Severe: subject to flooding; somewhat poorly drained.	Moderate: somewhat poorly drained; subject to flooding.	Severe: subject to flooding; somewhat poorly drained.	Severe: subject to flooding; somewhat poorly drained.	Severe: subject to flooding.	Severe: subject to flooding; somewhat poorly drained.
Severe: very poorly drained; locally subject to flooding.	Severe: very poorly drained; locally subject to flooding.	Severe: very poorly drained.	Severe: very poorly drained; locally subject to flooding.	Severe: very poorly drained; locally subject to flooding.	Severe: very poorly drained; locally subject to flooding.	Severe: very poorly drained; locally subject to flooding.
Moderate: slope.	Moderate: slope; moderately slow permeability.	Slight	Moderate: moderately slow permeability.	Moderate: moderately slow permeability; slope.	Moderate: shale at depth of 3½ to 5 feet; moderately fine textured.	Moderate: moderately slow permeability.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: moderately slow permeability; slope.	Severe: slope	Moderate: shale at depth of 3½ to 5 feet; slope; moderately fine textured.	Moderate: moderately slow permeability; slope.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Severe: slope	Severe: [2] rapidly permeable.	Moderate: slope.
Slight	Moderate: moderately slow permeability.	Slight	Moderate: moderately slow permeability.	Moderate: moderately slow permeability.	Slight	Moderate: moderately well drained; moderately slow permeability.
Moderate: slope.	Moderate: moderately slow permeability; slope.	Slight	Moderate: moderately slow permeability.	Moderate: moderately slow permeability; slope.	Slight	Moderate: moderately well drained; moderately slow permeability.
Moderate: slope.	Moderate: moderately slow permeability; slope.	Slight	Moderate: moderately slow permeability.	Moderate: moderately slow permeability; slope.	Slight	Moderate: moderately well drained; moderately slow permeability.

TABLE 7.—*Estimated degree and kinds of*

Soil series and map symbol	Farming	Onsite disposal of sewage effluent	Sewage lagoons	Homesites [1] (buildings of three stories or less)	Lawns, landscaping, golf fairways
Crosby:					
CrA	Slight	Severe: moderately slow permeability.	Slight	Moderate: seasonal high water table.	Moderate: somewhat poorly drained.
CrB	Slight	Severe: moderately slow permeability.	Moderate: slope	Moderate: seasonal high water table.	Moderate: somewhat poorly drained.
Fox:					
FnA	Slight	Slight [2]	Severe: [2] rapidly permeable substratum.	Slight	Slight
FnB, FnB2	Slight	Slight [2]	Severe: [2] rapidly permeable substratum.	Slight	Slight
FnC2	Moderate: erosion hazard.	Moderate: [2] slope.	Severe: [2] rapidly permeable substratum; slope.	Moderate: slope	Moderate: slope
FoC3 Casco soils in this unit have the same ratings as Fox.	Severe: erosion hazard.	Moderate: [2] slope.	Severe: [2] rapidly permeable substratum; slope.	Moderate: slope	Moderate: droughty; Casco part severe: droughty.
FrE2 Casco and Rodman soils in this unit have the same ratings as Fox.	Severe: erosion hazard.	Severe: [2] slope	Severe: [2] rapidly permeable substratum; slope.	Severe: slope	Severe: slope
Genesee: Gn	Slight	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Hennepin Mapped only with Miamian soils.	Severe: erosion hazard.	Severe: moderately slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope; erosion.
Henshaw:					
HeA	Slight	Severe: moderately slow permeability; seasonal high water table.	Slight	Moderate: seasonal high water table; soft when wet.	Moderate: somewhat poorly drained.
HkA	Slight	Severe: moderately slow permeability; seasonal high water table.	Slight	Moderate: seasonal high water table; soft when wet.	Moderate: somewhat poorly drained.

See footnotes at end of table.

limitations of soils for town and country uses—Continued

Streets and parking lots	Recreational facilities: Athletic fields	Recreational facilities: Parks and play areas	Recreational facilities: Campsites: Tents	Recreational facilities: Campsites: Trailers	Sanitary land-fill (trench method)	Cemeteries
Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained; moderately slow permeability.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained; moderately slow permeability.	Moderate: somewhat poorly drained; moderately slow permeability.	Moderate: somewhat poorly drained.	Severe: somewhat poorly drained.
Moderate: somewhat poorly drained; slope.	Moderate: somewhat poorly drained; slope.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained; moderately slow permeability.	Moderate: somewhat poorly drained; moderately slow permeability; slope.	Moderate: somewhat poorly drained.	Severe: somewhat poorly drained.
Slight	Slight	Slight	Slight	Slight	Severe: [2] pervious substratum.	Slight.
Moderate: slope.	Moderate: slope.	Slight	Slight	Moderate: slope.	Severe: [2] pervious substratum.	Slight.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Severe: slope	Severe: [2] pervious substratum.	Moderate: slope.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Severe: slope	Severe: [2] pervious substratum.	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: [2] pervious substratum.	Severe: slope.
Severe: subject to flooding.	Moderate to severe: subject to flooding.	Slight to severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: somewhat poorly drained; soft when wet.	Moderate: moderately slow permeability; seasonal high water table.	Moderate: somewhat poorly drained.	Moderate: moderately slow permeability; somewhat poorly drained.	Moderate: moderately slow permeability; somewhat poorly drained.	Moderate: seasonal high water table; somewhat poorly drained.	Severe: somewhat poorly drained.
Moderate: somewhat poorly drained; soft when wet.	Moderate: moderately slow permeability; seasonal high water table.	Moderate: somewhat poorly drained.	Moderate: moderately slow permeability; somewhat poorly drained.	Moderate: moderately slow permeability; somewhat poorly drained.	Moderate: somewhat poorly drained; moderately fine texture.	Severe: somewhat poorly drained.

TABLE 7.—*Estimated degree and kinds of*

Soil series and map symbol	Farming	Onsite disposal of sewage effluent	Sewage lagoons	Homesites [1] (buildings of three stories or less)	Lawns, landscaping, golf fairways
Kendallville:					
KeB, KeB2	Slight	Severe: moderately slow permeability.	Moderate: slope; moderate permeability in uppermost 2 feet.	Slight	Slight
KeC2	Moderate: erosion hazard.	Severe: moderately slow permeability.	Severe: slope	Moderate: slope	Moderate: slope
KlC3	Severe: erosion hazard.	Severe: moderately slow permeability.	Severe: slope	Moderate: slope	Severe: droughty
KlD3	Severe: erosion hazard.	Severe: moderately slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope; droughty.
Medway:					
Md	Slight	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Me	Slight	Severe: subject to flooding; limestone at depth of 20 to 40 inches.	Severe: subject to flooding; limestone at depth of 20 to 40 inches.	Severe: subject to flooding; limestone at depth of 20 to 40 inches.	Severe: subject to flooding.
*Miamian:					
MlB, MlB2	Slight	Severe: moderately slow permeability.	Moderate: slope	Slight	Slight
MlC, MlC2	Moderate: erosion hazard.	Severe: moderately slow permeability.	Severe: slope	Moderate: slope	Moderate: slope
MmB3	Moderate: erosion hazard.	Severe: moderately slow permeability.	Moderate: slope	Slight	Severe: erosion
MmC3	Severe: erosion hazard.	Severe: moderately slow permeability.	Severe: slope	Moderate: slope	Severe: erosion
MlD2, MmD3, MpE2, MpF2, MrF3. For Hennepin part of MpE2, MpF2, and MrF3, refer to Hennepin series.	Severe: erosion hazard.	Severe: moderately slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope; erosion.

See footnotes at end of table.

limitations of soils for town and country uses—Continued

Streets and parking lots	Recreational facilities: Athletic fields	Recreational facilities: Parks and play areas	Recreational facilities: Campsites: Tents	Recreational facilities: Campsites: Trailers	Sanitary land-fill (trench method)	Cemeteries
Moderate: slope.	Moderate: slope; moderately slow permeability.	Slight	Moderate: moderately slow permeability.	Moderate: slope; moderately slow permeability.	Slight	Moderate: moderately slow permeability.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope; moderately slow permeability.	Severe: slope	Moderate: slope.	Moderate: moderately slow permeability; slope.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope; moderately slow permeability.	Severe: slope	Moderate: slope.	Moderate: moderately slow permeability; slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: subject to flooding.	Moderate to severe: subject to flooding.	Slight to severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Severe: subject to flooding.	Severe: limestone at depth of 20 to 40 inches; subject to flooding.	Slight to severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding; limestone at depth of 20 to 40 inches.	Severe: subject to flooding; limestone at depth of 20 to 40 inches.
Moderate: slope.	Moderate: slope; moderately slow permeability.	Slight	Moderate: moderately slow permeability.	Moderate: slope; moderately slow permeability.	Slight	Moderate: moderately slow permeability.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope; moderately slow permeability.	Severe: slope	Moderate: slope.	Moderate: moderately slow permeability; slope.
Moderate: slope.	Moderate: slope; moderately slow permeability.	Severe: texture of surface layer; erosion.	Moderate: texture of surface layer; moderately slow permeability.	Moderate: texture of surface layer; slope.	Slight	Moderate: moderately slow permeability.
Severe: slope	Severe: slope	Severe: texture of surface layer; erosion.	Moderate: slope; moderately slow permeability.	Severe: slope	Moderate: slope.	Moderate: moderately slow permeability; slope; texture of surface layer.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.

TABLE 7.—*Estimated degree and kinds of*

Soil series and map symbol	Farming	Onsite disposal of sewage effluent	Sewage lagoons	Homesites [1] (buildings of three stories or less)	Lawns, landscaping, golf fairways
Millsdale: Ms	Moderate: wetness hazard.	Severe: seasonal high water table; limestone at depth of 20 to 40 inches.	Severe: limestone at depth of 20 to 40 inches.	Severe: limestone at depth of 20 to 40 inches; very poorly drained; seasonal high water table.	Severe: very poorly drained.
Milton:					
MtB, MtB2	Slight	Severe: [2] limestone at depth of 20 to 40 inches; moderately slow permeability.	Severe: limestone at depth of 20 to 40 inches.	Severe: limestone at depth of 20 to 40 inches.	Moderate: limestone at depth of 20 to 40 inches.
MtC2	Moderate: erosion hazard.	Severe: [2] limestone at depth of 20 to 40 inches; moderately slow permeability.	Severe: limestone at depth of 20 to 40 inches.	Severe: limestone at depth of 20 to 40 inches.	Moderate: limestone at depth of 20 to 40 inches.
Odell: OdA	Slight	Severe: moderately slow permeability.	Slight	Moderate: seasonal high water table.	Moderate: somewhat poorly drained.
Patton: Pa, Pc	Slight	Severe: seasonal high water table; Pc subject to flooding.	Pa: slight; Pc severe: subject to flooding.	Severe: seasonal high water table; Pc subject to flooding.	Severe: very poorly drained; Pc subject to flooding.
Randolph: RcB	Moderate: wetness hazard.	Severe: seasonal high water table.	Severe: limestone at depth of 20 to 40 inches.	Severe: limestone at depth of 20 to 40 inches.	Moderate: somewhat poorly drained; moderately slow permeability.
*Ritchey: RmC, RmF2. For Romeo part of RmC and RmF2, refer to Romeo series.	Severe: erosion hazard; limestone at depth of 10 to 20 inches; slope.	Severe: limestone at depth of 10 to 20 inches; moderately slow permeability; slope; pollution hazard.	Severe: limestone at depth of 10 to 20 inches; slope.	Severe: limestone at depth of 10 to 20 inches; slope.	Severe: limestone at depth of 10 to 20 inches; droughty, slope.
Rodman: Mapped only with Casco and Fox soils. See both Casco and Fox for ratings.					
Romeo. Mapped only with Ritchey soils.	Severe: erosion hazard; limestone at depth of 0 to 10 inches; slope.	Severe: limestone at depth of 0 to 10 inches; moderately slow permeability; slope; pollution hazard.	Severe: limestone at depth of 0 to 10 inches; slope.	Severe: limestone at depth of 0 to 10 inches; slope.	Severe: limestone at depth of 0 to 10 inches; droughty, slope.

See footnotes at end of table.

limitations of soils for town and country uses—Continued

Streets and parking lots	Recreational facilities: Athletic fields	Recreational facilities: Parks and play areas	Recreational facilities: Campsites: Tents	Recreational facilities: Campsites: Trailers	Sanitary landfill (trench method)	Cemeteries
Severe: very poorly drained; limestone at depth of 20 to 40 inches.	Severe: very poorly drained; limestone at depth of 20 to 40 inches.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained; limestone at depth of 20 to 40 inches.	Severe: very poorly drained; limestone at depth of 20 to 40 inches.
Severe: limestone at depth of 20 to 40 inches.	Severe: limestone at depth of 20 to 40 inches.	Moderate: limestone at depth of 20 to 40 inches.	Moderate: moderately slow permeability.	Moderate: moderately slow permeability; slope.	Severe:[2] limestone at depth of 20 to 40 inches.	Severe: limestone at depth of 20 to 40 inches.
Severe: limestone at depth of 20 to 40 inches; slope.	Severe: limestone at depth of 20 to 40 inches; slope.	Moderate: limestone at depth of 20 to 40 inches; slope.	Moderate: moderately slow permeability.	Severe: slope	Severe:[2] limestone at depth of 20 to 40 inches.	Severe: limestone at depth of 20 to 40 inches.
Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained; moderately slow permeability.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained; moderately slow permeability.	Moderate: somewhat poorly drained; moderately slow permeability.	Moderate: somewhat poorly drained.	Severe: somewhat poorly drained.
Severe: very poorly drained; Pc subject to flooding.	Severe: very poorly drained; Pc subject to flooding.	Severe: very poorly drained; Pc subject to flooding.	Severe: very poorly drained; Pc subject to flooding.	Severe: very poorly drained; Pc subject to flooding.	Severe: very poorly drained; Pc subject to flooding.	Severe: very poorly drained; Pc subject to flooding.
Severe: limestone at depth of 20 to 40 inches.	Severe: limestone at depth of 20 to 40 inches.	Moderate: somewhat poorly drained; limestone at depth of 20 to 40 inches.	Moderate: somewhat poorly drained; moderately slow permeability.	Moderate: somewhat poorly drained; moderately slow permeability; slope.	Severe: limestone at depth of 20 to 40 inches.	Severe: limestone at depth of 20 to 40 inches; somewhat poorly drained.
Severe: limestone at depth of 10 to 20 inches; slope.	Severe: limestone at depth of 10 to 20 inches; slope.	Severe: limestone at depth of 10 to 20 inches; slope.	Severe: limestone at depth of 10 to 20 inches; slope.	Severe: limestone at depth of 10 to 20 inches; slope.	Severe: limestone at depth of 10 to 20 inches; slope.	Severe: limestone at depth of 10 to 20 inches; slope.
Severe: limestone at depth of 0 to 10 inches; slope.	Severe: limestone at depth of 0 to 10 inches; slope.	Severe: limestone at depth of 0 to 10 inches; slope.	Severe: limestone at depth of 0 to 10 inches; slope.	Severe: limestone at depth of 0 to 10 inches; slope.	Severe: limestone at depth of 0 to 10 inches; slope.	Severe: limestone at depth of 0 to 10 inches; slope.

TABLE 7.—*Estimated degree and kinds of*

Soil series and map symbol	Farming	Onsite disposal of sewage effluent	Sewage lagoons	Homesites [1] (buildings of three stories or less)	Lawns, landscaping, golf fairways
Ross: Rs	Slight	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Sleeth: SlA	Slight	Severe: seasonal high water table; moderately slow permeability.	Severe: permeable substratum.	Moderate: seasonal high water table.	Moderate: somewhat poorly drained.
Thackery: ThB	Slight	Slight [2]	Severe:[2] permeable substratum.	Slight	Slight
Warners: We	Severe: wetness hazard; marl.	Severe: seasonal high water table; moderately slow permeability.	Severe: subject to local flooding; high organic-matter content in surface layer.	Severe: seasonal high water table; soft and compressible when wet.	Severe: very poorly drained.
Warsaw: WrB	Slight	Slight [2]	Severe:[2] rapidly permeable substratum.	Slight	Slight
Wea: WsA	Slight	Slight [2]	Severe:[2] rapidly permeable substratum.	Slight	Slight
Westland: Wu, Wv	Slight	Severe:[2] seasonal high water table; moderate permeability; Wv subject to flooding.	Severe:[2] rapidly permeable substratum; Wv subject to flooding.	Severe: seasonal high water table; Wv subject to flooding.	Severe: very poorly drained; Wv subject to flooding.

[1] Ratings in this column also apply to small industrial, institutional, and commercial locations for buildings of three stories or less.

limitations of soils for town and country uses—Continued

Streets and parking lots	Recreational facilities: Athletic fields	Recreational facilities: Parks and play areas	Recreational facilities: Campsites: Tents	Recreational facilities: Campsites: Trailers	Sanitary land-fill (trench method)	Cemeteries
Severe: subject to flooding.	Moderate to severe: subject to flooding.	Slight to severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained; moderately slow permeability.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained; moderately slow permeability.	Moderate: somewhat poorly drained; moderately slow permeability.	Severe: seasonal high water table; permeable substratum.	Severe: somewhat poorly drained.
Moderate: slope	Moderate: slope	Slight	Slight	Moderate: slope	Severe:[2] moderately rapid permeability in substratum.	Slight.
Severe: very poorly drained; mucky material over marl; soft when wet.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.	Severe: very poorly drained.
Moderate: slope.	Moderate: slope.	Slight	Slight	Moderate: slope.	Severe:[2] rapidly permeable substratum.	Slight.
Slight	Slight	Slight	Slight	Slight	Severe:[2] rapidly permeable substratum.	Slight.
Severe: very poorly drained; Wv subject to flooding.	Severe: very poorly drained; Wv subject to flooding.	Severe: very poorly drained; Wv subject to flooding.	Severe: very poorly drained; Wv subject to flooding.	Severe: very poorly drained; Wv subject to flooding.	Severe:[2] very poorly drained; Wv subject to flooding.	Severe: very poorly drained; Wv subject to flooding.

[2] There is a pollution hazard because of the porous nature of the substratum and inadequate filtration.

Utility lines

The installation and maintenance of utility lines are affected by soil properties (the soils are not rated for this use in table 6). Depth to bedrock, natural drainage, water table characteristics, and corrosion potential are among the outstanding properties affecting utilities. Corrosion potential of all the soils in the county has been rated in table 5. The soil descriptions point out other properties important to installation and maintenance. During the planning stages, routing of utility lines can be facilitated by the soil survey. The establishment, control, and maintenance of vegetation on utility rights-of-way are also related to soil properties. Table 6 shows soil features affecting pipeline installation.

Descriptions of the Soils

This section describes the soil series and mapping units of Fayette 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 the mapping units in that series. 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. As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Cut and fill land, for example, does not belong to a soil series, but nevertheless it is listed in alphabetical order along with the soil series.

An essential part of each soil series is the description of the soil profile, the sequence of layers beginning at the surface and continuing downward to depths beyond which the roots of most plants penetrate. Each soil series contains both a brief nontechnical and a detailed technical description of the same profile. The nontechnical description is useful for most readers. The detailed technical description is included for soil scientists, engineers, and others who need to make thorough and precise studies of soils.

The descriptions of mapping units describe each individual soil with reference to the typical soil described for the series. Unless differences are obvious from the name or are otherwise noted, each soil in the series has characteristics similar to those mentioned in the series description.

Unless otherwise stated, the colors given in the descriptions are for the soils when moist. The reference to light-colored or dark-colored soils, where used, has reference to the color of the surface layer. A surface layer having a color value of 4 or more (Munsell notation) is light colored. A color value of less than 4 denotes a dark-colored soil. This difference is observable in the field, and the term light- or dark-colored soil is commonly used in Ohio.

The reference to soil reaction in the root zone is given to show the most acid condition that can be expected in the root zone in each soil series. Liming and other management practices can cause any individual soil tested to vary from the reaction given.

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.

The reader is urged to read both the series descriptions and the mapping unit descriptions, and then to turn to the section "Use and Management of the Soils" for details on use and management for farming, wildlife, woodland, engineering, or town and country planning.

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 (7). Many of these terms are also defined in the Glossary.

Algiers Series

The Algiers series consists of nearly level, somewhat poorly drained soils on flood plains throughout the county. These soils consist of 14 to 36 inches of loamy alluvial material that overlies a buried, dark-colored soil. The profile of the buried soil commonly is that of a Westland soil. The upper, lighter colored alluvium washed from soils that occur on uplands and were derived from calcareous glacial till.

A representative Algiers soil that is cultivated has a dark grayish-brown silt loam plow layer about 8 inches thick. Below the plow layer, to a depth of about 18 inches, is loamy, friable, dark grayish-brown material. Next is loamy soil material that is black in the upper part but is dark gray as depth increases. The soil layers at a depth of 24 to 37 inches are clayey. Gray gravelly loam is at a depth of 48 inches. Normally, no bedrock is within 8 to 10 feet of the soil surface.

Algiers soils have a seasonal high water table and are subject to flooding. If adequately drained, they have a root zone deep enough for most of the commonly grown farm crops. Available moisture capacity is high in these soils.

The lighter colored soil material in the upper part of these soils is moderately permeable. The underlying, darker soil material is moderately slowly permeable. Algiers soils have neutral reaction in the rooting zone. If adequately drained, Algiers soils are well suited to row crops. Most areas are used for corn and soybeans. A few areas are used for pasture and woodland, particularly where the flooding hazard is severe.

Representative profile of Algiers silt loam in a cultivated field near the intersection of Washington and New Martinsburg Road and Ghormley Road; Perry Township:

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

C—8 to 18 inches, dark grayish-brown (10YR 4/2) silt loam; massive; friable; neutral; abrupt, smooth boundary.

IIAb—18 to 24 inches, black (10YR 2/1) silty clay loam, very dark brown (10YR 2/2) rubbed; strong, fine, subangular and angular blocky structure; firm; mildly alkaline; clear, wavy boundary.

IIB21tgb—24 to 29 inches, very dark brown (10YR 2/2) silty clay loam; common, fine, distinct, brown (10YR 4/3) mottles; strong, medium, subangular blocky structure; firm; thin, patchy, black (10YR 2/1) clay films; mildly alkaline; gradual, wavy boundary.

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

Soil	Area	Extent
	Acres	*Percent*
Algiers silt loam	952	0.4
Brookston silty clay loam	88,709	34.1
Cana silt loam, 2 to 6 percent slopes, moderately eroded	64	[1]
Cana silt loam, 6 to 12 percent slopes, moderately eroded	48	[1]
Casco and Rodman soils, 2 to 12 percent slopes, moderately eroded	88	[1]
Celina silt loam, 0 to 2 percent slopes	287	.1
Celina silt loam, 2 to 6 percent slopes	43,992	17.0
Celina silt loam, 2 to 6 percent slopes, moderately eroded	975	.3
Corwin silt loam, 2 to 6 percent slopes	218	[1]
Crosby silt loam, 0 to 2 percent slopes	46,766	18.0
Crosby silt loam, 2 to 6 percent slopes	564	.2
Cut and fill land	279	.1
Fox silt loam, 0 to 2 percent slopes	590	.2
Fox silt loam, 2 to 6 percent slopes	2,411	.9
Fox silt loam, 2 to 6 percent slopes, moderately eroded	743	.3
Fox silt loam, 6 to 12 percent slopes, moderately eroded	247	[1]
Fox and Casco soils, 6 to 12 percent slopes, severely eroded	174	[1]
Fox, Casco and Rodman soils, 12 to 25 percent slopes, moderately eroded	127	[1]
Genesee silt loam	826	.3
Gravel pits	128	[1]
Henshaw silt loam, 0 to 2 percent slopes	146	[1]
Henshaw silt loam, dark variant, 0 to 2 percent slopes	115	[1]
Kendallville silt loam, 2 to 6 percent slopes	431	.2
Kendallville silt loam, 2 to 6 percent slopes, moderately eroded	562	.2
Kendallville silt loam, 6 to 12 percent slopes, moderately eroded	267	.1
Kendallville clay loam, 6 to 12 percent slopes, severely eroded	267	.1
Kendallville clay loam, 12 to 18 percent slopes, severely eroded	286	.1
Medway silt loam	229	[1]
Medway silt loam, moderately shallow variant	189	[1]
Miamian silt loam, 2 to 6 percent slopes	11,692	4.1
Miamian silt loam, 2 to 6 percent slopes, moderately eroded	24,203	9.3
Miamian silt loam, 6 to 12 percent slopes	221	[1]
Miamian silt loam, 6 to 12 percent slopes, moderately eroded	3,820	1.4
Miamian silt loam, 12 to 18 percent slopes, moderately eroded	663	.2
Miamian clay loam, 2 to 6 percent slopes, severely eroded	367	.1
Miamian clay loam, 6 to 12 percent slopes, severely eroded	5,248	2.0
Miamian clay loam, 12 to 18 percent slopes, severely eroded	2,163	.8
Miamian and Hennepin silt loams, 18 to 25 percent slopes, moderately eroded	345	.1
Miamian and Hennepin silt loams, 25 to 35 percent slopes, moderately eroded	329	.1
Miamian and Hennepin soils, 18 to 35 percent slopes, severely eroded	961	.3
Millsdale silty clay loam	695	.3
Milton silt loam, 2 to 6 percent slopes	216	[1]
Milton silt loam, 2 to 6 percent slopes, moderately eroded	272	.1
Milton silt loam, 6 to 12 percent slopes, moderately eroded	111	[1]
Odell silt loam, 0 to 2 percent slopes	705	.3
Patton silty clay loam	153	[1]
Patton silty clay loam, overwash	2,900	.9
Quarries	51	[1]
Randolph silt loam, 2 to 6 percent slopes	47	[1]
Ritchey and Romeo silt loams, 2 to 12 percent slopes	138	[1]
Ritchey and Romeo silt loams, 12 to 35 percent slopes, moderately eroded	138	[1]
Ross silt loam	1,393	.5
Sleeth silt loam, 0 to 2 percent slopes	117	[1]
Thackery silt loam, 1 to 4 percent slopes	289	.1
Warners muck	10	[1]
Warsaw silt loam, 1 to 4 percent slopes	265	.1
Wea silt loam, 0 to 2 percent slopes	166	[1]
Westland silty clay loam	833	.3
Westland silty clay loam, overwash	10,578	4.0
Water area	71	[1]
Individual soils less than 0.1 percent of the total acreage	-------	2.4
Total	259,840	100.0

[1] Less than 0.1 percent.

IIB22tgb—29 to 37 inches, dark-gray (10YR 4/1) clay that has many, medium, prominent, yellowish-brown (10YR 5/4) mottles; moderate, coarse, subangular blocky structure; firm; thin, patchy, very dark gray (10YR 3/1) clay films on vertical ped faces; mildly alkaline; gradual, smooth boundary.

IIB3gb—37 to 48 inches, dark gray (10YR 4/1) to gray (10YR 5/1) silty clay loam; many, medium, prominent, yellowish-brown (10YR 5/6, 10YR 5/4) mottles; weak, coarse, subangular blocky structure; friable; mildly alkaline; abrupt, wavy boundary.

IIICb—48 to 60 inches, gray (N 5/0) gravelly loam; massive; loose; many limestone pebbles; mildly alkaline; calcareous.

Recent deposits range from 14 to 36 inches in thickness. The Ap horizon is dominantly dark grayish brown (10YR 4/2) but ranges to dark grayish brown (2.5Y 4/2). The Ap and C horizons are neutral to mildly alkaline. Thin lenses of sand occur in the C horizon in some places. The buried IIAb horizon ranges from black (N 2/0 and 10YR 2/1) to very dark gray (N 3/0 and 10YR 3/1). Mottles are lacking within 20 inches of the surface.

The somewhat poorly drained Algiers soils are adjacent to the well drained Genesee soils and the moderately well drained Medway soils on flood plains. They are adjacent to the very poorly drained Westland soils on nearby stream terraces. Below a depth of about 18 inches, the Algiers soils are grayer and are less well drained than Genesee soils. Algiers soils have a lighter colored A horizon than the Medway and Westland soils.

Algiers silt loam (Ag).—This nearly level soil commonly is in areas that are along the major streams and range in size from 10 to 30 acres. Along the smaller streams, the areas are smaller and have linear, winding shapes. Included with this soil in mapping are areas of darker colored, very poorly drained Westland soils.

The major limitations of this soil for farming are natural wetness and a flooding hazard. Unless it is drained, the soil generally is too wet for growing satisfactory crops. Tile drains work well if suitable outlets can be established. Flooding is a limitation to most nonfarm uses of this soil. (Capability unit IIw-1)

Brookston Series

The Brookston series consists of dark-colored soils that are very poorly drained. These soils are nearly level to depressional, and they occupy areas on the uplands. They formed in loamy calcareous glacial till.

A representative cultivated Brookston soil has a very dark gray silty clay loam plow layer about 7 inches thick. The subsoil, to a depth of about 40 inches, is mostly grayish-brown and yellowish-brown clay loam, but it is coated and mottled with gray. As a result, the overall color of the subsoil is mostly gray. Below a depth of 40 inches there is a calcareous loamy substratum that is firm and compact. The substratum contains limestone and igneous pebbles and a few stones and boulders.

Brookston soils have a seasonal high water table that is indicated by the grayness in the subsoil. The high water table develops in winter and spring because of moderately slow permeability in the substratum. Brookston soils have a high available moisture capacity and commonly a high organic-matter content in the surface layer. Because the upper 2 to 3 feet of these soils is moderately permeable, artificial drainage by tile is satisfactory. Soil reaction in the root zone generally is neutral. Unless they are artificially drained, Brookston soils normally are too wet for satisfactory crop growth. Most areas, however, are drained and farmed. Corn, soybeans, wheat, and hay are the most commonly grown crops.

Representative profile of Brookston silty clay loam in a cultivated field, 1.6 miles east of Manara; Marion Township:

Ap—0 to 7 inches, very dark gray (10YR 3/1) silty clay loam; moderate, medium and coarse, granular structure; firm; many roots; neutral; abrupt, smooth boundary.

B21—7 to 13 inches, black (10YR 2/1) clay loam; strong, fine, subangular blocky structure; firm; many roots; neutral; clear, smooth boundary.

B22tg—13 to 16 inches, very dark gray (10YR 3/1) and dark-brown (10YR 4/3) clay loam; moderate to strong, fine and medium, subangular blocky structure; firm; common roots; thin, continuous, very dark gray clay films on ped surfaces; neutral; clear, smooth boundary.

B23tg—16 to 19 inches, grayish-brown (10YR 5/2) clay loam; weak, coarse, prismatic structure parting to moderate, medium, subangular blocky; firm; common roots; thin, continuous, dark-gray (10YR 4/1) and grayish-brown (10YR 5/2) clay films; neutral; clear, smooth boundary.

B24tg—19 to 28 inches, grayish-brown (10YR 5/2) silty clay loam that has common, fine, yellowish-brown (10YR 5/4) mottles; weak, coarse, prismatic structure parting to weak to moderate, coarse and medium, subangular blocky structure; firm; few roots; thin, continuous, gray (10YR 5/1) and very dark gray (10YR 3/1) clay films are most noticeable in upper part of horizon; neutral; clear, smooth boundary.

B3—28 to 40 inches, yellowish-brown (10YR 5/6) clay loam that has common, medium, distinct, grayish-brown (10YR 5/2) and gray (10YR 5/1) mottles; very weak, coarse, subangular blocky structure; firm; few roots; few small glacial pebbles; neutral; clear, smooth boundary.

C—40 to 60 inches, mottled olive-brown (2.5Y 4/4) and gray (N 5/0) loam glacial till; massive to weak, thick, platy structure; firm and compact; very few roots; common pebbles; mildly alkaline; calcareous.

The solum ranges from about 30 to 50 inches in thickness, but the average in the county is about 45 inches. The dark-colored upper horizons and underlying mottled horizons range from about 12 to 20 inches in combined thickness. The clay content in the upper B2 horizons ranges from about 27 to 40 percent. Mottles in the B2 and B3 horizons are yellowish brown (10YR 5/4 and 10YR 5/6) to dark yellowish brown (10YR 4/4), olive brown (2.5Y 4/4), grayish brown (10YR 5/2), or gray (10YR 5/1). Reaction in the B21 horizon is neutral to slightly acid and becomes less acid with depth. The B horizons grade with depth to the mildly alkaline to moderately alkaline C horizon. The C horizon is calcareous.

The Brookston soils are the very poorly drained members of a topographic sequence of soils that includes the progressively higher lying, somewhat poorly drained Crosby soils, moderately well drained Celina soils, and the well drained Miamian soils. Brookston soils have a darker colored surface layer than the other members of this sequence. The subsoil of Brookston soils is more gray than that of the Crosby, Celina, and Miamian soils.

Brookston silty clay loam (Bs).—Most areas of this nearly level soil are rounded and contain from 3 to 15 acres each. This soil commonly occupies the lowest positions on the uplands. Some basinlike areas are subject to surface ponding if not adequately drained.

Included with this soil in mapping are lighter colored areas of somewhat poorly drained Crosby soils. These included soils occupy low knolls on the landscape. Also included are some areas of Brookston soils that have slopes of 2 to 6 percent and other areas that have 4 to 6 inches of silty overwash. The overwash inclusions have a lighter colored surface layer than is typical for Brookston soils.

This soil has a seasonal wetness limitation for farming. Moderately slow permeability and a seasonal high water table are limitations for many nonfarm uses, including homesites and disposal of sewage effluent from septic tanks. (Capability unit IIw–2)

Cana Series

Soils in the Cana series are moderately well drained and deep to shale bedrock. They formed in three layers of soil material. The uppermost layer is loess, the middle layer is loamy glacial till, and the lower layer is residuum weathered from shale. Cana soils are gently sloping to sloping. They are in the southeastern part of the county where relatively thin glacial till overlies shale bedrock.

A representative cultivated Cana soil has a dark grayish-brown silt loam plow layer 8 inches thick. The upper part of the subsoil formed in the till material. It is mostly brown and yellowish brown to a depth of about 26 inches. This layer is more clayey than the plow layer. The lower part of the subsoil formed in residuum from shale and contains shale fragments. These fragments increase in volume with increasing depth. At a depth of 38 inches, there is very shaly silty clay loam. Shale bedrock is at a depth of 50 inches.

These soils have moderately slow permeability and a medium available moisture capacity. Their root zone is mostly moderately deep and is strongly acid to extremely acid. Cana soils dry out somewhat more slowly in spring than well drained soils, and they are commonly droughty in summer.

Most areas of Cana soils are planted to corn, soybeans, wheat, hay, and similar crops. Some areas are wooded.

Representative profile of a cultivated Cana silt loam near intersection of State Route 41 and Beatty Road; Perry Township.

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

B&A—8 to 12 inches, brown (10YR 5/3) silt loam; moderate, thick, platy structure parting to moderate, fine, subangular blocky structure; friable; brown (10YR 4/3) coatings and a few, thin, patchy, grayish-brown (10YR 5/2) clay films on ped surfaces and in pores; slightly acid; clear, smooth boundary.

IIB21t—12 to 19 inches, dark yellowish-brown (10YR 4/4) silty clay loam that has common, fine, prominent, dark reddish-brown (5YR 3/4) and a few, fine, distinct, grayish-brown (10YR 5/2) mottles; moderate, medium, subangular blocky structure; friable; continuous, brown (10YR 4/3) coatings that have thin, patchy clay films; 2 percent weathered shale fragments and 10 percent fine gravel; strongly acid; clear, smooth boundary.

IIB22t—19 to 26 inches, brown (10YR 4/3) silty clay loam that has common, fine, prominent, brown (7.5YR 4/4) to strong-brown (7.5YR 5/6) mottles and many, fine, prominent, grayish-brown (10YR 5/2) mottles; moderate, medium, subangular blocky structure; firm; continuous, dark grayish-brown (10YR 4/2) coatings and thin, patchy clay films on and within peds; very strongly acid; abrupt, smooth boundary.

IIIB3—26 to 38 inches, very dark gray (5YR 3/1) silty clay loam that has many, fine and medium, prominent, brown (7.5YR 4/4) mottles; moderate, medium, platy structure; friable; thin, very patchy clay films; extremely acid; 10 percent shale fragments; gradual, wavy boundary.

IIIC—38 to 50 inches, very dark gray (5YR 3/1) and dark reddish-brown (5YR 3/4) very shaly silty clay loam; strong, medium, platy structure; very strongly acid.

IIIR—50 inches, shale bedrock.

The solum is less than 40 inches thick. Depth to shale bedrock is more than 40 inches. The B2 horizons are clay loam, silty clay loam, and light clay. The IIIB horizon developed from shale residuum and reflects the character and composition of the bedrock by its variable texture. The depth to the IIIC horizon is more than 40 inches. The IIIC horizon and the shale bedrock are very strongly acid or extremely acid.

Cana soils are similar to Celina soils except that the lower part of their subsoil was derived from shale and they are underlain by acid shale.

Cana silt loam, 2 to 6 percent slopes, moderately eroded (CaB2).—This soil has the profile described as representative for the series. Included with this soil in mapping are severely eroded areas and areas shallower to shale. The severely eroded areas are indicated by a symbol on the soil map. Also included are some spots of mildly alkaline soil that is calcareous at a depth of 36 to 40 inches. These areas occur along the boundary of Miamian soils.

The surface or plow layer of this soil is low in organic-matter content because of erosion. Surface runoff is rapid, and there is a moderate erosion hazard where the soil is cultivated. Moderately slow permeability is a limitation for some nonfarm uses. (Capability unit IIe–2)

Cana silt loam, 6 to 12 percent slopes, moderately eroded (CaC2).—This Cana soil includes in mapping some small gullied and severely eroded areas. Also included are some spots of mildly alkaline soil that is calcareous at a depth of 36 to 40 inches. These spots are most commonly adjacent to Miamian soils.

Past erosion and a continuing severe erosion hazard are limitations to use for cultivated crops. This soil has low organic-matter content and rapid runoff. Slope and moderately slow permeability are limitations to many nonfarm uses. (Capability unit IIIe–3)

Casco Series

The Casco series consists of well-drained soils that are shallow to sand and gravel. These soils are gently sloping to steep, and they formed in gravelly outwash. Gently sloping to sloping Casco soils are on stream terraces and glacial kames.

A representative cultivated Casco soil has a brown loam surface layer 5 inches thick. The subsoil, to a depth of 19 inches, consists of gravelly loam that is yellowish brown in the upper part and brown in the lower part. Loose very gravelly loamy sand is below a depth of 19 inches.

Casco soils have moderate permeability in the surface layer and subsoil. The gravelly substratum has moderately rapid to rapid permeability. The root zone is shallow, for depth of root penetration is mostly limited by the gravelly and sandy substratum. The available moisture capacity is low because of shallow depth and the high sand and gravel content. Casco soils are medium acid to mildly alkaline in the root zone.

The gently sloping and sloping Casco soils are used for pasture and cultivated crops. The steeper Casco soils are mostly used for pasture and trees.

A representative profile of a cultivated Casco loam near the intersection of State Route 207 and Cook-Yankeetown Road; Madison Township:

Ap—0 to 5 inches, brown (10YR 4/3) loam; weak, coarse, granular structure; friable; 10 percent pebbles; mildly alkaline; abrupt, smooth boundary.

B2t—5 to 11 inches, dark yellowish-brown (10YR 4/4) gravelly clay loam; weak, coarse, subangular blocky structure; firm; 20 percent gravel; brown (10YR 4/3) continuous ped coatings; thin, patchy clay films; mildly alkaline; gradual, wavy boundary.

B3t—11 to 19 inches, brown (10YR 5/3) gravelly loam; weak, coarse, subangular blocky structure; friable; thin, very patchy brown (10YR 4/3) clay films on pores and within peds; 20 percent gravel; mildly alkaline, calcareous; abrupt, irregular or wavy boundary.

C—19 to 40 inches, grayish-brown (10YR 5/2) and brown (10YR 5/3) very gravelly loamy sand; loose; moderately alkaline, calcareous.

The A1 and A2 horizons and the Ap horizon are loam or gravelly loam. The B horizon has hues of 10YR, 7.5YR, and 5YR; values of 4 or 5, and chromas of 3 to 5. The texture range in the B2t horizon is clay loam, gravelly or sandy clay loam, and clay or gravelly clay. This horizon ranges from medium acid to mildly alkaline. The B3t horizon ranges from 2 to 9 inches in thickness. The depth to sand and gravel is 10 to 20 inches. In the C horizon stratification of sand and gravel generally is evident. This coarse material commonly extends to a depth of 60 inches and deeper.

The Casco soils are commonly near Fox and Rodman soils. Casco soils are similar to Fox soils but are shallower to the underlying sand and gravel substratum. Casco soils have a Bt horizon that is missing in the Rodman soils, which are also darker colored. In this county Casco soils were mapped only in undifferentiated groups of Casco and Rodman soils, Fox and Casco soils, and Fox, Casco, and Rodman soils. See the Fox series for the mapping unit descriptions of Fox and Casco and of Fox, Casco, and Rodman.

Casco and Rodman soils, 2 to 12 percent slopes, moderately eroded (CdC2).—Either one or both of these soils may occur in any given area mapped as this unit. They are so similar in use and management that they were mapped together. Casco soils are lighter colored than Rodman, but soils of both series are shallow to sand and gravel. The surface layer in this mapping unit is loam or gravelly loam. The total acreage of Casco soils is greater than that of Rodman soils in this mapping unit.

The Casco soils have the profile described as representative for the Casco series; one of Rodman soils is described for the Rodman series. Because of past erosion, the plow layer of these soils is a mixture of material from the subsoil or substratum and the remaining part of the original surface layer.

Areas of this mapping unit range from 5 to 20 acres in size. They are irregular in shape, and their surface is uneven, particularly in kame areas.

These soils are droughty. Because they are shallow, the erosion hazard is a very severe limitation to use for cultivated crops. Slope and droughtiness are limitations for some nonfarm uses. (Capability unit IVe–2)

Celina Series

The Celina series consists of moderately well drained soils that are nearly level to sloping. These soils occupy uplands where they formed in calcareous loamy till. In the southeastern corner of the county, silt (loess) up to 18 inches thick caps the Celina soils.

A representative cultivated Celina soil has a brown silt loam plow layer about 8 inches thick. The subsoil, to a depth of about 22 inches, consists of layers of dark-brown or yellowish-brown clayey material. Contrasting dark grayish-brown and yellowish-brown mottles occur in these layers. Below a depth of 22 inches, the substratum is light yellowish-brown, calcareous, massive loamy till.

Celina soils are wet in winter and early in spring because they have moderately slow permeability. The root zone for most annual crops is moderately deep. It has a medium available moisture capacity. If the soil is not limed, the root zone commonly is medium acid or strongly acid in the uppermost 18 to 24 inches. These soils are less acid as depth increases.

Most areas of Celina soils are farmed. They are used for crops such as corn, soybeans, wheat, and hay.

Representative profile of a cultivated Celina silt loam adjacent to Bloomingburg Road, one-half mile north of New Holland; Marion Township:

Ap—0 to 8 inches, brown (10YR 5/3) silt loam; weak, medium and fine, granular structure; friable; many roots; slightly acid; abrupt, smooth boundary.

B1—8 to 10 inches, yellowish-brown (10YR 5/6) clay loam; moderate to strong, fine, subangular blocky structure; firm; common roots; thin, patchy clay films on some ped faces; medium acid to strongly acid; clear, smooth boundary.

IIB21t—10 to 14 inches, dark-brown (10YR 4/3) clay that has few, medium, faint, yellowish-brown (10YR 5/6) mottles; strong, fine and medium, subangular blocky structure; firm to very firm; few roots; thin continuous clay films; medium acid; clear, wavy boundary.

IIB22t—14 to 19 inches, dark-brown (10YR 4/3) clay that has few, medium, faint, dark grayish-brown (10YR 4/2) mottles; strong, medium, subangular blocky structure; firm to very firm; few roots; thin continuous clay films; slightly acid; clear, wavy boundary.

IIB3t—19 to 22 inches, yellowish-brown (10YR 5/8) clay that has few, medium, distinct, dark grayish-brown (10YR 4/2) mottles; moderate, medium and coarse, subangular blocky structure; firm; few roots; thin, patchy clay films; slightly acid to neutral; clear, smooth boundary.

IIC—22 to 60 inches, light yellowish-brown (10YR 6/4) loam glacial till that has few, medium, faint, yellowish-brown (10YR 5/6) and brown (10YR 5/3) mottles; weak, coarse, angular blocky structure in upper part, but massive as depth increases; firm to very firm; compact; mildly alkaline to moderately alkaline; calcareous.

The solum ranges from 20 to 40 inches in thickness. Depth to carbonates ranges from 18 to 36 inches but in most places is about 22 or 23 inches. The B1 horizon is medium acid to strongly acid. Horizons that are deeper in the profile are progressively less acid. If a B23 horizon is present, it is slightly acid to neutral. In the B2 horizons, the matrix of the ped interiors ranges from yellowish brown (10YR 5/4) to dark brown (10YR 4/3) or dark grayish brown (10YR 4/2). Clay content of the B22t horizon ranges from 35 to slightly more than 45 percent but in most places is between 40 and 45 percent. The C horizon of underlying glacial till is mainly loam, but in some places it is clay loam. It has a calcium carbonate equivalent ranging from 25 to 45 percent.

The Celina soils are the moderately well drained members of a drainage sequence that includes the well drained Miamian soils, the progressively lower lying, somewhat poorly drained Crosby soils, and the very poorly drained Brookston soils. Celina soils differ from Miamian soils by having grayish mottling in the subsoil. The Celina soils are not so gray nor so mottled as are the Crosby soils. The surface layer of Celina soils is lighter colored than that of the Brookston soils. Celina soils are less gray throughout than Brookston soils.

Celina silt loam, 0 to 2 percent slopes (CeA).—Areas of this nearly level soil generally range from 3 to 10 acres in size. This soil dries out somewhat more slowly in spring than the gently sloping Celina soils. It generally has good tilth in the surface layer.

Included with this soil in mapping are a few areas of somewhat poorly drained Crosby soils in relatively low positions. Gently sloping Celina soils commonly are adjacent to this soil.

This soil has few limitations to use and management for farming. Random tile may be needed to improve drainage in small wet spots. Moderately slow permeability is a limitation for some nonfarm uses. (Capability unit I–1)

Celina silt loam, 2 to 6 percent slopes (CeB).—This soil has the profile described as representative for the series. It commonly occupies slightly convex slopes. The upper parts of drainageways typically occur in most areas of this soil. Most areas range from 5 to 20 acres in size. Locally, the glacial till underlying this soil has a clay loam texture.

Surface runoff is rapid, particularly where the soil is bare of plant cover. In cultivated areas, the erosion hazard is moderate. Moderately slow permeability is a limitation for some nonfarm uses. (Capability unit IIe–1)

Celina silt loam, 2 to 6 percent slopes, moderately eroded (CeB2).—A profile of this soil is similar to that described as representative for the series except that the silt loam surface layer is thinner because of erosion. The plow layer is a mixture of the brownish upper part of the subsoil and the remaining original surface layer. This causes a narrower range of optimum moisture for tillage than in the less eroded Celina soils. The surface layer is sticky and generally lower in organic-matter content than in uneroded Celina soils.

Seeps commonly occur in some areas of this soil. This soil typically is sloping and lies below less steep Celina or Miamian soils. Drainageways commonly cross areas of this soil. Most areas are on hillsides and range from 5 to 25 acres in size.

Surface runoff is rapid, particularly where the surface is bare of plant cover. Because of the continuing moderate erosion hazard, extra care is needed if this soil is used for cultivated crops. Moderately slow permeability is a limitation for many nonfarm uses. (Capability unit IIe-1)

Corwin Series

The Corwin series consists of deep, dark-colored soils that are moderately well drained. These soils formed in weathered calcareous loam till capped with up to 18 inches of silty loess. Corwin soils occupy uplands and are gently sloping. They probably formed under native vegetation of mixed prairie grasses and scattered deciduous hardwoods.

The plow layer of a representative Corwin soil is very dark grayish-brown silt loam about 7 inches thick. To a depth of 12 inches, texture and color are about the same as those of the plow layer. The subsoil, to a depth of about 34 inches, is brown clay loam mottled with yellowish brown. Grayish mottling occurs and indicates a seasonal saturation of this soil. At a depth of more than 34 inches, the substratum is calcareous loam till.

Corwin soils have high organic-matter content in the surface layer. Their available moisture capacity is mostly medium. These soils have moderately slow permeability. Their root zone is moderately deep to deep and is medium acid to strongly acid in the upper part. The root zone is less acid as depth increases.

Most areas of Corwin soil are cultivated. Corn, soybeans, wheat, and other crops common in the county are grown on this soil.

Representative profile of cultivated Corwin silt loam, near the intersection of Miami Trace Road and Burnett-Perrill Road; Jasper Township:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam, dark brown (10YR 3/3) when rubbed; weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

A12—7 to 12 inches, very dark grayish-brown (10YR 3/2) silt loam, dark brown (10YR 3/3) when rubbed; moderate, medium, subangular blocky structure; friable; medium acid; clear, smooth boundary.

B21t—12 to 19 inches, brown (10YR 4/3) clay loam that has common, fine, prominent, yellowish-brown (10YR 5/6) mottles; moderate, fine, subangular blocky structure; firm; very dark grayish-brown (10YR 3/2), thin, continuous clay films; 3 percent fine pebbles; slightly acid; gradual, smooth boundary.

B22t—19 to 26 inches, brown (10YR 4/3) clay loam that has few, fine, distinct, yellowish-brown (10YR 5/4) mottles; weak, coarse, subangular blocky structure; firm; very dark grayish-brown (10YR 3/2), thin and medium, continuous clay films on vertical ped faces; thin and very patchy clay films on horizontal faces; neutral; abrupt, wavy boundary.

B3t—26 to 34 inches, brown (10YR 5/3) clay loam that has common, fine, distinct, yellowish-brown (10YR 5/4) and grayish-brown (10YR 5/2) mottles; weak, coarse, subangular blocky structure; friable; dark grayish-brown (10YR 4/2) and some very dark grayish-brown (10YR 3/2), thin, patchy clay films on vertical ped faces; 5 percent fine gravel that includes some soft limestone fragments; mildly alkaline; calcareous; gradual, wavy boundary.

C1—34 to 42 inches, yellowish-brown (10YR 5/4) loam; massive; friable; mildly alkaline to moderately alkaline; calcareous; gradual, wavy boundary.

C2—42 to 60 inches, brown (10YR 5/3) loam that has common, fine, distinct yellowish-brown (10YR 5/4 and 5/6) mottles; massive; firm; common, fine, prominent, gray (10YR 6/1) lime segregations; moderately alkaline; calcareous.

The A horizon ranges from very dark brown (10YR 2/2) to very dark grayish brown (10YR 3/2). It is 10 to 14 inches thick. The A horizon is strongly acid to slightly acid, and the B horizon is medium acid to mildly alkaline. Depth to the C horizon of calcareous loam ranges from 19 to 44 inches, though a depth of about 34 inches is most common. The calcium carbonate equivalent of the till ranges from 25 to 45 percent.

Corwin soils are near soils in the Miamian, Celina, Crosby, and Brookston drainage sequence. The Corwin soils have a darker colored surface layer than the Miamian, Celina, or Crosby soils. Corwin soils are less gray and mottled in the subsoil and are better drained than the Brookston or Crosby soils.

Corwin silt loam, 2 to 6 percent slopes (CoB).—This soil generally is between Brookston soils in depressional areas and drainageways and Celina or Miamian soils in slightly higher areas.

Included with this soil in mapping are small areas of moderately well drained Celina soils and some small areas of very poorly drained Brookston soils. These wetter Brookston inclusions are most commonly on the lowest parts of the landscape.

Surface runoff is medium to rapid and, because of the moderate erosion hazard, is a limitation to use of this soil for cultivated crops. Moderately slow permeability is a limitation for some nonfarm uses. (Capability unit IIe-1)

Crosby Series

The Crosby series consists of somewhat poorly drained soils that formed in calcareous loam glacial till. Locally, the glacial till is capped with a thin loess mantle. These soils occur on uplands and are nearly level to gently sloping.

A representative cultivated Crosby soil has a dark grayish-brown silt loam plow layer 6 inches thick. The subsoil, to a depth of 23 inches, consists of dark grayish-brown material that has grayish and brownish mottles and firm consistence. The subsoil contains more clay than the surface layer or the underlying layers. Below a depth of 23 inches, the substratum is yellowish-brown, calcareous loam till that is mostly dense and massive.

Crosby soils have a seasonal high water table because permeability is moderately slow. The subsoil and substratum are the most restrictive layers to the movement of air and water. If these soils are adequately drained, the root zone for most annual crops is moderately deep. Crosby soils can be drained satisfactorily by tile. The available moisture capacity is mostly medium, but natural seepage contributes moisture for plants to use.

The upper 18 to 24 inches of the root zone is medium acid or strongly acid in some places.

Representative profile of a cultivated Crosby silt loam, 1 mile northwest of Manara and one-half mile north of New Holland on New Holland-Bloomingburg Road; Marion Township:

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

A2—6 to 8 inches, grayish-brown (10YR 5/2) silt loam that has few, fine, faint, light yellowish-brown (10YR 6/4) mottles; weak, fine and medium, granular structure that has indications of weak, thin, platy structure; friable; common roots; medium acid; clear, smooth boundary.

B1t—8 to 10 inches, dark grayish-brown (10YR 4/2) clay loam that has common, medium, faint, yellowish-brown (10YR 5/4) mottles; moderate, medium, subangular blocky structure; firm; few to common roots; thin, patchy, very dark grayish-brown (10YR 3/2) clay films on few ped faces; medium acid; clear, wavy boundary.

B21t—10 to 14 inches, dark grayish-brown (10YR 4/2) silty clay loam that has common, medium, distinct, dark yellowish-brown (10YR 4/4) and dark-brown (10YR 4/3) mottles; strong, fine and medium, subangular blocky structure; firm to very firm; few roots; thin, continuous, very dark grayish-brown (10YR 3/2) clay films on ped faces; slightly acid to medium acid; clear, wavy boundary.

B22t—14 to 19 inches, dark grayish-brown (10YR 4/2) clay that has common, medium, distinct, dark yellowish-brown (10YR 4/4) and dark-brown (10YR 4/3) mottles; weak, coarse, prismatic structure that parts to moderate to strong, medium and coarse, subangular blocky; very firm; few roots; thin, continuous, very dark grayish-brown (10YR 3/2) clay films on ped faces; slightly acid; clear, wavy boundary.

B23t—19 to 23 inches, dark grayish-brown (10YR 4/2) clay loam that has common, medium, distinct, dark yellowish-brown (10YR 5/6) mottles; moderate, coarse, subangular blocky structure; firm; few roots; thin, very dark grayish-brown (10YR 3/2) clay films on ped faces; neutral; clear, wavy boundary.

B3—23 to 26 inches, yellowish-brown (10YR 5/4) loam that has many, distinct, gray (10YR 5/1) and light brownish-gray (10YR 6/2) mottles; very weak, coarse, subangular blocky structure; firm; thin, dark grayish-brown (10YR 4/2) clay films on some ped faces; mildly alkaline, mildly calcareous; clear, wavy boundary.

C—26 to 60 inches, yellowish-brown (10YR 5/6) loam that has many, medium, distinct, gray (10YR 5/1) and light brownish-gray (10YR 6/2) mottles; weak, thick, platy structure to massive; very firm and compact in place; mildly to moderately alkaline, strongly calcareous.

In uneroded, nearly level areas, the solum ranges from 18 to 36 inches in thickness over calcareous glacial till. But in most places north of the outer boundary of the Reesville moraine, the solum is about 22 to 23 inches thick. In most cultivated areas, the A2 horizon normally is mixed into the plow layer. The B1 horizon is strongly acid or medium acid. Lower horizons are progressively less acid, and the B23 horizon is neutral or only slightly acid. The matrix of the ped interiors in the B2 horizons ranges from brown (10YR 5/3) to dark grayish brown (10YR 4/2), dark brown (10YR 4/3), or dark yellowish brown (10YR 4/4). The clay content of the B2t horizon is up to 48 percent. Depth from the surface to the mottled horizons ranges from 6 to 10 inches.

The Crosby soils are the somewhat poorly drained members of a drainage sequence that includes the progressively higher lying, moderately well drained Celina soils, the well drained Miamian soils, and the lower lying, dark-colored, very poorly drained Brookston soils. Crosby soils have a grayer B horizon than the Celina and Miamian soils and a less gray B horizon than Brookston soils, which have a darker A horizon.

Crosby silt loam, 0 to 2 percent slopes (CrA).—Areas of this soil are fairly wide and rounded. They range mostly from 3 to 25 acres in size. A profile of this soil is described as representative for the series.

Included with this soil in mapping are a few areas of dark-colored, very poorly drained Brookston soils that occupy lower positions along drains and in depressions.

Moderate seasonal wetness is a limitation to use of this soil for farm and many nonfarm purposes. Moderately slow permeability also is a limitation for many nonfarm purposes. (Capability unit IIw–3)

Crosby silt loam, 2 to 6 percent slopes (CrB).—Most areas of this soil are wide and rounded. They range from 5 to 20 acres in size.

Included with this soil in mapping are a few moderately eroded areas. In these areas the plow layer has less desirable physical properties than that in uneroded areas. Also included are small areas of Celina soils that commonly occupy higher lying positions near the crest of knolls and hills.

Surface runoff is medium to rapid, particularly where this soil is bare of plant cover. The main limitation to use of this soil for crops is moderate seasonal wetness. Also, because of slope, erosion is a hazard. Most areas have long slopes that increase runoff and the erosion hazard. Moderately slow permeability and seasonal wetness are limitations for many nonfarm uses. (Capability unit IIw–3)

Cut and Fill Land

Cut and fill land (Cw) consists of areas where the soil material has been removed or where soil material has been deposited as a fill. Such areas commonly are associated with construction and debris disposal. The slope of this mapping unit is highly variable. Most areas of Cut and fill land are 3 to 5 acres in size.

In areas of removal, this mapping unit commonly is similar to the substratum of the adjacent soil. In fill or disposal areas, the soil material varies but it normally consists of varying mixtures of material from the subsoil and substratum of nearby soils.

This soil material commonly is in poor physical condition. It generally is calcareous where it was removed from soils underlain by till. Available moisture capacity and organic-matter content are low. Erosion is a hazard in most areas. Cut and fill land is easily gullied and may be a source of sediment.

Resurfacing with suitable soil material helps to improve the root zone and to make establishment and maintenance of vegetative cover easier.

Most areas of Cut and fill land have a potential as wildlife or recreational areas. This land, however, is not rated for these uses, because it is extremely variable and requires onsite investigation for planning purposes. (Capability unit not assigned)

Fox Series

The Fox series consists of well-drained soils that formed in 24 to 40 inches of loamy material overlying stratified gravel and sand. The upper part of this loamy material is a silt mantle. These soils are nearly level to steep and are mostly on glacial outwash terraces.

A representative cultivated Fox soil has a dark-brown silt loam plow layer 7 inches thick. The uppermost subsoil layer extends to a depth of 13 inches and is dark yellowish-brown clay loam. Between depths of 13 and 36 inches the subsoil is brown clay loam, clay, and gravelly loam. Contrasting brownish clay films are on most natural surfaces in the lower part of the subsoil. The gravel content gradually increases with increasing depth. The substratum, below a depth of 36 inches, is stratified, loose, calcareous gravel and sand.

Fox soils have moderate permeability above the sandy and gravelly substratum but the substratum is rapidly permeable. The root zone is moderately deep for most annual crops. In only a few places is the root zone much more than 36 inches deep. The depth of root growth normally is limited by the gravel and sand substratum. These soils have a medium to low available moisture capacity and are droughty, particularly for crops maturing late in summer. Where the depth to sand and gravel is about 24 inches, the available moisture capacity is low. The root zone is mostly medium acid in the uppermost 18 inches. It is neutral to alkaline in the lower part of the soil. Fox soils warm up and dry out early in spring.

Most areas of Fox soils are farmed. Corn, wheat, soybeans, and hay are commonly grown.

Representative profile of cultivated Fox silt loam, 2 to 6 percent slopes, west of Parrott Station Road and Prairies Road junction; Jefferson Township:

Ap—0 to 8 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; neutral; abrupt, smooth boundary.

B1t—8 to 13 inches, dark yellowish-brown (10YR 4/4) light clay loam; moderate, fine, subangular blocky structure; friable; continuous, brown (10YR 4/3) clay films; 5 percent fine gravel; medium acid; clear, smooth boundary.

IIB21t—13 to 19 inches, dark-brown (7.5YR 4/4) clay loam; weak, fine, subangular blocky structure; firm; continuous, dark-brown (7.5YR 4/3 to 4/2) clay films on ped surfaces; 5 percent fine gravel; medium acid; gradual, smooth boundary.

IIB22t—19 to 26 inches, dark-brown (7.5YR 4/4) clay; weak, medium and coarse, subangular blocky structure; firm; thin, continuous, dark-brown (7.5YR 4/2 to 3/2) clay films on ped faces; 5 percent fine gravel; neutral; abrupt, wavy boundary.

IIB31t—26 to 29 inches, dark-brown (7.5YR 3/2) clay loam; weak, coarse, subangular blocky structure; firm; thin, patchy clay films on ped faces; 10 percent fine gravel and weathered limestone fragments; mildly alkaline; clear, wavy boundary.

IIB32—29 to 36 inches, brown (10YR 4/2) gravelly loam; weak, coarse, subangular blocky structure; friable; many partly weathered dolomite pebbles, some siliceous and calcareous sand and gravel, and some shale fragments; mildly alkaline, calcareous; abrupt, smooth boundary.

IIIC—36 to 60 inches, brown (10YR 5/3), stratified gravel and sand; single grain; loose; mildly to moderately alkaline; calcareous.

The silt mantle on Fox soils in this county ranges from 12 to 18 inches in thickness. The depth to calcareous sand and gravel is 24 to 40 inches, but average thickness is about 36 inches. The depth of the solum commonly coincides with depth to carbonates. The A horizon is mainly silt loam but ranges to loam or gravelly loam. The IIBt horizons range 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 material from IIB3 horizon extend into the IIIC horizon to a depth of several feet.

Fox soils commonly are near the Casco and Warsaw soils. They are lighter colored than the dark-colored Warsaw soils, and they are deeper to sand and gravel than Casco soils.

Fox silt loam, 0 to 2 percent slopes (FnA).—Most areas of this soil occupy broad terraces and range from 5 to 20 acres in size.

Included with this soil in mapping are gravelly areas that are indicated by a symbol on the soil map. Other inclusions, along North Fork Paint Creek, are areas that have limestone within 40 inches of the surface.

This soil has good tilth and is easy to farm. Except for a moderate hazard of drought, limitations to farming are few if any. This soil is well suited to irrigation and very well suited to specialty crops if irrigated. It dries out and warms up quickly in spring. This soil has few limitations for most nonfarm uses. (Capability unit IIs–1)

Fox silt loam, 2 to 6 percent slopes (FnB).—A profile of this soil is described as representative for the series. Most areas of this soil occupy broad terraces. These areas commonly are linear in shape and range from about 5 to 20 acres in size.

Included with this soil in mapping are gravelly areas that are indicated by a special symbol on the soil map. Also included, along North Fork Paint Creek, are some areas where limestone is within 40 inches of the surface.

This soil is suited to irrigation if erosion is controlled. If this soil is used for cultivated crops, surface runoff is medium and the erosion hazard is moderate. Slope is a limitation for some nonfarm uses. (Capability unit IIe–3)

Fox silt loam, 2 to 6 percent slopes, moderately eroded (FnB2).—The surface layer of this soil is less friable than that of uneroded Fox soils. Because of past erosion, the plow layer is a mixture of the brownish upper part of the subsoil and the remaining original surface layer. Gravel generally is more noticeable on the surface because it has been concentrated by erosion.

Most areas of this soil are on terraces and are irregularly shaped. These areas range from 5 to 20 acres in size. The slopes are generally smooth except where broken by small drainageways. Along the North Fork of Paint Creek, included areas have limestone within 40 inches.

Because of erosion, the plow layer has moderate physical limitations to tillage. This layer is more difficult to till than that of uneroded Fox soils. The erosion hazard is continuing and moderate in cultivated areas. This soil is not so well suited to specialty crops as are uneroded Fox soils. Other than slope, the limitations for nonfarm uses are few. (Capability unit IIe–3)

Fox silt loam, 6 to 12 percent slopes, moderately eroded (FnC2).—Areas of this soil are commonly linear in shape and range from 5 to 20 acres in size. Because of past erosion the plow layer of this soil is a mixture of the brownish upper part of the subsoil and the remaining original surface layer. As a result, the plow layer is more sticky than that of uneroded Fox soils.

Included with this soil in mapping are a few areas of gravelly Casco soils. Also included are a few areas of severely eroded Fox soils that have slopes of more than 12 percent and that have been tilled up-and-down hill. These severely eroded soils have a uniform brown color where bare of plant cover. In most places they are much more gravelly than this soil.

The erosion hazard on this soil is severe because surface runoff is rapid. Slope and erosion are the dominant limitations for many nonfarm uses. (Capability unit IIIe-1)

Fox and Casco soils, 6 to 12 percent slopes, severely eroded (FoC3).—Both of these soils generally occur in each mapped area. They were not mapped separately, because they have similar use and management needs.

The Fox and Casco soils have profiles similar to the ones described as representative for their series, except for the difference caused by severe erosion. Because of erosion the present plow layer of both soils is mainly material from the subsoil or substratum or a mixture of these two kinds of material. The surface layer is silt loam, loam, clay loam, or clay, each of which is gravelly in places. Most areas are 3 to 15 acres in size and occupy short, linear terrace escarpments or rounded kames. The gravel content in the surface layer is variable. Both soils are droughty.

The plow layer of these soils commonly is low in organic-matter content and generally has poor tilth. Where bare of plant cover, the surface is subject to crusting that limits infiltration of water. Both crusting and low moisture content hinder emergence of seedlings and good growth of plants.

Because surface runoff is rapid, the erosion hazard is very severe in cultivated areas. Slope and drought are limitations for many nonfarm uses of these soils. (Capability unit IVe-2)

Fox, Casco and Rodman soils, 12 to 25 percent slopes, moderately eroded (FrE2).—Any one or all three of these soils occur in each mapped area. In some areas, these soils are intermingled to the extent that mapping them separately was not practical. They are mapped together because they have similar use and management needs.

The Fox soils have a profile similar to the one described as representative for the series, except that it is moderately eroded and the surface layer contains gravel. The Casco and Rodman soils are described separately under their respective series. Except for the effects of erosion, these soils also have profiles similar to the ones described as representative for the series.

Because of past erosion, the plow layer of the soils in this mapping unit consists of a mixture of the remaining original surface layer and material from the subsoil or upper part of the substratum.

Included with these soils in mapping are a few severely eroded areas where the soils, particularly the Casco and Rodman, have a greater clay content than that described in the typical profiles. The surface layer and subsoil are 20 to 50 percent gravel. The Rodman soils have a dark-colored surface layer.

This mapping unit occurs on moraines, kames, and terrace escarpments. Because the deposits from which these soils were derived vary within short horizontal distances, many differences in extent of each soil and in soil properties can be expected. The Fox and Casco soils in this mapping unit are more extensive than the Rodman soils.

The surface of the soils in this mapping unit is uneven. Most areas are rounded and irregular in shape. They are mostly 10 to 30 acres in size.

These soils, particularly the Casco and Rodman, are droughty, but the main limitation to farming is erosion. The erosion hazard is severe when these soils are used for pasture unless a thick plant cover is maintained. The soils generally are too steep and droughty for field crops. Slope is a limitation to use for many nonfarm purposes. (Capability unit VIe-2)

Genesee Series

The Genesee series consists of deep, well-drained soils on flood plains. These soils formed in loamy alluvium that washed from uplands where the soils formed in calcareous glacial till. Genesee soils are nearly level, and they occupy flood plains along most streams in the county.

A typical cultivated Genesee soil has a dark grayish-brown plow layer 7 inches thick. The subsoil extends to a depth of about 28 inches and consists of layers of brown and dark grayish-brown loamy material that is friable. The substratum consists of layers of silt loam and silty clay loam to a depth of 54 inches. Below this depth, there is stratified silt, sand, and gravel. Bedrock normally does not occur within a depth of 8 to 10 feet.

Genesee soils are moderately permeable. Most annual crops commonly develop deep roots in this soil. The root zone has a high available moisture capacity. These soils are subject to flooding, mainly in winter and spring.

Genesee soils are well suited to summer row crops, and corn and soybeans are commonly grown. In the few areas where flooding is particularly hazardous, these soils are mostly used for pasture or trees.

Representative profile of pastured Genesee silt loam near intersection of State Route 207 and Walters Road; Madison Township:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; neutral to mildly alkaline, calcareous; abrupt, smooth boundary.

B21—7 to 17 inches, dark grayish-brown (10YR 4/2) loam; weak, medium, subangular blocky structure; friable; very dark grayish-brown (10YR 3/2) coatings; mildly alkaline; calcareous; clear, wavy boundary.

B22—17 to 28 inches; brown (10YR 4/3) loam; weak, coarse, subangular blocky structure; friable; dark grayish-brown (10YR 4/2) coatings; 3 percent gravel between depths of 22 and 26 inches; mildly alkaline: calcareous; clear, smooth boundary.

C1—28 to 33 inches, dark grayish-brown (10YR 4/2) silt loam; massive; friable; mildly alkaline; calcareous; clear, smooth boundary.

IIC2—33 to 40 inches; brown (10YR 4/3) light silty clay loam; massive; friable; few limestone pebbles; mildly alkaline; calcareous; clear, smooth boundary.

IIIC3—40 to 54 inches, dark grayish-brown (10YR 4/2) silt loam that has common, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; massive; friable; mildly alkaline, calcareous; gradual, wavy boundary.

IVC4—54 to 60 inches, stratified silt, sand, and gravel.

The Ap horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 4/3). The C horizon is mainly dark grayish brown (10YR 4/2) or very dark grayish brown (10YR 3/2).

The Genesee soils in this county differ from Genesee soils elsewhere by being calcareous throughout the profile. This feature, however, does not significantly alter use and management.

The well-drained Genesee soils commonly are adjacent to the dark-colored Ross and Medway soils and other alluvial soils. Genesee soils have a lighter colored A horizon than Ross or Medway soils.

Genesee silt loam (Gn).—Most mapped areas of this nearly level soil range from 5 to 20 acres in size along the larger streams. Linear flood channels cross most of the larger areas. Along the smaller streams, the areas are smaller and commonly are linear and winding. This soil has good surface tilth and is easy to farm.

Included with this soil in mapping are a few areas of moderately well drained Medway soils that occupy lower positions. Also included in a few areas is a soil that is about 2 to 3 feet deep over buried soils similar to Fox and Warsaw soils.

Limitations to the use of this soil for farming are few, if any, because soil properties are favorable. Flooding, however, limits to some extent the choice of crops that can be grown. Flooding is a severe limitation to most nonfarm uses of this soil. (Capability unit IIw-4)

Gravel Pits

Gravel pits (Gp) consists of areas that are surface mined for construction aggregate. Most of these areas are mined for material that meets local needs. These pits commonly occupy glacial kames and outwash areas. Slopes in and around the pits range from nearly level to very steep.

Typically, Gravel pits occur with Casco, Fox, Rodman, and other soils that are underlain by gravel and sand outwash. Most pits range from 3 to 10 acres in size. The mined pits are continually being enlarged.

The material mined consists of stratified layers of gravel and sand. These layers vary in thickness and orientation, depending on the kinds of sediment and how they were deposited. The kinds of aggregate and the grain sizes are relatively uniform in any one layer, but in many places they contrast with the aggregate in adjacent layers.

Nearly all of the large aggregate is rounded. Dolomite limestone is the dominant material in these pits. Some softer shale aggregate occurs in places. Most of the dolomite and shale is of relatively local origin. Quartz, granite, and other siliceous materials are less extensive. In some places, calcareous cementation has formed a weakly bonded conglomerate.

Because of the nature of mining, the piled soil debris varies within short horizontal distances. This soil material commonly has poor physical properties. Both organic-matter content and available moisture capacity are low. Most areas are erodible. Instability of the soil material also causes gullying and a source of siltation.

Areas not mined need to be resurfaced with favorable soil material. This benefits the establishment and maintenance of plant cover. Grasses and trees tolerant of calcareous soil help to provide protective cover and have esthetic values as well.

Ponded areas in the pits commonly are free of pollution and siltation. These areas have some local potential for development of wildlife habitat and recreation facilities. (Capability unit not assigned)

Hennepin Series

The Hennepin series consists of well-drained soils that are shallow to calcareous glacial till. These soils occupy uplands and are steep or very steep. They occur mostly in the southern part of the county.

A typical Hennepin soil has a very dark grayish-brown silt loam surface layer about 5 inches thick. At depths between 5 and 9 inches, the soil is dark grayish-brown silt loam. Brown loamy subsoil layers extend to a depth of 20 inches. Brown calcareous loamy till is below a depth of 20 inches.

Hennepin soils have low to medium organic-matter content, moderately slow permeability, and a low available moisture capacity. These soils are slightly acid to mildly alkaline.

In most areas the Hennepin soils are too thin and too steep for cultivated crops. These soils are used mostly for pasture and trees.

Hennepin soils in this county have been mapped only in undifferentiated groups with Miamian soils.

Representative profile of a wooded Hennepin silt loam near the intersection of Creek-Rock Bridge Road and Flakes Ford Road; Union Township:

O1—¼ inch to 0, leaf litter.

A1—0 to 5 inches, very dark grayish-brown (10YR 3/2) silt loam, dark brown (10YR 3/3) when rubbed; weak, fine, subangular blocky structure; friable; neutral; clear, wavy boundary.

A3—5 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, subangular blocky structure; friable; mildly alkaline; abrupt, wavy boundary.

B21—9 to 12 inches, brown (10YR 4/3) loam; weak, fine, subangular blocky structure; friable; 5 percent pebbles and stones; mildly alkaline; calcareous; clear, wavy boundary.

B22—12 to 20 inches, brown (10YR 4/3) loam; weak, fine, subangular blocky structure; friable; 5 percent pebbles and stones; mildly alkaline; calcareous; gradual, smooth boundary.

C1—20 to 36 inches, brown (10YR 5/3) loam; massive; friable; mildly to moderately alkaline; calcareous; clear, smooth boundary.

C2—36 to 42 inches, brown (10YR 5/3) loam; massive; firm; moderately alkaline; calcareous.

Depth to the calcareous C horizon ranges from 15 to 20 inches. The A horizon ranges from very dark brown (10YR 2/2) in undisturbed areas to yellowish brown (10YR 5/4) in eroded areas. The A and B horizons range from slightly acid to mildly alkaline.

Hennepin soils are typically adjacent to steep Miamian soils, but Hennepin soils have a thinner, less acid solum than Miamian soils and lack a horizon of clay accumulation.

Henshaw Series

The Henshaw series consists of deep, somewhat poorly drained soils. These soils formed in calcareous lacustrine material that has a high silt content. Henshaw soils are nearly level and occupy stream terraces.

A representative Henshaw soil in a cultivated field has a dark gray silt loam plow layer about 9 inches thick. The subsoil, to a depth of about 34 inches, consists of brown silt loam and silty clay loam layers. These layers have contrasting grayish-brown and yellowish-brown mottles. They also have dark grayish-brown and dark-gray clay films on natural structural faces. The substratum, below a depth of 34 inches, consists of stratified layers of brown, loamy material that is high in content of silt.

Henshaw soils have a seasonal high water table, and they are wet in winter and spring. These soils dry fairly quickly in spring if artificially drained. In summer Henshaw soils have a moderately deep to deep root zone for most annual crops. Available moisture capacity is high, and permeability is moderately slow. These soils are medium acid to mildly alkaline in the root zone.

Most areas of Henshaw soils are used for farming. Corn, soybeans, wheat, and hay are commonly grown.

Representative profile of Henshaw silt loam in a cultivated field near intersection of U.S. Highway No. 22 and Rattlesnake Creek; Concord Township.

Ap—0 to 9 inches, dark-gray (10YR 4/1) silt loam; weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

B1t—9 to 14 inches, brown (10YR 4/3) silt loam that has many, fine and medium, distinct, dark grayish-brown (10YR 4/2), dark-gray (10YR 4/1), and yellowish-brown (10YR 5/4) mottles; weak, fine, subangular blocky structure; friable; dark-gray (10YR 4/1) and dark grayish-brown (10YR 4/2), thin, patchy clay films; medium acid; clear, smooth boundary.

B21tg—14 to 19 inches, brown (10YR 5/3) silty clay loam that has common, fine, dark grayish-brown (10YR 4/2) and grayish-brown (10YR 5/2) mottles; moderate, fine, subangular blocky structure; friable; dark-gray (10YR 4/1) and gray (10YR 5/1), continuous coatings; thin, patchy, dark grayish-brown (2.5Y 4/2) clay films; medium acid; gradual, smooth boundary.

B22tg—19 to 26 inches, brown (10YR 5/3) silty clay loam that has common, fine, distinct, dark grayish-brown (10YR 4/2) mottles; moderate, coarse, dark-gray (10YR 4/1) and very dark gray (10YR 3/1) clay coatings that are thin and continuous on vertical faces and patchy on horizontal faces; thin, patchy clay films on and in peds; slightly acid; clear, smooth boundary.

B3t—26 to 34 inches, brown (10YR 5/3) silt loam that has few, fine, prominent, yellowish-brown (10YR 5/6) mottles and common, fine, distinct, grayish-brown (10YR 5/2) mottles; weak, coarse, subangular blocky structure; firm; dark-gray (10YR 4/1) clay films on vertical faces and in peds; light brownish-gray (10YR 6/2), large, calcareous zones; mildly alkaline; calcareous; gradual, wavy boundary.

C1—34 to 46 inches, brown (10YR 5/3), stratified silt loam, silt, and fine sandy loam that has common, medium, prominent, yellowish-brown (10YR 5/6) mottles and common, coarse, distinct, light brownish-gray (10YR 6/2) mottles; massive; friable; mildly alkaline; calcareous; gradual, wavy boundary.

C2—46 to 58 inches, brown (10YR 4/3) fine sandy loam that has few, fine, distinct, yellowish-brown (10YR 5/4) and grayish-brown (10YR 5/2) mottles; massive; friable; moderately alkaline; calcareous; gradual, wavy boundary.

C3—58 to 60 inches, brown (10YR 5/3) silt loam that has common, fine, prominent, yellowish-brown (10YR 5/6) mottles; massive; friable; 1 percent round pebbles; moderately alkaline; calcareous.

The depth to the C horizon ranges from about 28 to 50 inches. The solum is generally less than 40 inches thick. The B2t horizon is silty clay loam or silt loam. The Bt horizon has hues of 10YR and 2.5Y and common to many, grayish and brownish mottles. The A horizon ranges from neutral to medium acid. The B horizon is medium to strongly acid in the upper part and medium acid to mildly alkaline in the lower part.

The Henshaw soils in this county have grayer coatings and mottles in the B horizons than Henshaw soils elsewhere, but this does not greatly change or influence use and management.

Henshaw soils are somewhat poorly drained members of a topographic sequence that includes the lower lying, very poorly drained Patton soils. Henshaw soils have a lighter colored A horizon and a less gray B horizon than Patton soils. The A horizon of Henshaw soils is lighter colored and thinner than that of Henshaw soils, dark variant.

Henshaw silt loam, 0 to 2 percent slopes (HeA).—This soil occurs on stream terraces in areas 5 to 10 acres in size. It is subject to surface crusting.

Included in mapping are areas of soils that are moderately well drained instead of somewhat poorly drained. In a few places, sandy layers are at a depth of 3 feet or more.

Seasonal wetness is a moderate limitation to use of this soil for farming. It is also a limitation to many nonfarm uses. This soil tends to be soft and compressible when it is wet. (Capability unit IIw–3)

Henshaw Series, Dark Variant

The Henshaw series, dark variant, consists of soils that are deep and somewhat poorly drained. These soils are nearly level and occur on stream terraces. They formed in calcareous, loamy and silty lacustrine material.

A representative Henshaw silt loam, dark variant, in a cultivated field has very dark grayish-brown silt loam surface and subsurface layers that together are 12 inches thick. The subsoil layers, to a depth of about 40 inches, consist of yellowish-brown loamy material. These layers have contrasting grayish and brownish mottles and grayish coatings on natural structural faces. The substratum, below a depth of 40 inches, consists of yellowish-brown to grayish-brown loamy material that is weakly stratified.

These soils have a seasonal high water table. If artificially drained, these soils dry fairly rapidly in the spring. The rooting zone is moderately deep to deep and accommodates most annual crops. Tile drains help to reduce seasonal wetness. Available moisture capacity is high, and permeability is moderately slow. These soils are strongly acid in the subsoil, but they are less acid as depth increases.

Most areas of these soils are farmed. Corn, soybeans, wheat, and hay are commonly grown.

Representative profile of Henshaw silt loam, dark variant, in a cultivated field near intersection of West Fork Road and the Baltimore and Ohio Railroad; Jasper Township:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam, dark brown (10YR 3/3) when rubbed; weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

A12—8 to 12 inches, very dark grayish-brown (10YR 3/2) silt loam, dark brown (10YR 3/3) when rubbed; weak, fine, subangular blocky structure; friable; slightly acid; gradual, smooth boundary.

B1t—12 to 18 inches, yellowish-brown (10YR 5/4) heavy silt loam; common, fine, distinct, grayish-brown (10YR 5/2) and dark-gray (10YR 4/1) mottles; moderate, fine, subangular blocky structure; friable; dark-gray (10YR 4/1) to brown (10YR 5/3) ped coatings, thin, patchy clay films on ped faces; medium acid; clear, smooth boundary.

B2t—18 to 30 inches, yellowish-brown (10YR 5/4) silty clay loam; many, medium, distinct, grayish-brown (10YR 5/2), dark grayish-brown (10YR 4/2), and yellowish-brown (10YR 5/6) mottles; moderate, medium and fine, subangular blocky structure; friable; dark grayish-brown (10YR 4/2), thin, continuous clay films on ped faces; slightly acid in upper part but grades to neutral as depth increases; gradual, wavy boundary.

B3t—30 to 40 inches, dark yellowish-brown (10YR 4/4) silty clay loam; common, fine, distinct, brown (10YR 5/3) to yellowish-brown (10YR 5/4) mottles; weak, coarse, subangular blocky structure; friable; thin to medium, very dark grayish-brown (10YR 3/2) clay films on vertical faces; neutral; abrupt, wavy boundary.

C—40 to 60 inches, yellowish-brown (10YR 5/4) to grayish-brown (10YR 5/2) silt loam that is stratified with thin layers of silty clay loam; many, medium, distinct, light brownish-gray (10YR 6/2) to light olive-brown (2.5Y 5/4) mottles; massive; alkaline, calcareous.

The depth to the C horizon ranges from 30 to 42 inches and generally corresponds to the thickness of the solum. The A horizon is more than 10 inches thick. The Bt horizon is mainly silty clay loam but is heavy silt loam in some places. The Bt horizon has hues of 10YR and 2.5Y and common to many grayish and brownish mottles. The A horizon ranges from neutral to medium acid. The B horizon is medium acid to strongly acid in the upper part and medium acid to neutral in the lower part.

The Henshaw soils, dark variant, are the somewhat poorly drained members of a drainage sequence that includes the lower lying, very poorly drained Patton soils. These Henshaw soils are less gray in the subsoil than Patton soils. They have a darker colored, thicker A horizon than other Henshaw soils.

Henshaw silt loam, dark variant, 0 to 2 percent slopes (HkA).—This soil has a moderately high organic-matter content. It is less susceptible to surface crusting than lighter colored Henshaw soils. This soil is on stream terraces in areas 5 to 10 acres in size. Included with this soil in mapping are small areas of wetter, dark-colored Patton soils.

Seasonal wetness is the dominant limitation to the use of this soil for farming. It also is the dominant limitation for many nonfarm uses. (Capability unit IIw-3)

Kendallville Series

The Kendallville series consists of soils that are deep and well drained. These soils formed in a mantle of loamy outwash and underlying compact glacial till. The lower part of the subsoil formed in weathered till. Kendallville soils are mostly moderately deep to compact, limy glacial till. They are nearly level to moderately steep and are on upland areas of moraines and on the till plain.

A representative cultivated Kendallville soil has a brown silt loam plow layer 8 inches thick. The next layer, to a depth of 13 inches, is brown silty clay loam. To a depth of about 36 inches, layers in the lower part of the subsoil range from clay loam to gravelly loam. These subsoil layers are mostly brown and acid in the upper part and are neutral to mildly alkaline in the lower part. Between depths of 36 inches and 40 inches, the subsoil is a brown loam. This layer contains glacial pebbles and limestone fragments and is underlain by massive, calcareous loam glacial till.

Permeability in the Kendallville soils is moderate above the till and moderately slow in it. The compact underlying till generally restricts root growth to a moderately deep zone. This zone has a medium available moisture capacity.

The Kendallville soils are mostly used for cropland in this county. Corn, soybeans, wheat, and hay crops are most commonly grown.

Representative profile of a cultivated Kendallville silt loam in a cultivated field; near intersection of Creek-Rock Bridge Road and Locust Grove Road; Wayne Township:

Ap—0 to 8 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

B1—8 to 13 inches, brown (7.5YR 4/4) silty clay loam; weak, medium and fine, subangular blocky structure; friable; thin, very patchy, brown (7.5YR 5/3) clay films and degraded surfaces; 2 percent fine pebbles; medium acid; clear, smooth boundary.

B21t—13 to 19 inches, brown (7.5YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; thin, patchy clay films on ped faces; 10 percent fine pebbles; medium acid; clear, smooth boundary.

B22t—19 to 26 inches, brown (7.5YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; thin, continuous clay films on ped faces; 10 percent fine pebbles; slightly acid; clear, smooth boundary.

B23t—26 to 34 inches, dark-brown (7.5YR 3/4) sandy clay loam; weak, coarse, subangular blocky structure; firm; thin, patchy clay films, clay bridging of sand and coarse fragments; 10 percent fine pebbles; neutral; abrupt, wavy boundary.

B24t—34 to 36 inches, brown (10YR 4/3) gravelly loam; weak, coarse, subangular blocky structure; friable; dark grayish-brown, (10YR 4/2), thin, patchy clay films; 20 percent fine pebbles; mildly alkaline; calcareous; abrupt, smooth boundary.

IIB3t—36 to 40 inches, brown (10YR 5/3) loam; weak, coarse, subangular blocky structure; friable; dark grayish-brown (10YR 4/2), thin, patchy clay films on vertical ped faces; 5 percent pebbles; mildly alkaline; calcareous; clear, smooth boundary.

IIC—40 to 60 inches, brown (10YR 5/3) loam that has common, fine, distinct, yellowish-brown (10YR 5/6) mottles; massive; firm and dense; common, fine, distinct, light brownish-gray (10YR 6/2) calcareous zones; 5 percent gravel; mildly to moderately alkaline; calcareous.

The depth to carbonates ranges from 24 to 40 inches and generally is 2 to 15 inches less than the thickness of the solum. The A horizon is brown (10YR 4/3) or dark grayish brown (10YR 4/2).

The B horizon ranges from slightly acid to strongly acid in the upper part to neutral or mildly alkaline in the lower part. In some areas the contact between that part of the solum developed in loamy outwash and that developed in till is not well defined. The B horizon commonly extends 2 to 15 inches into the underlying glacial till. It normally is leached or partly leached and has a loamy texture. Some clay films are on ped and gravel surfaces, particularly on the vertical surfaces. In a few places, the solum is directly on calcareous till.

The Bt horizons are silty clay loam, clay loam, sandy clay loam, loam, gravelly loam, or gravelly clay loam. These horizons are dark brown and dark yellowish brown or reddish brown in hues of 10YR to 5YR.

Kendallville soils are commonly adjacent to Miamian and Fox soils. They differ from the Miamian soils in that the upper part of the solum formed in loamy outwash. The Fox soils have a substratum of stratified gravel and sand instead of glacial till.

Kendallville silt loam, 2 to 6 percent slopes (KeB).—A profile of this Kendallville soil is described as representative for the series. This soil generally has good tilth. Commonly included with this soil in mapping are small areas of Fox silt loam.

This Kendallville soil is used mostly for general farming, but the erosion hazard is moderate in cultivated areas. Surface runoff is slow to medium. This soil is well suited to adapted specialty crops. It is suited to irrigation if erosion is controlled. Moderately slow permeability is the dominant limitation of this soil for many nonfarm uses. (Capability unit IIe–1)

Kendallville silt loam, 2 to 6 percent slopes, moderately eroded (KeB2).—This soil has lost about half of its original surface layer through erosion. As a result, it has a lower available moisture capacity and is more subject to cloddiness than uneroded Kendallville soils. The profile of this soil has a stickier surface layer than that described as representative for the series. This is because subsoil material has been mixed into the surface layer by plowing. Water infiltrates more slowly into this soil than into uneroded Kendallville soils. Surface runoff is medium. Gravel is common on the surface in some areas, particularly in small included areas that are severely eroded.

This soil is mostly used for general farming. The erosion hazard is moderate in cultivated areas. Moderately slow permeability is the dominant limitation for many nonfarm uses. (Capability unit IIe–1)

Kendallville silt loam, 6 to 12 percent slopes, moderately eroded (KeC2).—This soil has a profile that is shallower to calcareous till than the one described as typical for the series. Shallowness is partly because of accelerated erosion and partly because of slope and geologic erosion. Since the plow layer of this soil contains some subsoil material, the surface is stickier and more cloddy than normal. Erosion also has lowered the capacity of this soil to absorb and retain moisture. In some included areas there are shallow gullies and gravelly spots. Surface runoff from this soil is rapid. Infiltration of water is slower on this soil than on uneroded Kendallville soils.

The erosion hazard on this soil is cultivated areas is severe. Slope and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIIe–2)

Kendallville clay loam, 6 to 12 percent slopes, severely eroded (KlC3).—This soil commonly occupies knobs and side slopes that have been cultivated up and down hill. As a result, erosion has been severe.

A profile of this soil is similar to that described as representative for the series except that it has been altered by erosion. The present plow layer consists mostly of material from the upper part of the subsoil. Also, in a few areas the calcareous till is at or near the surface, particularly in gullied areas. Gullies are common in some areas.

The plow layer commonly is low in organic-matter content, and it has poor tilth. Where bare of plant cover, the surface crusts firmly and limits infiltration of water. Both crusting and low moisture content hinder emergence of seedlings and good growth of crops.

Because surface runoff is rapid to very rapid, the erosion hazard is continuous and very severe in fields of cultivated crops. Slope, erosion hazard, and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IVe–1)

Kendallville clay loam, 12 to 18 percent slopes, severely eroded (KlD3).—This soil commonly occupies knobs and side slopes that have been cultivated up and down hill. As a result, erosion has been severe.

A profile of this soil is similar to that described as representative for the series, except that the upper part of the profile has been greatly changed by erosion. The present plow layer consists mostly of the upper part of the subsoil. Also, the depth to calcareous till is less, and in some places this till is exposed at the surface. Gullies are common in some areas.

The plow layer of this soil is commonly low in organic-matter content, and it has poor tilth. Where bare of plant cover, the surface crusts firmly and the infiltration of water is slowed. Both crusting and low moisture content hinder the emergence of seedlings and good growth of crops.

Surface runoff is very rapid on this moderately steep soil, and erosion makes it poorly suited to cultivated crops. In pasture the erosion hazard is severe unless a thick plant cover is maintained. Moderately steep slopes are a severe limitation for many nonfarm uses. (Capability unit VIe–1)

Medway Series

The Medway series consists of deep, moderately well drained soils that are dark colored and nearly level. These soils formed on bottom lands in recently deposited loamy sediments.

A representative Medway soil is black or very dark gray silt loam to a depth of more than 2 feet. The subsoil is between depths of 25 and 30 inches and is friable, dark-brown loam. Next is friable, brown or grayish-brown loam that extends to a depth of about 55 inches. Below a depth of 55 inches, the soil material is mostly calcareous, friable gravelly loam.

Medway soils have a high available moisture capacity, high organic-matter content, moderate permeability, and a deep root zone. They have a seasonal high water table for short periods and are subject to flooding, particularly in winter and spring. Their reaction is mostly neutral.

Medway soils are well suited to summer row crops. Corn and soybeans are most commonly grown. In a few areas where flooding is particularly hazardous, these soils are mostly used for pasture or trees.

Representative profile of Medway silt loam, 1¼ miles west of intersection of State Route 753 and Flakes Ford Road, in a cornfield; Union Township:

Ap—0 to 8 inches, black (10YR 2/1) silt loam, very dark brown (10YR 2/2) when rubbed; weak, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A12—8 to 15 inches, black (10YR 2/1) silt loam, very dark brown (10YR 2/2) when rubbed; strong, fine and very fine, subangular blocky structure; friable; neutral; clear, smooth boundary.

A3—15 to 25 inches, very dark gray (10YR 3/1) silt loam, very dark grayish brown (10YR 3/2) when rubbed; weak, fine and medium, subangular blocky structure; friable; 1 percent fine pebbles; neutral; gradual, smooth boundary.

B—25 to 30 inches, dark-brown (10YR 4/3) loam that has many, fine, distinct, grayish-brown (10YR 5/2) mottles; weak, coarse, subangular blocky structure; friable; dark grayish-brown coating on vertical ped faces; 2 percent fine pebbles; neutral; clear, smooth boundary.

C1—30 to 35 inches, brown (10YR 4/3) loam that has common, fine, distinct, grayish-brown (10YR 5/2) mottles and a few, fine, distinct, yellowish-brown (10YR

5/6) mottles; massive; friable; 3 percent fine pebbles; neutral; clear, smooth boundary.

C2—35 to 47 inches, brown (10YR 5/3) loam that has few, fine, faint, grayish-brown (10YR 5/2) mottles and a few, fine, prominent, yellowish-brown (10YR 5/6) mottles; massive; friable; 5 percent fine pebbles; mildly alkaline, calcareous; gradual, wavy boundary.

C3—47 to 55 inches, grayish-brown (10YR 5/2) loam that has common, medium and coarse, faint, yellowish-brown (10YR 5/6) mottles; massive; friable; 5 percent fine pebbles; mildly alkaline; calcareous; gradual, smooth boundary.

C4—55 to 60 inches, gray (10YR 5/1) to dark-gray (10YR 4/1) gravelly loam; massive; friable; mildly alkaline; calcareous.

The A horizon ranges from very dark grayish brown (10YR 3/2) to black (10YR 2/1). This horizon is silt loam or loam. It ranges from 20 to 34 inches in thickness but most commonly is 24 to 34 inches thick. Structure in the B horizon is weak or moderate. The C horizon above the coarser underlying material has a single uniform texture or stratified layers of various textures. This horizon commonly is loam, silt loam, light clay loam, sandy clay loam, and sandy loam.

The dark-colored A horizon generally is thicker in Fayette County than in survey areas elsewhere. This, however, does not significantly change the use and management of the Medway soils.

The Medway soils are adjacent to the well-drained Ross soils. Typically, Medway soils have grayish-brown mottles at a depth of about 25 inches in contrast to the Ross soils, which are not mottled in the upper 40 inches.

Medway silt loam (Md).—This nearly level soil is subject to flooding, which generally occurs on an average of at least once a year. This soil is well suited to summer row crops because they normally can be planted and harvested late in spring or in summer when floods do not occur. The tilth of this soil is good through a wide range of moisture content.

Included with this soil in mapping are a few spots of soil that has a surface layer of loam or sandy loam. Some included areas of wetter soils are too small to be mapped separately. These wetter inclusions have, within 1 foot of the surface, gray and yellow mottles that indicate wetness. A few included areas have a dark yellowish-brown surface layer. Also included are areas where the dark-colored surface layer is less than 24 inches thick.

Erosion is not a hazard on this soil, but flooding and seasonal wetness somewhat limit the choice of crops. Flooding is a severe limitation for most nonfarm uses. (Capability unit IIw-4)

Medway Series, Moderately Shallow Variant

The Medway series, moderately shallow variant, consists of soils that are only moderately deep to limestone. They are moderately well drained and dark colored.

A representative Medway silt loam, moderately shallow variant, in a cultivated area has a very dark brown silt loam plow layer 10 inches thick. Beneath the plow layer, to a depth of 28 inches, is very dark grayish-brown loam and clay loam. The substratum consists of stratified loamy material that is brown and friable. Limestone bedrock commonly occurs at a depth of about 34 inches.

These soils have a medium available moisture capacity. Depth of root growth is limited by limestone. Organic-matter content is high, and permeability is moderate. The water table is seasonally high for short periods, and flooding is likely. Reaction is neutral.

Moderate depth to limestone and flooding have affected the use of this soil. Most areas are in pasture or trees. A few areas are used for corn and soybeans.

Representative profile of pastured Medway silt loam, moderately shallow variant, near the intersection of Fishback Road and Rattlesnake Creek; Green Township:

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

A12—10 to 24 inches, very dark grayish-brown (10YR 3/2) loam, dark brown (10YR 3/3) when rubbed; common, fine, faint, dark yellowish-brown (10YYR 4/4) mottles; weak, fine, subangular blocky structure; friable; neutral; gradual, smooth boundary.

A13—24 to 28 inches, very dark grayish-brown (10YR 3/2) clay loam that has very dark gray (10YR 3/1) coatings; common, fine, faint, brown (10YR 4/3) mottles; weak, coarse, subangular blocky structure; friable; neutral; gradual, smooth boundary.

C—28 to 34 inches, brown (10YR 4/3), stratified loam and sandy loam; many, fine and medium, distinct, dark-gray (10YR 4/1) mottles; massive; friable; neutral in upper part to mildly alkaline and calcareous in lower 2 inches; abrupt, wavy boundary.

R—34 inches +, limestone bedrock.

Depth to bedrock ranges from 28 to 36 inches. The A horizon ranges from very dark grayish brown (10YR 3/2) to black (10YR 3/1). It is 20 to 28 inches thick. The C horizon above the limestone is either one texture or stratified layers of several textures. These textures commonly are silt loam, loam, light clay loam, sandy clay loam, or sandy loam.

Medway soils, moderately shallow variant, differ from normal Medway soils in that they are moderately shallow over limestone.

Medway silt loam, moderately shallow variant (Me).—Included in some mapped areas of this nearly level soil is a soil in which depth to limestone is less than 20 inches. In other included areas the limestone is at a depth of more than 40 inches. Other inclusions have a loam surface layer.

The tilth of this soil is good through a wide range of moisture content. Because this soil is subject to flooding, usually about once a year, the choice of crops is limited to those that are not damaged by flooding. Flooding also severely limits use for building sites and other nonfarm purposes. (Capability unit IIw-4)

Miamian Series

The Miamian series consists of soils that are well drained and deep. These soils are only moderately deep to compact calcareous glacial till. The Miamian soils occupy extensive upland areas and are gently sloping to very steep. Areas of Miamian soils in the southeastern corner of the county have a silt mantle about 12 inches thick.

The surface layer of a cultivated Miamian soil is dark grayish-brown silt loam. It is about 8 inches thick. The subsoil layers, to a depth of 26 inches, are yellowish brown, dark yellowish brown, and brown to dark brown and are firm and clayey. They commonly contain some crystalline glacial pebbles and limestone fragments. Below a depth of 26 inches, there is dense, compact glacial till that varies in thickness but generally is 5 feet or more thick. The till has a loam texture.

The root zone for most annual crops is moderately deep and is restricted by compact glacial till. Because of this compact till, Miamian soils are moderately slowly permeable to the internal movement of air and water. The available moisture capacity within the root zone is medium in most Miamian soils, but it is low in severely eroded areas. In some places Miamian soils are strongly acid in the upper part of the root zone, but they are less acid as depth increases.

Miamian soils are important to farming. Cultivated areas are used mostly for corn, wheat, and soybeans.

Representative profile of a Miamian silt loam in a cultivated field one-fourth mile southeast of the intersection of Bloomingburg-New Holland Road and Roth Road; Marion Township:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine and medium, granular structure; friable; many roots; neutral; abrupt, smooth boundary.

A2—8 to 9 inches, brown (10YR 5/3) silt loam; weak, medium and coarse, granular structure; friable; some root or worm channels filled with dark grayish-brown (10YR 4/2) silt loam; many roots; neutral; clear, smooth boundary.

B1—9 to 11 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, fine and medium, subangular blocky structure; firm to friable; most peds coated with thin dark grayish-brown (10YR 4/2) clay films; some root or worm channels filled with dark-grayish brown (10YR 4/2) silt loam; common roots; medium acid; clear, smooth boundary.

B21t—11 to 14 inches, brown to dark-brown (10YR 4/3) clay; strong, fine and medium, subangular blocky structure; firm; peds coated with thin, dark grayish-brown (10YR 4/2) clay films; some channels filled with dark grayish-brown (10YR 4/2) silt loam; few small pebbles and dark concretions; few roots; medium acid; clear, wavy boundary.

B22t—14 to 18 inches, dark yellowish-brown (10YR 4/4) clay; strong, medium, subangular blocky structure; firm to very firm when moist, plastic and sticky when wet; peds coated with thin, dark grayish-brown (10YR 4/2) clay films; few small pebbles; few roots; medium acid; clear, wavy boundary.

B23t—18 to 23 inches, dark-brown (10YR 4/3) clay loam; moderate, coarse, subangular blocky structure; firm when moist, plastic and sticky when wet; peds coated with thin, dark grayish-brown (10YR 4/2) clay films; many small pebbles; few roots; slightly acid; clear, smooth boundary.

B3—23 to 26 inches, yellowish-brown (10YR 5/4) to light yellowish-brown (10YR 6/4) loam to clay loam glacial till; dark grayish-brown (10YR 4/2) clay flows; weak, coarse, subangular blocky structure; firm to very firm; few or no roots; mildly alkaline; calcareous; clear, smooth boundary.

C—26 to 60 inches, light yellowish-brown (10YR 6/4) loam glacial till; weak to moderate, medium, platy structure; very firm, compact; mildly alkaline to moderately alkaline; calcareous.

The solum ranges from 20 to 36 inches in thickness, but generally it is about 24 inches thick. The A2 horizon normally is mixed into the Ap horizon in most cultivated areas. The B1 horizon is medium acid to strongly acid. The B21t horizon and B22t horizons typically have dark-brown (10YR 4/3), dark yellowish-brown (10YR 4/4), or brown (10YR 5/3) ped interiors. The Bt horizon is medium acid in the upper part and progressively less acid as depth increases. The C horizon is mostly loam but is clay loam in some places.

The Miamian soils are in a drainage sequence with, and generally adjacent to, the Celina, Crosby, and Brookston soils. All of these soils formed in the same kind of material, but they differ in topographic position and natural drainage. Miamian soils have a mottle-free B horizon and are generally topographically higher than the wetter Celina or Crosby soils, which have a mottled B horizon. Miamian soils are light colored, whereas Brookston soils are dark colored and very poorly drained.

Miamian silt loam, 2 to 6 percent slopes (MlB).—A profile of this soil is described as representative for the series. This soil is on low knolls and undulating relief throughout the till plain. The areas have no characteristic size or shape, both of which are extremely variable.

Included with this soil in mapping are spots of wetter Celina soils that are too small to map separately. Some mapped areas adjacent to the limestone quarry southwest of Buena Vista have a moderate depth to limestone bedrock.

Surface runoff is rapid where this soil is most sloping. The erosion hazard is continuing and moderate if this soil is cultivated. Moderately slow permeability is the dominant limitation for many nonfarm uses. (Capability unit IIe-1)

Miamian silt loam, 2 to 6 percent slopes, moderately eroded (MlB2).—On much of the area of this soil, erosion has thinned the plow layer to the point where some of the upper subsoil is now incorporated into the plow layer. This results in poorer seed germination, increased surface runoff, and sealing of the surface after rain. Moderate erosion has lowered the capacity to absorb and supply moisture to plants. Consequently, this soil requires more careful management than uneroded Miamian soils to achieve the same crop growth.

Included with this soil in mapping are small areas of severely eroded Miamian soils. These included areas generally are recognizable in gullied areas and as small galled spots.

Surface runoff from this soil is rapid, and erosion is a continuing moderate limitation in cultivated areas. Moderately slow permeability is the major limitation for many nonfarm uses. (Capability unit IIe-1)

Miamian silt loam, 6 to 12 percent slopes (MlC).—This soil has a profile similar to the one described as typical for the series, except that in places the surface layer or plow layer is thicker. This soil is on moraines and adjacent to drainageways. It is moderately deep to limestone in some local areas.

Surface runoff is rapid on this soil, and the erosion hazard is continuing and severe in cultivated areas. Much of this soil is used for trees or permanent pasture. Moderately slow permeability and slope are limitations for many nonfarm uses. (Capability unit IIIe-2)

Miamian silt loam, 6 to 12 percent slopes, moderately eroded (MlC2).—As a result of erosion, there has been some mixing of the original surface layer and the upper part of the subsoil in the plow layer of this soil. This soil has a stickier surface layer than uneroded Miamian silt loam that has the same slope. It also has a lower available moisture capacity, largely because of lowered organic-matter content. More careful management and greater inputs of fertilizer are required to achieve the same plant growth as on uneroded Miamian silt loam.

Included with this soil in mapping are some areas of soils that are moderately deep to limestone. Some included areas are severely eroded and have a surface layer that is almost entirely subsoil material.

Surface runoff from this soil is rapid. The erosion hazard is severe in cultivated areas. Slope and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIIe-2)

Miamian silt loam, 12 to 18 percent slopes, moderately eroded (MlD2).—This soil has lost much of its original surface layer because of erosion. As a result, the available moisture capacity has been lowered. In some areas the present surface layer consists mainly of brown subsoil material. In some places shallow gullies have cut into the underlying limy till.

This soil has very rapid surface runoff and the erosion hazard is very severe in cultivated areas. Much of this soil is used for pasture. Slope is the dominant limitation for most nonfarm uses. (Capability unit IVe–1)

Miamian clay loam, 2 to 6 percent slopes, severely eroded (MmB3).—This soil occurs in small areas on till plains and moraines. It has a profile similar to the one described as representative for the series, except that erosion has removed most of the original surface layer. About 2 inches of the original surface layer remains. The present plow layer is mostly material from the subsoil. The organic-matter content of the plow layer is very low. The available moisture capacity is low. The plow layer is sticky, and the root zone is moderately deep to shallow. This soil is suited to cultivation, but the erosion hazard is continuing and severe in cultivated areas. Surface runoff generally is very rapid. Past erosion and moderately slow permeability are limitations for many nonfarm uses of this soil. (Capability unit IIIe–2)

Miamian clay loam, 6 to 12 percent slopes, severely eroded (MmC3).—The surface layer of this soil is mostly moderately fine textured material from the subsoil. In a few areas, the limy till is at the surface. Shallow gullies are common, and in some places there are deep ones. Seed germination generally is poor on this soil, particularly where the limy till is at the surface. Surface runoff is rapid, and the available moisture capacity is low. Past erosion, the present erosion hazard, and very rapid surface runoff combine to make this soil suited to only occasional cultivation. Severe erosion, slope, and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IVe–1)

Miamian clay loam, 12 to 18 percent slopes, severely eroded (MmD3).—This soil has lost most of its original silt loam surface layer as a result of erosion. The brown sticky subsoil is exposed in many places; the limy glacial till is exposed in some places. This soil has a low available moisture capacity, and surface runoff is very rapid and high in volume. Scattered gullies, 1 to 3 feet deep, commonly occur.

As a result of slope and past erosion, this soil is better suited to pasture than to crops. It has a continuing severe erosion hazard unless a thick plant cover is maintained in pasture. Slope and effects of past erosion are dominant limitations for many nonfarm uses. (Capability unit VIe–1)

Miamian and Hennepin silt loams, 18 to 25 percent slopes, moderately eroded, (MpE2).—One or both of these soils may occur in the same mapped area. They were combined in this mapping unit because they have similar management needs and use. A larger percentage of the total acreage is Miamian silt loam than Hennepin silt loam.

A profile of the Miamian soil is similar to the one described as representative for the series, except that the depth to calcareous till is less. Also, the surface layer and subsoil generally are thinner. Except for the effects of erosion, the Hennepin soil has a profile similar to the one described under the Hennepin series. Because of erosion, the plow layer of these soils is a mixture of subsoil or substratum material and the remaining original surface layer. Mapped areas of these soils range from 5 to 20 acres each in size. They are irregular in shape and occupy side slopes of upland valleys.

Surface runoff is very rapid. The primary limitation to use of this mapping unit is a severe erosion hazard. The steepness of the soils make them better suited to pasture than to row crops. Steep slopes are a limitation for nonfarm uses. (Capability unit VIe–1)

Miamian and Hennepin silt loams, 25 to 35 percent slopes, moderately eroded (MpF2).—One or both of these soils may occur in any given area of this mapping unit. They were mapped together because they have similar management needs and use. Miamian silt loam is the dominant soil.

A profile of each of these soils is similar to the one described as representative for the series, but the depth to calcareous till is less. Also, the surface layer is very thin because of erosion. Operation of machinery is hazardous on these very steep soils. Mapped areas of these soils range from 5 to 20 acres in size. The areas are irregular in shape and occupy side slopes of upland valleys.

Surface runoff is very rapid. The primary limitation to use for pasture is a continuing severe erosion hazard. The soils are too steep and subject to erosion to be used as cropland. Slope is the dominant limitation for most nonfarm uses. (Capability unit VIe–1)

Miamian and Hennepin soils, 18 to 35 percent slopes, severely eroded (MrF3).—One or both of these soils may occur in a given area of this mapping unit. They were mapped together because they have similar management needs and use.

A profile of each of these soils is similar to the one described as representative for the series, except that these soils are severely eroded. The depth to calcareous till is also less than that described for each series. Because of erosion, the surface layer consists of exposed subsoil or substratum or of a mixture of them. The texture of the surface layer commonly is loam or clay loam.

Mapped areas of this soil range from 5 to 25 acres each in size. They are irregular to linear in shape and occupy side slopes and upland valleys.

The surface layer commonly is low in organic-matter content, and it has poor physical properties. Where bare of protective plant cover, the surface crusts firmly and limits infiltration of water. Crusting and low moisture content hinder emergence of seedlings and good growth of plants. Surface runoff is very rapid. These soils have a continuing severe erosion hazard. Machinery operation is hazardous, particularly on the steeper slopes. (Capability unit VIe–1)

Millsdale Series

The Millsdale series consists of moderately deep, dark-colored soils that are very poorly drained. They formed partly in moderately fine textured to medium-textured till or outwash and partly in residuum from the underlying limestone or shale. Limestone bedrock is at a depth of 20 to 40 inches. These nearly level soils occupy upland areas where the glacial till is thin over limestone. They also occupy terraces where limestone bedrock occurs at a relatively shallow depth.

The plow layer and uppermost 13 inches of a representative Millsdale soil is very dark brown to black silty clay loam. The subsoil extends to a depth of about 34 inches. The subsoil layers are mostly very dark gray to gray and have contrasting yellowish-brown mottles. These layers are sticky when wet and are silty clay, silty clay loam, and clay. Limestone bedrock underlies this soil at a depth of about 34 inches.

Millsdale soils have a high organic-matter content, moderately slow permeability, and a medium available moisture capacity. They are seasonally saturated with excess water for significant periods and are subject to seepage from adjacent soils. In most places they are neutral to mildly alkaline.

These soils are used for both pasture and field crops. Wetness is a limitation because of a seasonal high water table.

Representative profile of cultivated Millsdale silty clay loam near the intersection of Washington-New Martinsburg Road and Ghormley Road; Perry Township:

Ap—0 to 8 inches, very dark brown (10YR 2/2) silty clay loam; weak, fine and medium, granular structure; friable; mildly alkaline; abrupt, smooth boundary.

A12—8 to 13 inches, black (10R 2/1) silty clay loam, very dark brown (10YR 2/2) when rubbed; strong, fine, subangular blocky structure; friable; neutral; abrupt, smooth boundary.

B21t—13 to 17 inches, very dark brown (10YR 2/2) silty clay loam continuously coated with black (10YR 2/1); few, fine, faint, brown (10YR 4/3) mottles; strong, fine, subangular blocky structure; firm; thin, patchy clay films; neutral; clear, smooth boundary.

B22t—17 to 20 inches, very dark gray (10YR 3/1) silty clay; moderate, medium, subangular blocky structure; firm; thin, continuous clay coatings; mildly alkaline; clear, wavy boundary.

B23tg—20 to 27 inches, dark-gray (10YR 4/1) clay that has common, fine, distinct yellowish-brown (10YR 5/4) to brown (10YR 4/3) mottles; moderate, medium and coarse, subangular blocky structure; firm; very dark gray (10YR 3/1), thin clay films that are continuous vertically and patchy horizontally; 2 percent fine gravel; mildly alkaline; clear, wavy boundary.

B31tg—27 to 32 inches, gray (10YR 5/1) clay that has many, medium, prominent, yellowish-brown (10YR 5/4 to 5/6) mottles; weak, coarse, subangular blocky structure; firm; thin, dark-gray (10YR 4/1) clay coatings that are thin and patchy on vertical faces; 5 percent fine gravel; mildly alkaline; abrupt, wavy boundary.

IIB32—32 to 34 inches, black (10YR 2/1) clay that contains light brownish-gray (10YR 6/2) to brownish-yellow (10YR 6/6) fragments of disintegrated limestone; massive; firm; mildly alkaline; calcareous; abrupt, wavy boundary.

IIR—34 inches, limestone bedrock.

The A horizon is mainly silty clay loam, but it ranges to clay loam in places. The depth to limestone bedrock ranges from 20 to 40 inches.

The Millsdale soils are the very poorly drained members of a drainage sequence that includes the well-drained Milton and the somewhat poorly drained Randolph soils. Millsdale soils are dark colored in contrast to Milton or Randolph soils. They differ from Brookston soils by having bedrock within 40 inches of the surface.

Millsdale silty clay loam (Ms).—This soil is nearly level to depressional and has slow surface runoff. Surface water tends to pond in the depressions, and the soil stays wet for long periods unless artificially drained. Tile drainage helps to remove excess water, but installing tile is difficult in some places because bedrock is near the surface.

In cultivated areas the wetness hazard is severe. This soil has a narrow range of optimum moisture content for tillage, though the organic-matter content is moderately high. Naturally poor drainage and bedrock near the surface are limitations for many nonfarm uses. (Capability unit IIIw–1)

Milton Series

Soils of the Milton series are well drained and mostly moderately deep. They formed partly in glacial till and partly in residuum weathered from limestone. In some places a thin layer of loess overlies the glacial till. Milton soils are nearly level to sloping. They are in areas where the glacial till is relatively thin over limestone bedrock.

A representative cultivated Milton soil has an 8-inch plow layer that is brown silt loam. The uppermost subsoil layers extend to a depth of about 17 inches and are dark yellowish brown to brown and more clayey than the plow layer. The layers in the lower part of the subsoil are mostly brown and clayey to a depth of 29 inches. These lower layers contain many till pebbles and some limestone fragments. Limestone bedrock is at a depth of 29 inches.

Milton soils have moderately slow permeability and a medium to low available moisture capacity, depending on the depth to rock. These soils are mostly medium acid in the upper part and neutral to mildly alkaline and calcareous in the lower part.

Milton soils are mostly used for crops commonly grown in the county, but they are droughty in summer because bedrock is relatively near the surface.

Representative profile of a Milton silt loam near the intersection of State Route 41 and Ghormley Road; Wayne Township; in a meadow:

Ap—0 to 8 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; medium acid; abrupt, smooth boundary.

B1t—8 to 11 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; weak, medium, subangular blocky structure; friable; brown (10YR 4/3) thin, patchy clay films; medium acid; clear, wavy boundary.

B21t—11 to 17 inches, brown (7.5YR 4/4) clay loam; moderate, medium, subangular blocky structure; friable; strongly acid; clear, smooth boundary.

B22t—17 to 22 inches, brown (7.5YR 4/4) clay; strong, fine and medium, subangular blocky structure; friable; thin and medium, continuous, brown (7.5YR 4/2) clay films; 2 percent fine pebbles; medium acid; gradual, smooth boundary.

B23—22 to 27 inches, brown (7.5YR 4/4) and dark-brown (7.5YR 3/2) clay; weak, coarse, subangular blocky structure; friable; dark-brown and brown (7.5YR 3/2 and 4/2), thin and medium, continuous clay films on vertical faces; thin, patchy clay films on horizontal faces; 3 percent fine pebbles and stones; medium acid in upper part to neutral in lower part; clear, wavy boundary.

IIB3—27 to 29 inches, brown (10YR 4/3) clay; weak, coarse, subangular blocky structure; friable; thin, patchy, dark-brown (10YR 3/3) clay films; 30 percent weathered limestone fragments; mildly alkaline; calcareous; abrupt, wavy and irregular boundary.

IIR—29 inches, limestone; weathered upper part of limestone is up to 4 inches thick and consists mostly of pockets and local irregularities.

Depth to limestone ranges from 20 to 40 inches but most commonly is 24 to 32 inches. The B2 horizon is heavy clay loam, silty clay loam, or clay. The IIB horizon formed in residuum from limestone and varies in texture. The B1 horizon and the upper part of the B2 horizon are strongly acid to neutral, but alkalinity increases with increasing depth.

Milton soils are members of a drainage sequence that includes somewhat poorly drained Randolph soils and very poorly drained Millsdale soils. Milton soils have less gray in the B2t horizon than the Randolph soils and are light colored and much better drained than the dark-colored Millsdale soils.

Milton silt loam, 2 to 6 percent slopes (MtB).—A profile of this soil is described as representative for the series. Included with this soil in mapping are a few areas of Miamian soils in which bedrock is at a depth of more than 40 inches. Also included are some areas of soils that are similar to Milton soils but are dark colored rather than light colored.

Surface runoff generally is medium, and erosion is a hazard in cultivated areas. Limestone within 40 inches of the surface and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIe–2)

Milton silt loam, 2 to 6 percent slopes, moderately eroded (MtB2).—Erosion has removed part of the original surface layer of this soil. The present plow layer is a mixture of the original surface layer and some of the subsoil. It has a low to medium content of organic matter and a lower available moisture capacity than uneroded Milton silt loam. The plow layer of this eroded soil is stickier and harder to till than the plow layer in an uneroded Milton soil.

Included with this soil in mapping are small areas of Miamian soils. These inclusions are deeper than Milton soils but generally have limestone within 5 to 6 feet of the surface.

As a result of erosion, this soil has rapid surface runoff. The erosion hazard is moderate in cultivated areas. Bedrock within 40 inches of the surface and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIe–2)

Milton silt loam, 6 to 12 percent slopes, moderately eroded (MtC2).—This soil has rapid surface runoff. As a result, erosion has removed so much of the original surface layer that the plow layer now includes some of the subsoil. Because the depth to limestone is reduced, this is the most droughty Milton soil in the county. It is better suited to small grain than to row crops, particularly in years when rainfall is low in summer.

Included with this soil are a few areas where the depth to limestone is more than 40 inches. These deeper inclusions are not particularly droughty.

The erosion hazard is severe if this soil is cultivated. Slope, depth to limestone, and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIIe–3)

Odell Series

The Odell series consists of dark-colored, nearly level soils that are somewhat poorly drained. These soils formed mainly in calcareous loam glacial till, but in some places they formed partly in a thin loess mantle. Odell soils are moderately deep to calcareous glacial till. Their native vegetation is believed to have been mixed prairie grasses, swamp grasses, and scattered deciduous hardwoods.

A representative cultivated Odell soil has a very dark gray silt loam plow layer about 8 inches thick. This is underlain by a 3-inch layer of very dark grayish-brown silt loam. The uppermost layer in the subsoil is dark-brown silt loam mottled with grayish and yellowish colors. This layer extends to a depth of 16 inches. The layers in the lower part of the subsoil are brown clay and clay loam. The entire subsoil has grayish-brown or gray coatings on the ped surfaces. At a depth of about 30 inches, there is compact, calcareous till material. This material is grayish-brown silt loam to a depth of 39 inches and yellowish-brown loam between depths of 39 and 60 inches.

Odell soils have high organic-matter content, a medium available moisture capacity, and moderately slow permeability. They have a mostly moderately deep root zone and are medium acid to strongly acid in the uppermost 18 inches.

Odell soils are well suited to cultivation if artificially drained. Most areas are drained and farmed. Corn, syobeans, wheat, and hay are the most commonly grown crops.

Representative profile of cultivated Odell silt loam near intersection of Reynolds Road and Ford Road; Jasper Township:

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam; very dark grayish brown (10YR 3/2) when rubbed; moderate, medium and fine, granular structure; friable; medium acid; abrupt, smooth boundary.

A12—8 to 11 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, subangular blocky structure; friable; medium acid; gradual, smooth boundary.

B1t—11 to 16 inches, dark-brown (10YR 4/3) silt loam that has many, fine and medium, prominent, gray (10YR 5/1) and yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; friable; peds have continuous coatings, including very dark grayish-brown (10YR 3/2) and dark grayish-brown (10YR 4/2) organic coatings and thin, patchy clay films; strongly acid; clear, smooth boundary.

B21t—16 to 23 inches, brown (10YR 4/3) clay that has many, fine and medium, prominent, yellowish-brown (10YR 5/6) and grayish-brown (10YR 5/2) mottles; weak, fine and medium, prismatic structure parting to moderate, medium, subangular blocky structure; firm; continuous, dark grayish-brown (10YR 4/2), dark-gray (10YR 4/1), and very dark gray (10YR 3/1) ped coatings; thin, continuous clay films on vertical surfaces and thin, patchy films on horizontal ped surfaces; medium acid; gradual, smooth boundary.

B22t—23 to 30 inches, brown (10YR 4/3) clay loam that has many, fine and medium, prominent, yellowish-brown (10YR 5/6) and grayish-brown (10YR 5/2) mottles; weak, fine and medium, prismatic structure parting to moderate, medium, subangular blocky structure; firm; dark grayish-brown (10YR 4/2) and dark-gray (10YR 4/1) ped coatings; thin, patchy clay films on vertical surfaces; neutral; abrupt, wavy boundary.

C1—30 to 39 inches, grayish-brown (10YR 5/2) silt loam that has many, medium and coarse, prominent, yellowish-brown (10YR 5/6) mottles; massive; firm; mildly alkaline; calcareous; gradual, wavy boundary.

C2—39 to 60 inches, yellowish-brown (10YR 5/4) loam that has many, medium, prominent, grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/6) mottles; massive; firm; mildly to moderately alkaline; calcareous.

The loess mantle in Odell soils ranges from 0 to 18 inches in thickness. Depth to mottling ranges from 6 to 12 inches and commonly coincides with the thickness of the A horizon. The A horizon is very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), dark brown (10YR 3/3), or very dark brown (10YR 2/2). The A horizon is medium acid to neutral. Depth to calcareous till ranges from about 22 to 40 inches.

Odell soils are adjacent to Crosby, Brookston, and Celina soils. They are similar to Crosby soils but have a darker colored surface layer. Odell soils are darker colored and more poorly drained than Celina soils. They are better drained and less gray in the B horizon than the darker colored Brookston soils.

Odell silt loam, 0 to 2 percent slopes (OdA).—This soil occupies slightly higher elevations around Brookston soils, which are in lower areas.

Included with this soil in mapping are some small areas of lighter colored Crosby soils and a few areas of wetter Brookston soils. All of these soils are seasonally wet but can be drained fairly easily with tile.

Surface runoff is slow. The tilth of the plow layer of this soil generally is good because the organic-matter content is high. Seasonal wetness is a continuing limitation for farming. Seasonal wetness and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIw-3)

Patton Series

The Patton series consists of dark-colored, very poorly drained soils. These soils are nearly level and are mostly in slightly depressed areas on terraces in the county. They formed in loamy, calcareous lacustrine material.

A representative cultivated Patton soil has a very dark brown silty clay loam plow layer, about 8 inches thick, that overlies a very dark gray silty clay loam layer about 4 inches thick. The subsoil, to a depth of 33 inches, consists mostly of gray silty clay loam. Contrasting brown and yellowish-brown mottles in the subsoil are characteristic. Below a depth of 33 inches, the substratum consists of brownish and grayish loamy material that is massive, calcareous, and stratified in most places.

Patton soils have a seasonal high water table. If adequately drained, these soils have a deep root zone for most of the commonly grown annual crops. Typically, the organic-matter content of the surface layer is high. Patton soils have a high available moisture capacity and moderately slow permeability. They are mostly neutral in the root zone.

Where adequately drained, Patton soils are well suited to farming. Most areas are used for corn and soybeans.

Representative profile of cultivated Patton silty clay loam near the intersection of U.S. Highway No. 22 and West Fork Road; Jasper Township:

Ap—0 to 8 inches, very dark brown (10YR 2/2) light silty clay loam; moderate, fine, subangular blocky structure; friable; neutral; abrupt, smooth boundary.

A12—8 to 12 inches, very dark gray (10YR 3/1) light silty clay loam, very dark grayish brown (10YR 3/2) when rubbed; few, fine, distinct, brown (10YR 4/3) mottles; weak, medium and fine, subangular blocky structure; friable; neutral; clear, smooth boundary.

B1tg—12 to 18 inches, very dark gray (10YR 3/1) silty clay loam, very dark grayish brown (10YR 3/2) when rubbed; common, fine, distinct, brown (10YR 4/3) mottles; weak, medium, subangular blocky structure; firm; thin, patchy clay films on ped faces; neutral; clear, smooth boundary.

B21tg—18 to 24 inches, dark-gray (10YR 4/1) silty clay loam that has many, fine and medium, prominent, dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/4) mottles; weak, medium, prismatic structure parting to moderate, medium, subangular blocky structure; firm; thin, patchy, dark-gray (10YR 4/1) to very dark gray (10YR 3/1) clay films on vertical and horizontal ped faces; neutral; diffuse, smooth boundary.

B22tg—24 to 31 inches, gray (10YR 5/1) silty clay loam that has many, fine and medium, prominent yellowish-brown (10YR 5/4 to 5/6) mottles; very weak, medium, prismatic structure parting to moderate, medium, subangular blocky; firm; dark-gray (10YR 4/1) clay films that are thin and continuous on vertical ped faces and very patchy on horizontal faces; few manganese concretions; neutral; clear, smooth boundary.

B3g—31 to 33 inches, gray (10YR 5/1) silt loam that has many, fine and medium, prominent, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; firm; numerous manganese concretions; few gray (10YR 5/1) to dark-gray (10YR 4/1) clay films on vertical ped faces; mildly alkaline; diffuse, wavy boundary.

C1g—33 to 39 inches, gray (10YR 5/1) silt loam that has many, coarse, prominent, yellowish-brown (10YR 5/4 to 5/6) and brownish-yellow (10YR 6/6) mottles; massive; friable; vertical cracks filled with dark-gray (10YR 4/1) material; mildly alkaline; calcareous; clear, smooth boundary.

C2g—39 to 43 inches, yellowish-brown (10YR 5/6) silt loam that has many, medium to coarse, contrasting yellowish-brown (10YR 5/4) to light brownish-gray (10YR 6/2) mottles; massive; friable; light-gray (10YR 7/1) limestone concretions; calcareous; abrupt, smooth boundary.

C3g—43 to 76 inches, stratified, yellowish-brown (10YR 5/6) silt and silt loam that has common, medium and coarse, light brownish-gray (10YR 6/2) and pale-brown (10YR 6/3) mottles; massive; friable; mildly alkaline, calcareous; diffuse, wavy boundary.

The combined thickness of the dark-colored upper horizons (normally the A and B1 horizons) ranges from 10 to 19 inches. These horizons are very dark brown (10YR 2/2), very dark gray (10YR 3/2), or black (10YR 2/1 to N 2/0). The B horizons are typically silty clay loam, but in some places have thin strata of silty clay or silt loam. The C horizon generally is silt loam, but in some places it is very fine sandy loam or silty clay loam. In some areas the C3g horizon is very dark gray (10YR 3/1) and dark gray and has common, fine and medium, yellowish-brown (10YR 5/4) mottles. Depth to calcareous material ranges from 25 to 40 inches.

Patton soils are the very poorly drained members of a topographic sequence that includes the higher lying, somewhat poorly drained Henshaw soils. The A horizon of Patton soils is dark colored, and the B horizon is grayer than that of the Henshaw soils. Patton soils are similar to Brookston soils but have a higher silt content in the B and C horizons. Also, Patton soils generally are underlain by stratified, loamy lacustrine material that has a high silt content, whereas Brookston soils are underlain by loam till.

Patton silty clay loam (Pa).—Most mapped areas of this nearly level soil have oval or rounded shapes. These areas range from 3 to about 35 acres in size. A profile of this soil is described as representative for the series. Areas of this soil are generally slightly higher in elevation than Patton silty clay loam, overwash. This soil is subject to surface ponding but not to flooding from stream overflow. In many places, however, it is adjacent to soils that are flooded.

Use of this soil is moderately limited by wetness during winter and spring. Tile drainage helps to reduce seasonal wetness. Locally, tile outlets may be difficult to establish. Poor natural drainage and a seasonal high water table are limitations to many nonfarm uses. (Capability unit IIw–2)

Patton silty clay loam, overwash (Pc).—This nearly level soil makes up most of the acreage of Patton soils in the county. It lies on low-lying terraces along streams in the county. Areas of this soil are subject to flooding from the nearby streams during periods when floods are high. These areas normally are wet during the winter and spring because the water table is seasonally high. Tile drainage helps alleviate the seasonal wetness.

Seasonal wetness and a flooding hazard are limitations to farming on this soil. They also are limitations to many nonfarm uses. (Capability unit IIw–2)

Quarries

Quarries (Qu) consist of surface-mined areas that were developed as a source of limestone used in construction and farming. Most areas are actively mined according to local needs. These quarries commonly occupy areas where the till is relatively thin over dolomitic limestone bedrock.

Typically, Quarries occur with Miamian, Milton, Celina, and Kendallville soils. The pits range from 12 to 36 acres in size.

The material mined is chiefly dolomitic limestone that is used mainly as aggregate in construction. Some of the limestone is crushed into various grades suitable for use in farming.

In strip mining, the piling of the soil overburden varies within short horizontal conditions. This soil material commonly is calcareous and has poor physical properties. Both organic-matter content and available moisture capacity are low. Most areas are erodible. Because the piled material is not stable, gullies are cut and are a source of sediment.

Resurfacing with favorable soil material on areas that are not currently mined benefits the establishment and maintenance of plant cover. Grasses and trees tolerant of the resurfaced material will provide cover and improve the esthetic value of landscaping.

Ponds in areas of these limestone Quarries are commonly free of pollution and siltation where protected. Consequently, they are potential recreational or wildlife sites. (Capability unit not assigned)

Randolph Series

The Randolph series consists of moderately deep, somewhat poorly drained, gently sloping soils on uplands. These soils formed in relatively thin, calcareous glacial till that is underlain by limestone bedrock at a depth of 20 to 40 inches.

A typical cultivated Randolph soil has a dark grayish-brown surface layer about 8 inches thick. The subsurface layer is brown silt loam that extends to a depth of about 12 inches. It is distinctly mottled with dark yellowish brown. The subsoil layers are between depths of 12 and 26 inches and are mostly clay coated with dark grayish brown. These coatings are an indication of a seasonal high water table. Limestone bedrock is at a depth of 26 inches.

Randolph soils are low to medium in organic-matter content, have a medium available moisture capacity, and have moderately slow permeability. They are strongly acid to neutral, and they have a seasonal high water table.

Most areas of Randolph soil are farmed for wheat, corn, soybeans, and other general crops.

Representative profile of Randolph silt loam, 2 to 6 percent slopes, near the intersection of State Route 41 and Beatty Road; Perry Township:

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

B&A—8 to 12 inches, brown (10YR 5/3) silt loam that has common, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; friable; dark grayish-brown (10YR 4/2) to grayish-brown (10YR 5/2) ped surfaces; thin, patchy clay films on ped surfaces and in pores; slightly acid; clear, smooth boundary.

B21t—12 to 20 inches, dark yellowish-brown (10YR 4/4) clay that has few, fine, distinct, yellowish-brown (10YR 5/6) mottles and common, fine, distinct, grayish-brown (10YR 5/2) mottles; moderate, medium, prismatic structure parting to moderate, medium, subangular and angular blocky; firm; dark grayish-brown (10YR 4/2) ped coatings; thin, continuous clay films; 2 percent fine gravel; common, dark concretions 0.5 to 1.5 millimeters in size; medium acid; clear, smooth boundary.

B22tg—20 to 25 inches, dark grayish-brown (10YR 4/2) clay that has many, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; moderate, coarse, subangular blocky structure; firm; continuous, very dark grayish-brown (10YR 3/2) coatings; thin, patchy clay films; 4 percent gravel; common dark concretions 0.5 to 1.5 millimeters in size; neutral; abrupt, wavy boundary.

IIB3t—25 to 26 inches, brown (10YR 4/3) clay loam that has few, common, medium, prominent yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; firm; few dark grayish-brown (10YR 4/2) coatings on vertical ped faces; 15 percent soft fragments of weathered limestone; mildly alkaline; calcareous; abrupt, wavy boundary.

IIR—26 inches +, limestone bedrock; massive.

The A horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 5/3) and from medium acid to neutral. The B2 horizons range from strongly acid to neutral. They are silty clay loam, clay loam, or clay. In some areas a C horizon occurs where limestone is at or near its maximum. Depth to limestone bedrock ranges from 20 to 40 inches.

Randolph soils are members of a drainage sequence of soils that includes well-drained Milton soils and very poorly drained Millsdale soils. They are mottled and have grayish ped coatings that are lacking in the Milton soils. Randolph soils are light colored in contrast to the dark-colored Millsdale soils. They are less gray throughout than Millsdale soils.

Randolph silt loam, 2 to 6 percent slopes (RcB).—This soil is on ridgetops and at the heads of waterways on limestone and calcareous shale hills. Included with this soil in mapping are a few small areas of moderately well drained Celina soils.

Limestone bedrock limits the effective root depth of this soil. It is also a limitation to installation of tile drainage.

Surface runoff is slow to medium, but this soil is susceptible to erosion, particularly where it is most sloping and has long slopes. Seasonal wetness is a continuing limitation for farming, even in drained areas. Many nonfarm uses of this soil are also limited by seasonal wetness and by bedrock at a depth of 20 to 40 inches as well. (Capability unit IIIw-1)

Ritchey Series

The Ritchey series consists of shallow, well-drained soils. These soils formed mainly in thin, calcareous glacial till overlying limestone. The lowermost few inches of the soil formed in residuum weathered from limestone. These soils are gently sloping to very steep and are on uplands and terraces, mostly along Paint Creek.

A representative cultivated Ritchey soil has a brown silt loam surface layer 6 inches thick. The upper part of the subsoil extends to a depth of 9 inches and is friable, yellowish-brown silty clay loam. To a depth of about 14 inches, the subsoil is dark yellowish-brown silty clay loam. The lowermost subsoil layer is between depths of 14 and 18 inches; it formed in residuum from weathered limestone and is dark yellowish-brown clay. Limestone bedrock is at a depth of about 18 inches.

Ritchey soils have a very low available moisture capacity because they are shallow to rock. They have a medium organic-matter content and moderate permeability. Their root zone is shallow and medium acid to mildly alkaline.

The Ritchey soils are poorly suited to cultivation because they are shallow to limestone. They are mostly used for pasture or trees.

The Ritchey soils were not mapped separately in Fayette County. They were mapped in undifferentiated groups with Romeo soils because the two kinds of soil have similar management needs.

Representative profile of a cultivated Ritchey silt loam, near the intersection of Miami Trace Road and Paint Creek; Perry Township:

Ap—0 to 6 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

B1t—6 to 9 inches, yellowish-brown (10YR 5/4) light silty clay loam; weak, fine, subangular blocky structure; friable; thin, very patchy clay films on ped surfaces and in pores; medium acid; clear, smooth boundary.

B21t—9 to 14 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, continuous clay films on ped surfaces; 3 percent fine gravel; slightly acid grading to neutral; clear, smooth boundary.

IIB22t—14 to 18 inches, dark yellowish-brown (10YR 3/4) clay; strong, fine and medium, angular blocky structure; thin, continuous, very dark grayish-brown (10YR 3/2) clay films on ped surfaces; neutral; abrupt, smooth boundary.

IIR—18 inches + limestone bedrock.

The thickness of the solum and depth to bedrock range from 10 to 20 inches. The Ap horizon ranges from brown (10YR 4/3) to dark grayish brown (10YR 4/2) and dark brown (10YR 3/3). In undisturbed areas an A1 horizon, 1 to 4 inches thick, occurs and generally is very dark grayish brown (10YR 3/2) or very dark brown (10YR 2/2). The Bt horizons formed in glacial drift. They are 7.5YR or 10YR in hue, 4 or 5 in value, and 3 or 4 in chroma. The IIB horizon formed in residuum from bedrock and is fairly variable as a result of the weathering of impurities in the bedrock. The B2 horizons are heavy clay loam, heavy silty clay loam, silty clay, or clay.

The B1 or upper part of the B2 horizon ranges from slightly acid to medium acid but is mostly slightly acid. The lower part of the B2 horizons is commonly neutral.

The Ritchey soils in Fayette County contain more clay in the solum than the Ritchey soils mapped in other survey areas. This does not affect the use and management of Ritchey soils in this county, however, because they are shallow.

Ritchey soils are similar to Milton soils but are shallower to bedrock. They are less deep to bedrock and are better drained than Randolph soils. The Ritchey soils are deeper to bedrock and lighter colored than Romeo soils.

Ritchey and Romeo silt loams, 2 to 12 percent slopes (RmC).—This undifferentiated mapping unit occupies limestone bedrock areas where the overlying glacial till is thin or absent. The soils in this unit are shallow and very shallow. The Ritchey soil is less than 20 inches deep to bedrock and is light colored. In contrast, the Romeo soil is dark colored and is less than 10 inches deep to limestone. Both soils are well drained and droughty.

Included in mapping are a few areas on stream terraces cut in rock that have thin loamy overwash over the bedrock. Also included is a dark-colored soil that is 10 to 20 inches deep to bedrock. It is similar to the Ritchey soil except for the dark color. Other inclusions are eroded areas of Ritchey and Romeo soils. A few places, indicated by symbols on the soil map, are severely eroded.

The soils in this mapping unit are droughty. Surface runoff is medium to rapid, and erosion is a severe hazard unless a thick plant cover is maintained.

In some areas these soils are suited to crops, but crop growth is only fair. In most areas, however, these soils are better suited to pasture or hay. The shallow or very shallow depth to rock is a limitation for most nonfarm uses. (Capability unit IVe-2)

Ritchey and Romeo silt loams, 12 to 35 percent slopes, moderately eroded (RmF2).—In this mapping unit either one or both of these soils occur in various amounts and patterns. The Romeo soil is dark colored and very shallow to bedrock. The Ritchey soil is lighter colored than the Romeo and is generally 10 to 20 inches deep to limestone.

This unit is steep along the main streams and at the heads of waterways. A small acreage is on stream terraces. The soils on stream terraces formed in loamy outwash over the bedrock. They typically have a gravelly clay loam layer over the bedrock.

Erosion has removed all except about 3 to 4 inches of the original surface layer from the soils of this unit. In a few areas, erosion has been severe, and these areas are indicated by a symbol on the soil map. The available moisture capacity of the soils in this unit is very low. Surface runoff is very rapid, and susceptibility to further erosion is very high if a thick plant cover is not maintained.

This mapping unit is very poorly suited to cultivated crops because the soils are moderately sloping to very steep and shallow or very shallow to bedrock. Slope and depth to bedrock also are limitations for many other uses. (Capability unit VIe-2)

Rodman Series

The Rodman series consists of sandy and gravelly soils that are dark colored and well drained. These soils are shallow to stratified gravel and sand deposits. They are gently sloping to steep and are mostly on terrace escarpments.

A representative Rodman soil has about 16 inches of very dark grayish-brown to dark-brown gravelly loam and gravelly sandy loam overlying brown sand and gravel. In most places the sand and gravel deposits are more than 5 feet thick. The entire soil is neutral to alkaline in reaction.

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

Rodman soils generally are too steep or too droughty, or both, for cultivated crops. They are mostly used for pasture or as woodland.

Rodman soils were not mapped individually in Fayette County. They were mapped in undifferentiated groups of Casco and Rodman soils and of Fox, Casco, and Rodman soils. All these soils have similar management needs and use.

Representative profile of a pastured Rodman gravelly loam near the intersection of State Route 41 and Ghormly Road; Perry Township:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) gravelly loam; moderate, fine, granular structure; very friable; mildly alkaline; calcareous; clear, smooth boundary.
A12—7 to 16 inches, dark-brown (10YR 3/3) gravelly sandy loam; weak, fine, granular structure; loose; mildly alkaline and calcareous; clear, wavy boundary.
C1—16 to 25 inches, brown (10YR 4/3) very gravelly loamy coarse sand; single grain; loose; mildly alkaline; calcareous.
C2—25 to 50 inches, brown (10YR 4/3) very gravelly coarse sand; single grain; loose; mildly alkaline; calcareous.

The Ap horizon is very gravelly in severely eroded areas. In uneroded areas these soils have a dark-colored A1 horizon that is relatively high in organic-matter content. The A1 horizon is very dark brown (10YR 2/2), very dark grayish brown (10YR 3/2), or dark brown (10YR 3/3). The C horizon ranges from brown (10YR 5/3) or dark brown (10YR 4/3) to dark yellowish brown (10YR 4/4). Where the Rodman soils grade to the Casco soils, a thin gravelly loam B horizon commonly is present. The A1 horizon, the B horizon if present, and the C horizon range from neutral to mildly alkaline. The entire profile is commonly calcareous.

Rodman soils generally are adjacent to Casco or Fox soils, and they lack the horizon of clay accumulation in the subsoil of those soils. Also, undisturbed Rodman soils are dark colored in contrast to the lighter colored Casco and Fox soils.

Romeo Series

The Romeo series consists of dark-colored, well-drained soils that are very shallow to limestone. These soils formed in residuum weathered from limestone. They are gently sloping to very steep and are mostly in Perry Township along valley walls where bedrock is near the surface.

A typical Romeo soil has a thin, dark-brown silt loam surface layer. Fractured limestone bedrock is at a depth of about 7 inches. The depth to solid bedrock generally is less than 10 inches.

Romeo soils are very droughty, and most areas are too shallow to plow. They have medium to rapid surface runoff, depending on slope. Water movement through this very shallow soil is moderate. These soils are mostly neutral or mildly alkaline.

Nearly all areas of Romeo soils are used for permanent pasture or trees.

Romeo soils were not mapped individually in Fayette County. They were mapped with Ritchey soils in undifferentiated groups because the two kinds of soil have similar management needs and use.

Representative profile of a wooded Romeo silt loam near the intersection of Miami Trace Road and Paint Creek; Perry Township:

A1—0 to 7 inches, dark-brown (7.5YR 3/2) silt loam; moderate, medium and fine, subangular blocky structure; friable; neutral; abrupt, wavy boundary.
R—7 inches, limestone bedrock.

The A1 horizon ranges from black (10YR 2/1) to very dark gray (10YR 3/1) or very dark grayish brown (10YR 3/2). In many areas, organic matter occurs as coatings on the soil particles and the crushed or rubbed color is about one chroma lighter than the uncrushed color. The A1 horizon ranges from slightly acid or neutral to mildly alkaline. Limestone fragments and igneous pebbles are common on the surface and in the solum. Glacial erratics are common. Because the profile is shallow, it is not possible to identify till material. Limestone bedrock is at the surface in some places but ranges to a depth of 10 inches. The depth of soil varies within short horizontal distances, but the A1 horizon is 4 to 10 inches thick in most places. In some areas the upper part of the bedrock is highly fractured and may be intermixed with soil material. In other places the bedrock is very dense and there is little fracturing or mixing.

The Romeo soils in Fayette County are better drained than the Romeo soils in other survey areas. This does not greatly affect use and management, however, because the Romeo soils are very shallow.

Romeo soils are very shallow to limestone, and Ritchey and Milton soils are not. Also, Romeo soils are darker colored than Ritchey and Milton soils and lack a horizon of clay accumulation in the subsoil.

Ross Series

The Ross series consists of dark-colored, well-drained soils on flood plains. Ross soils formed on stream flood plains in loamy soil material that washed from limy glacial till and soils formed in the glacial till on uplands.

A representative Ross soil has a thick, dark-colored surface layer that is silt loam and loam. This layer is about 33 inches thick. Below a depth of 33 inches, there is lighter colored, brown to grayish-brown loam that extends to a depth of 60 inches or more.

Ross soils are deep, are moderately permeable, and have a deep root zone. They can absorb and retain large amounts of moisture for plants to use. They are subject to periodic flooding, generally in winter and spring. Ross soils have good tilth through a wide range of moisture content, largely because of the high organic-matter content.

Ross soils are well suited to corn, soybeans, and other summer row crops. Flooding is a hazard to farming during winter and spring.

Representative profile of cultivated Ross silt loam near intersection of Ghormley Road and Paint Creek; Wayne Township:

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; friable; very dark brown (10YR 2/2) coatings; neutral; abrupt, smooth boundary.

A12—6 to 20 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, subangular blocky structure; friable; very dark brown (10YR 2/2) organic coatings on ped faces; neutral; clear, smooth boundary.

A13—20 to 33 inches, very dark brown (10YR 2/2) loam; weak, fine and medium, subangular blocky structure; friable; black (10YR 2/1) organic coatings on ped faces; neutral; gradual, wavy boundary.

C1—33 to 42 inches, brown (10YR 4/3) loam; massive; friable; dark grayish-brown (10YR 4/2) to very dark grayish-brown (10YR 3/2) coatings in cracks; mildly alkaline; gradual, smooth boundary.

C2—42 to 50 inches, dark grayish-brown (10YR 4/2) loam; common, fine to medium, distinct, brown (10YR 4/3 to 5/3) mottles; massive; friable; 3 percent fine gravel and stones; mildly alkaline and calcareous; gradual, smooth boundary.

IIC3—50 to 60 inches, grayish-brown (10YR 5/2) loam that has few, coarse, prominent, yellowish-brown (10YR 5/6) mottles; moderate, coarse, prismatic structure; friable; 3 percent fine gravel and stones; mildly alkaline and calcareous.

The A horizons are very dark brown (10YR 2/2), very dark grayish brown (10YR 3/2), or dark brown (10YR 3/3). Ped faces have black (10YR 2/1) or very dark brown (10YR 2/2), organic coatings. The profile is black (10YR 2/1), very dark brown (10YR 2/2), or very dark grayish brown (10YR 3/2) to a depth ranging from 24 to 40 inches. The C horizons are stratified, generally having loam or silt loam texture, but the lower C horizons commonly approach silty clay loam in texture. The C horizons are brown (10YR 4/3), dark grayish brown (10YR 4/2), or grayish brown (10YR 5/2). Organic coatings are in cracks, but there is no evidence of clay films. Sand grains and pores are uncoated. Fine and medium sand exceeds 15 percent by weight throughout the profile.

The Ross soils are commonly adjacent to lighter colored Genesee and dark-colored Medway soils. They are similar in many respects to Wea soils, which are underlain by gravel and sand. Ross soils, however, do not have a B horizon of clay accumulation such as is typical in Wea soils. The Ross soils are better drained than the Medway soils.

Ross silt loam (Rs).—This nearly level soil generally occupies the highest areas on flood plains. It generally is slightly higher in elevation than the Medway soils. Areas of this soil are elongated and commonly are on the flood plain nearest the stream channel.

Flooding in winter and spring limits the choice of crops that can be successfully grown on this soil. Flooding typically is rare in summer. Except for flooding, this soil has few limitations for farming. Flooding also is a limitation for most nonfarm uses. (Capability unit IIw-4)

Sleeth Series

The Sleeth series consists of deep, somewhat poorly drained soils. These soils are on stream terraces. They formed in outwash materials that include outwash sand and gravel below a depth of 42 inches. In some places Sleeth soils have a silty loess capping up to 20 inches thick. The terraces that Sleeth soils occupy are nearly free of flooding.

A representative Sleeth soil has a dark grayish-brown silt loam surface layer about 8 inches thick. This is underlain by a thin, dark-gray transitional layer about 5 inches thick. The upper subsoil layers are mostly brown but are coated with gray. These layers are loamy, but they have more clay than the surface layer. The lower subsoil layers are mostly yellowish-brown clay loam mottled with gray. The gravel content increases with depth. Calcareous sand and gravel are below a depth of 58 inches.

Sleeth soils have moderately slow permeability above the underlying sand and gravel. They have medium organic-matter content and a medium to high available moisture capacity. Sleeth soils have a seasonal high water table, and they dry slowly in spring unless artificially drained. They are medium acid to mildly alkaline.

If Sleeth soils are artificially drained, they are well suited to row crops and other farm crops. Most areas of these soils are used for growing corn and soybeans.

Representative profile of cultivated Sleeth silt loam near intersection of Mark Road and Armbrust Road; Union Township:

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

A&Btg—8 to 13 inches, dark-gray (10YR 4/1) silt loam that has many, fine, prominent, yellowish-brown (10YR 5/4) mottles; weak, fine, subangular blocky structure; friable; very thin, very patchy, grayish-brown (10YR 5/2) clay films in pores and on ped surfaces; few concretions; slightly acid; clear, wavy boundary.

B21tg—13 to 20 inches, brown (10YR 5/3) light silty clay loam that has common, fine, distinct, gray (10YR 5/1) mottles and few, fine, prominent, yellowish-brown (10YR 5/6) mottles; weak, fine, subangular blocky structure; friable; thin, patchy, gray (10YR 5/1) and dark-gray (10YR 4/1) clay films; medium acid; abrupt, smooth boundary.

IIB22tg—20 to 27 inches, brown (10YR 4/3) clay loam that has coarse, medium, distinct, yellowish-brown (10YR 5/6) mottles and few, fine, distinct, grayish-brown (10YR 5/2) mottles; moderate, medium, subangular blocky structure; firm; continuous, dark grayish-brown (10YR 4/2) films that have a pattern of common, fine, distinct, dark-gray (10YR 4/1) and yellowish-brown (10YR 5/4) mottles; 2 percent fine gravel; slightly acid; clear, smooth boundary.

IIB23tg—27 to 36 inches, yellowish-brown (10YR 5/4) clay loam that has common, fine, distinct, yellowish-brown (10YR 5/6) mottles and common, medium, distinct, grayish-brown (10YR 5/2) mottles; moderate, coarse, subangular blocky structure; firm; continuous, grayish-brown (10YR 5/2) coatings that have a pattern of common, fine, distinct, yellowish-brown (10YR 5/4) mottles on vertical ped faces; thin, patchy clay films; 5 percent fine gravel; neutral; clear, wavy boundary.

IIB31tg—36 to 39 inches, yellowish-brown (10YR 5/4) clay that has common, fine, distinct, yellowish-brown (10YR 5/6) mottles and many, fine, prominent, grayish-brown (10YR 5/2) and gray (10YR 5/1) mottles; weak, coarse, medium subangular blocky structure; friable; few, patchy clay films; mildly alkaline; clear, wavy boundary.

IIIB32g—39 to 44 inches, yellowish-brown (10YR 5/4) gravelly loam that has common, coarse, distinct, yellowish-brown (10YR 5/6) mottles and many, coarse, prominent, grayish-brown (10YR 5/2) to gray (10YR 5/1) mottles; massive; friable; many soft limestone fragments; moderately alkaline; calcareous; clear, wavy boundary.

IIIB33g—44 to 58 inches, dark-gray (10YR 4/1) and gray (10YR 5/1) gravelly loam that has common, medium, prominent, yellowish-brown (10YR 5/4) mottles; friable; moderately alkaline; calcareous; clear, wavy boundary.

IVC—58 to 60 inches, dark-gray (10YR 4/1) gravelly sand; single grain; loose; calcareous.

The Ap horizon ranges from dark grayish brown (10YR 4/2) to dark brown (10YR 4/3) or grayish brown (10YR 5/2). The B2 horizons are clay loam, sandy clay loam, or silty clay loam, and they include varying amounts of gravel.

The IVC horizon ranges from stratified sand and gravel to stratified sand and gravel interspersed with layers of sandy loam and loam.

Sleeth silt loam, 0 to 2 percent slopes (SlA).—This soil is on outwash terraces along streams near the break to the uplands. It also is on outwash plains. Included with this soil in mapping are some areas where the underlying material is sandy loam or loam instead of sand and gravel.

This soil has a deep root zone when the water table is low. Surface runoff is slow, and susceptibility to erosion is slight. Artificial drainage helps to lower the seasonal high water table. Tile drainage works well in this soil. The seasonal high water table is a limitation to farming and to many nonfarm uses. (Capability unit IIw–3)

Thackery Series

Soils in the Thackery series are deep and moderately well drained. They are gently sloping and formed in silt-mantled outwash material. They occupy outwash terraces that normally are above stream flooding.

A representative Thackery soil has a dark grayish-brown silt loam surface layer and a grayish-brown silt loam subsurface layer that together are 13 inches thick. Most of the subsoil layers are brown to dark yellowish-brown clay loam that is mottled. The lower part of the subsoil is very gravelly. Below a depth of 56 inches, there are layers of calcareous, grayish-brown sand and gravel.

Thackery soils have a medium organic-matter content and moderate permeability. Their water table is seasonally high for short periods in winter and spring. They have a deep root zone and a high available moisture capacity. The upper 18 inches of these soils are strongly acid or medium acid, but the soils are less acid as depth increases.

Thackery soils are well suited to most of the crops commonly grown in the county. Corn and soybeans are commonly grown.

Representative profile of cultivated Thackery silt loam near intersection of State Route 38 and Yatesville-Wissler Road; Paint Township:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; medium acid; abrupt, smooth boundary.

A2—9 to 13 inches, grayish-brown (10YR 5/2) silt loam that has few, fine, faint, brown (10YR 5/3) and yellowish-brown (10YR 5/4) mottles; weak, thick, platy structure; friable; dark grayish-brown (10YR 4/2) ped coatings; medium acid; abrupt, smooth boundary.

B1t—13 to 18 inches, brown (10YR 5/3) heavy silt loam; weak, fine, subangular blocky structure; friable; brown (10YR 4/3) ped surfaces that have patchy, grayish-brown (10YR 5/2), silty degradation surfaces; thin, very patchy clay films on surfaces and within protected parts of peds; medium acid; clear, smooth boundary.

IIB21t—18 to 26 inches, dark yellowish-brown (10YR 4/4) clay loam that has few, fine, faint, dark grayish-brown (10YR 4/2) and yellowish-brown (10YR 5/4) mottles; moderate, medium, subangular blocky structure; firm; brown (10YR 4/3) ped coatings that have thin, patchy clay films; 2 percent gravel or coarse fragments; medium acid; clear, wavy boundary.

IIB22t—26 to 32 inches, brown (10YR 4/3) clay loam that has common, fine and medium, distinct, grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/4) mottles; moderate, medium, subangular blocky structure; firm; dark grayish-brown (10YR 4/2) ped coatings that have common, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; thin, continuous clay films that have few, fine, faint, grayish-brown (10YR 5/2) mottles; few, black manganese concretions and stains; 5 percent gravel; slightly acid; clear, wavy boundary.

IIB23t—32 to 39 inches, grayish-brown (10YR 5/2) heavy clay loam that has few, fine, faint, gray (10YR 5/1) and many, medium, distinct, brown (10YR 4/3) and yellowish-brown (10YR 5/4) mottles; weak, medium and coarse, subangular blocky structure; firm; dark grayish-brown (10YR 4/2) coatings that have many, medium, distinct, grayish-brown (10YR 5/2) mottles; thin, patchy clay films that have many, medium, prominent, brown (10YR 4/3) and yellowish-brown (10YR 5/4) mottles; 5 percent gravel; few, black manganese concretions; neutral; abrupt, wavy boundary.

IIIB3—39 to 56 inches, yellowish-brown (10YR 5/4) very gravelly loam that has many, medium, prominent, dark grayish-brown (10YR 4/2) mottles; massive; friable; many, large, prominent, light brownish-gray (10YR 6/2) calcareous zones; mildly alkaline and calcareous; gradual, wavy boundary.

IVC—56 to 72 inches, grayish-brown (10YR 5/2) and brown (10YR 5/3), stratified sand and gravel; moderately alkaline and calcareous.

The silt cap, or loess mantle, ranges from 10 to 24 inches in thickness. The texture of the lowest B2 horizon ranges from sandy clay loam to gravelly clay loam and heavy clay loam. The gravelly substratum commonly extends below a depth of 72 inches.

Thackery soils are moderately well drained members of a drainage sequence that includes moderately deep, well drained Fox soils, somewhat poorly drained Sleeth soils, and very poorly drained Westland soils. Thackery soils are mottled and are deeper to calcareous sand and gravel than Fox soils, which are not mottled. They are less poorly drained than Sleeth soils and are lighter colored than Westland soils.

Thackery silt loam, 1 to 4 percent slopes (ThB).—This soil occurs on stream terraces near the breaks to the uplands. Included with this soil in mapping is a soil that has slopes of more than 4 percent. Also included are small areas of somewhat poorly drained Sleeth soils. The Sleeth soils generally are on low parts of the landscape.

Surface runoff is slow to medium, and susceptibility to erosion is slight in cultivated areas. Where the gently sloping areas of this soil are cultivated, the erosion hazard is moderate. This soil has few limitations for many nonfarm uses. (Capability unit I–1)

Warners Series

The Warners series consists of dark-colored soils that are very poorly drained. These soils are made up of mixed material that includes muck and silty clay loam, and that is about 1 foot thick over a marly substratum. They formed in a saturated accumulation of partly decomposed vegetation and mineral materials. Warners soils occupy small, low-lying bogs and kettleholes.

A typical Warners soil has a dark-colored silt loam surface layer that contains some snail shells and a large amount of muck. The underlying marly material is loamy and has loose, calcerous, beadlike, nodular shells.

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Undrained Warners soils have a continuously high water table. If these soils are adequately drained, most annual crops commonly grown develop only shallow roots because they are restricted by alkalinity. Available moisture capacity is medium, but there generally is much seepage from surrounding areas. Permeability is moderate to moderately slow in the surface layer and moderately slow to slow in the underlying marl.

Warners soils are used for pasture in this county. They can be drained, but establishment of outlets is difficult in some areas.

Representative profile of Warners muck, in a bluegrass pasture, near the intersection of White Road and Clemens Road; Wayne Township:

A11—0 to 6 inches, black (N 2/0) silty muck; strong, fine, granular structure; friable; mildly alkaline; calcareous; clear, smooth boundary.

A12—6 to 9 inches, black (10YR 2/1) light silty clay loam that has few, fine, faint, dark grayish-brown (10YR 4/2) mottles; moderate, medium, angular blocky and subangular blocky structure; friable; mildly alkaline and calcareous; clear, smooth boundary.

A13—9 to 11 inches, black (10YR 2/1) light silty clay loam that has common, medium, faint, dark grayish-brown (10YR 4/2) mottles; moderate, coarse, angular blocky structure; friable; mildly alkaline; calcareous; abrupt, wavy boundary.

C1—11 to 15 inches, dark-gray (10YR 4/1) light silty clay loam that has common, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; massive; friable; beadlike nodules of marl; moderately alkaline; calcareous; clear, smooth boundary.

C2—15 to 30 inches, dark-gray (10YR 4/1) silt loam that has common, medium, distinct mottles; massive; friable; beadlike nodules of marl; moderately alkaline; calcareous; gradual, smooth boundary.

IIC3—30 to 50 inches, dark-gray (10YR 4/1) loam; massive; friable; beadlike nodules of marl; moderately alkaline and calcareous.

The mucky A11 horizon is less than 10 inches thick. The IIC3 horizon commonly contains enough lime nodules and fragments of snail shells to give it a gritty feel.

Warners soils differ from other very poorly drained soils in the county by having a mucky surface layer.

Warners muck (We).—In this county this soil occurs in only two mapped areas, both of which are in Wayne Township. The larger mapped area contains about 7 acres, and the smaller one about 3 acres. These areas are roughly circular in shape.

If this soil is not drained it is too wet for crops. During part of the year, it is so wet that it is poorly suited to pasture. Also, it is soft and highly compressible when wet. Even where drained, this soil has a very severe limitation for use as cropland. It has severe limitations for most other uses. (Capability unit IVw-1)

Warsaw Series

The Warsaw series consists of well-drained, dark-colored soils. These soils formed in about 24 to 40 inches of loamy material that overlies stratified gravel and sand. The upper part of this material is loess in some places. These soils are on outwash terraces and are nearly level to gently sloping. The natural vegetation is believed to have been tall prairie grasses and scattered hardwood trees.

The plow layer of a representative Warsaw soil is very dark grayish-brown silt loam about 7 inches thick. Next is a layer, about 5 inches thick, that is similar to the plow layer except that it is very dark brown. The subsoil consists of layers of silt loam or clay loam that is mostly brown or dark yellowish brown. These layers are at depths between 12 and 35 inches. Approximately the lower half of this subsoil contains some gravel. Contrasting grayish-brown clay coatings and clay films are on many of the natural surfaces in the subsoil. The substratum is at a depth of 35 inches and consists of stratified, loose, calcareous gravel and sand.

In Warsaw soils permeability is moderate above the substratum and rapid in it. The root zone of these crops is moderately deep for most annual crops. The depth of root growth normally is limited by the gravel and sand substratum. These soils have a medium available moisture capacity, but they are droughty, particularly for crops maturing late in summer. Warsaw soils warm up and dry out early in the spring. These soils normally can be tilled soon after a rain. They are medium acid to mildly alkaline.

Most areas of Warsaw soils are cropland. Corn, wheat, soybeans, and hay are commonly grown.

Representative profile of Warsaw silt loam in a bluegrass pasture near intersection of Marchant-Luttrell Road and Rattlesnake Creek; Jasper Township:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine and medium, granular structure; friable; neutral; abrupt, smooth boundary.

A12—7 to 12 inches, very dark brown (10YR 2/2) silt loam; moderate, fine and very fine, subangular blocky structure; friable; neutral; clear, smooth boundary.

B21t—12 to 15 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, subangular and angular blocky structure; friable; continuous very dark brown (10YR 2/2) organic coatings; slightly acid; abrupt, wavy boundary.

IIB22t—15 to 22 inches, dark yellowish-brown (10YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; thin and medium, very dark grayish-brown (10YR 3/2) and dark grayish-brown (10YR 4/2) clay films on vertical faces; neutral; gradual, wavy boundary.

IIB23t—22 to 28 inches, brown (10YR 4/3) clay loam; weak, coarse, subangular blocky structure; firm; thin, very dark grayish-brown (10YR 3/2) clay films that are continuous on vertical and patchy on horizontal ped faces; 5 percent fine gravel; neutral; abrupt, wavy boundary.

IIB3—28 to 35 inches, brown (10YR 5/3) loam; weak, coarse, subangular blocky structure; friable; dark grayish-brown (10YR 4/2) coating and clay films; light brownish-gray (10YR 6/2) lime coatings; 10 percent fine gravel; moderately alkaline; calcareous; abrupt, wavy boundary.

IIIC—35 to 60 inches, brown (10YR 5/3) gravelly loamy sand; gravel of fine size; single grain; loose; stratified; moderately alkaline; calcareous.

The dark A horizon and upper B horizon combined range from 12 to 16 inches in thickness. In some areas the upper 12 to 16 inches of the profile was derived from loess. The B22t and B23t horizons are sandy clay loam or clay loam. The Bt horizons have hues of 7.5YR and 10YR. In many areas clay films occur on the pieces of gravel 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 30 to 40 inches in this county.

Warsaw soils are commonly near the Wea and Fox soils and are darker colored than the light-colored Fox soils. The gravel and sand substratum of Warsaw soils is nearer the surface than that of the Wea soils. Warsaw soils also have a higher gravel and sand content in the B horizon than the Wea soils.

Warsaw silt loam, 1 to 4 percent slopes (WrB).—Most mapped areas of this soil are about 5 to 20 acres in size and are gently sloping. Some areas, however, are nearly level.

This soil has good surface tilth and is easy to farm. It is suited to irrigation if erosion is controlled. The erosion hazard is moderate in cultivated areas. Limitations for many nonfarm uses are few. (Capability unit IIe-3)

Wea Series

The Wea series consists of well-drained, dark-colored soils. These soils formed in 42 to 60 inches of loamy material that overlies stratified outwash of gravel and sand. The uppermost 8 to 18 inches is wind-deposited silt (loess) in some places. These soils are nearly level and lie on outwash terraces. The natural vegetation is believed to have been tall prairie grass and scattered hardwoods.

The plow layer of a representative Wea soil typically is dark-brown silt loam about 8 inches thick. Next is a layer that extends to a depth of about 13 inches and is similar to the plow layer. The subsoil is between depths of 13 and 55 inches. It consists mostly of loamy material that commonly is of a fairly uniform brown color. The subsoil has a higher clay content than the surface layer. The lower part of the subsoil is gravelly. Contrasting brownish clay films are on many of the natural surfaces in the subsoil. The substratum is at a depth of 55 inches and consists of stratified, loose, calcareous gravel and sand.

Permeability is moderate above the substratum and rapid in it. Most annual crops grown on this soil commonly develop a deep root system. The root zone is mostly limited to the soil material overlying the gravel and sand substratum. Wea soils have a high available moisture capacity. They warm up early in spring and can be tilled soon after a rain. In some places they are medium acid in the upper 18 to 24 inches. They are less acid as depth increases.

Wea soils are locally important to farming. Most areas are used for corn, wheat, soybeans, and hay. These soils are well suited to irrigation and specialized crops.

Representative profile of cultivated Wea silt loam, east of State Route 41 and south of Ghormley Road; Wayne Township:

Ap—0 to 8 inches, dark-brown (10YR 3/3) silt loam; moderate, medium, granular structure; friable; neutral; abrupt, smooth boundary.

A12—8 to 13 inches, dark-brown (10YR 3/3) silt loam; weak, fine, subangular blocky structure; friable; neutral; clear, wavy boundary.

B1t—13 to 17 inches, brown (10YR 5/3) silt loam; weak, medium, subangular blocky structure; friable; dark grayish-brown (10YR 4/2) to very dark grayish-brown (10YR 3/2) organic coatings on some vertical ped faces; thin, patchy, brown (10YR 4/3) clay films on other ped faces; neutral; clear, smooth boundary.

IIB21t—17 to 22 inches, dark yellowish-brown (10YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; thin, patchy, brown (10YR 4/3) clay films on ped faces; 2 percent fine gravel; neutral; clear, smooth boundary.

IIB22t—22 to 30 inches, brown (7.5YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; contrasting brown (10YR 4/3) clay films on ped faces; slightly acid; clear, smooth boundary.

IIB23t—30 to 38 inches, brown (10YR 4/3) clay; moderate, medium, subangular blocky structure; firm; thin and medium, continuous, very dark grayish-brown (10YR 3/2) clay films on vertical ped faces; thin, patchy clay films on horizontal ped faces; 10 percent fine gravel; neutral; abrupt, wavy boundary.

IIB31—38 to 41 inches, brown (10YR 4/3) clay loam; massive; friable; few, dark grayish-brown (10YR 4/2) clay films; mildly alkaline; calcareous; abrupt, wavy boundary.

IIIB32—41 to 55 inches, brown (10YR 4/3 to 5/3) gravelly loam; massive; loose; many, soft, weathered limestone pebbles and light-gray (10YR 7/2) calcareous coatings; mildly alkaline; calcareous; gradual, wavy boundary.

IVC—55 to 60 inches, brown (10YR 5/3) to grayish-brown (10YR 5/2) gravel and sand; massive; loose; stratified; mildly alkaline to moderately alkaline; calcareous.

The dark-colored A horizon ranges from 13 to 20 inches in thickness, and dark coatings extend into the B horizon on ped surfaces. The B horizon has hues of 10YR and 7.5YR. The upper part of the B horizon is clay loam, sandy clay loam, or silt loam. Thin horizons of clay or gravelly clay occur in the middle to lower parts of the Bt horizon in some places. The content of gravel in the solum increases below a depth of 20 to 36 inches. The A horizon ranges from medium acid to neutral and the B horizon ranges from slightly acid to mildly alkaline. The depth to calcareous sand and gravel ranges from 42 to about 60 inches.

Wea soils commonly are near Warsaw and Fox soils. They are deeper to the underlying gravel and sand than the Warsaw or Fox soils and have less gravel and sand in the subsoil. Wea soils also are dark colored in contrast to the lighter colored Fox soils.

Wea silt loam, 0 to 2 percent slopes (WsA).—Most mapped areas of this soil are on broad terraces, some of which are linear in shape. They range from about 5 to 20 acres in size.

Included with this soil in mapping are small areas of soils on alluvial fans, the material of which washed from nearby uplands. These fans grade from 2 feet deep near the middle to a few inches at their outer edges. Slopes commonly are 2 to 3 percent where the reduced stream grade has caused the flow of water to spread out and to deposit alluvium on this Wea soil.

This soil has few or no limitations to farm use. It is easy to till, and it dries out readily in spring. Limitations for many nonfarm uses are few, except in areas of the alluvial fans. These areas are subject to minor flooding. (Capability unit I-1)

Westland Series

The Westland series consists of very poorly drained, dark-colored soils. These soils formed in loamy outwash that overlies calcareous sand and gravel. They are depressional or nearly level. In this county most areas of Westland soils are subject to flooding. Areas that are flooded lie along drainageways and intermittent streams.

A profile of a representative Westland soil has a surface layer of black silty clay loam about 12 inches thick. The upper part of the subsoil is very dark gray silty clay loam that is mottled. The entire subsoil is mostly gray and is mottled throughout. Between depths of 32 and 48 inches, there is gray, gravelly, loamy material that is mottled. A substratum of dark-gray gravelly sand is below a depth of 48 inches.

Westland soils have high organic-matter content and a high available moisture capacity. They have moderate permeability and a seasonal high water table. If the soils are adequately drained, most annual crops develop deep roots. Westland soils can be drained by tile where outlets can be established. In some places they are medium acid to neutral in the uppermost 18 inches. They are less acid as depth increases.

Westland soils, if drained, are well suited to farming. Most areas are cropland. Corn, soybeans, wheat, and hay are the most commonly grown crops.

Representative profile of cultivated Westland silty clay loam about one-third mile south of State Route 38 and east of East Fork Paint Creek; Union Township:

Ap—0 to 7 inches, black (10YR 2/1) silty clay loam; weak, medium, subangular blocky structure; friable; neutral; abrupt, smooth boundary.

A12—7 to 12 inches, black (10YR 2/1) silty clay loam; weak, coarse, subangular blocky structure; firm; organic coatings evident; 1 percent gravel; neutral; abrupt, wavy boundary.

B1t—12 to 15 inches, very dark gray (10YR 3/1) silty clay loam has few, fine, distinct, olive-brown (2.5Y 4/4) mottles; strong, fine, subangular blocky structure; firm; very thin, patchy clay films on ped surfaces; 1 percent gravel; mildly alkaline; abrupt, wavy boundary.

B21tg—15 to 22 inches, gray (10YR 5/1) silty clay loam that has many, fine, distinct, and prominent, yellowish-brown (10YR 5/4) to light olive-brown (2.5Y 5/4) mottles and common, medium, prominent, yellowish-brown (10YR 5/6) mottles; thin, continuous, gray (10YR 5/1) to dark-gray (10YR 4/1) clay films on vertical ped faces; thin, patchy clay films on horizontal faces; 3 percent gravel including a few concretions and limestone fragments; mildly alkaline; gradual, smooth boundary.

B22tg—22 to 32 inches, gray (10YR 5/1) silty clay loam that has many, small to medium, yellowish-brown (10YR 5/6) mottles; weak, coarse, prismatic structure parting to moderate, coarse subangular blocky structure; firm; thin, continuous, gray (10YR 5/1) coatings and thin, patchy clay films on vertical ped faces; 5 percent gravel and weathered limestone fragments; mildly alkaline; abrupt, wavy boundary.

B31g—32 to 41 inches, gray (10YR 5/1) gravelly clay loam that has many, coarse, prominent, yellowish-brown (10YR 5/6) and strong-brown (7.5YR 5/6) mottles; weak, coarse, subangular blocky structure; friable; mildly alkaline; calcareous; clear, wavy boundary.

B32g—41 to 48 inches, gray (10YR 5/1) gravelly loam that has common, medium, prominent, yellowish-brown (10YR 5/4) mottles; massive; friable; moderately alkaline; calcareous; clear, wavy boundary.

Cg—48 to 60 inches, dark-gray (10YR 4/1) gravelly sand; single grain; loose; moderately alkaline; calcareous.

The Ap horizon is very dark brown (10YR 2/2) or black (10YR 2/1). The Ap and A12 horizons combined are 10 to 14 inches thick. The C horizon in Fayette County ranges from stratified sand and gravel to stratified sand and gravel interspersed with layers of loamy materials. This horizon is at a depth of 42 to 60 inches.

Westland soils are commonly adjacent to well-drained Wea soils and well-drained Fox and Warsaw soils. Westland soils are grayer in the subsoil and much more poorly drained than Wea, Fox, or Warsaw soils.

Westland silty clay loam (Wu).—This nearly level soil is on outwash terraces along streams. It is in slight depressions near the breaks to the uplands. A profile of this soil is described as representative for the series. This soil is generally at a slightly higher elevation than Westland silty clay loam, overwash, and as a result, it is seldom flooded. It is subject to surface runoff from adjacent higher areas and to ponding during wet periods in winter and spring.

Included with this soil in mapping are a few areas of a Westland soil that has a loam or silt loam surface layer and small areas of the somewhat poorly drained Sleeth soils. The Sleeth inclusions are lighter colored than this Westland soil.

This soil is favorable to deep root development if the soil is artificially drained. Its surface tilth generally is good, but surface runoff is very slow. Seasonal wetness is the principal limitation to use for farm and nonfarm purposes. (Capability unit IIw–2)

Westland silty clay loam, overwash (Wv).—Most mapped areas of this soil are on relatively low-lying terraces that are subject to flooding. Fairly broad areas of this soil are adjacent to various streams throughout the county.

Surface runoff is very slow to ponded, and wetness is a moderate limitation because of flooding and a seasonal high water table. Flooding is a severe hazard to nonfarm uses of this soil. (Capability unit IIw–2)

Formation and Classification of Soils

This section has four main parts. First the important factors of soil formation are discussed as they relate to the formation of soils in Fayette County. Next the processes of formation of horizons are described. Then the current system of soil classification is briefly described, and the soil series in the county are placed in some of the categories of this system. The last part gives laboratory data.

Factors of Soil Formation

Soils are the products of soil-forming processes acting on materials deposited or accumulated by geologic forces. The important factors in soil formation are parent material, climate, living organisms, topography, and time.

Climate and living organisms, particularly vegetation, are the active factors in soil formation. Their effect on the parent material is modified by topography and by the length of time the parent material has been acted upon. The relative importance of each factor differs from place to place. In some places, one factor dominates and is responsible for most of the soil properties, but normally the interaction of all five factors determines the kind of soil that forms in any given place.

Parent material

The soils of Fayette County developed in several different kinds of parent material. This material includes glacial drift, weathered sedimentary bedrock, loess, and a combination of these materials. Other parent materials are lacustrine deposits, alluvium from soil on upland, and marly materials.

Glacial drift, a general term that refers to till and outwash sand and gravel, is the most extensive parent material in the county. The Miamian, Celina, Crosby, Corwin, and other soils developed in weathered till can have a cap of loess up to 18 inches thick. The till is relatively homogeneous and uniform in texture, and the soils that developed in this parent material have fairly uniform, moderately fine textured to fine textured subsoil layers.

Outwash sand and gravel was deposited by melt water along the glacial streams in the county. Much of this fairly well sorted, coarse material was covered by finer textured loamy outwash. The Fox, Wea, Warsaw, and similar soils formed in these materials. These soils developed the strong-brown and reddish colors as the parent material weathered. Westland and Sleeth soils formed in similar materials, but their colors are grayer because of restricted drainage and poor aeration. Rodman and Casco soils developed in the sorted coarse sand and gravel where most of the loamy outwash layer was originally thin or later was removed by geologic erosion. These soils are consequently thin, droughty, and likely to be gravelly throughout the profile.

Limestone and clay shale bedrock influenced some of the soils in the county. Such soils as the Milton, Millsdale, and Randolph developed in parent material consisting of a layer of till and a layer of the weathered bedrock. The Romeo soils are very shallow to bedrock. The deeper layers of these soils inherited the colors of the weathered bedrock.

Areas of lacustrine material, or old sediments on lake bottoms, are in only small areas in the county. The stratified silts and clays that are characteristic of these areas are reflected in the profiles of Patton and Henshaw soils.

The Cana soils formed in windblown silty material (loess) over glacial till that are both underlain by weathered Ohio shale. The profile of Cana soils reflects all three kinds of materials.

Deposits by floodwater are the youngest parent materials in the county. These materials still accumulate when fresh sediments are added by stream overflow. The sediments are from the surface layer of higher lying soils on uplands in the county. The Ross and Medway soils on first bottoms are dark colored, fertile, and high in lime content.

Climate

The climate of Fayette County during the formation of the soils has been favorable to physical change and chemical weathering of parent materials and to biological activity.

Rainfall has been such that there was adequate percolating water to leach carbonates to moderate depths as is shown in Celina, Miamian, and other soils. Rainfall has been frequent enough to allow wetting and drying cycles that are favorable to the translocation of clay minerals and the formation of soil structure, as shown in the Miamian, Kendallville, and Wea soils.

The range in temperature variations has favored both physical change and chemical weathering of parent material. Freezing and thawing have aided in the development of soil structure. Warm summer temperatures have favored chemical reactions in the weathering of primary minerals.

Both rainfall and temperature have promoted plant growth and subsequent accumulation of a moderate to high organic-matter content in Corwin, Brookston, Wea, and similar soils.

Topography

Topography can help to account for the development of different kinds of soils from the same kind of parent material. This is illustrated by comparing the Hennepin, Miamian, Celina, Crosby, and Brookston soils, all of which formed in calcareous, loamy glacial till. The moderately well drained Celina and well drained Miamian soils are moderately deep to the calcareous till. These soils formed where the slope was not strong enough to encourage excessive erosion and not nearly level enough to prevent runoff. The well-drained Hennepin soils are shallow because they formed where the slope is strong enough that soil is removed by erosion almost as fast as it is formed. The somewhat poorly drained Crosby soils formed in nearly level areas where runoff is slow.

Nearby, the very poorly drained, dark-colored Brookston soils formed in the most nearly level areas and in swales where organic residues accumulated because of a seasonally high water table. Miamian and Celina soils, as well as steep Hennepin soils, are dominant in the morainic areas. Brookston and Crosby soils are dominant on the very gently undulating till plains.

Living organisms

In Fayette County the vegetation at the time of settlement was hardwood forest. Beech, maple, oak, hickory, and ash were most prevalent. Also present were grassy clearings on the well-drained sites and marshy openings in the poorly drained swales.

Soils formed in the forests are light colored, acid, and moderate in natural fertility. These include Miamian, Crosby, and Celina soils. The well-drained grassy clearings have dark-colored, less acid, and more fertile soils, such as the Corwin and Wea. In the marshy swales are the Brookston, Millsdale, Patton, and other soils that are dark colored and fertile.

Small animals, insects, worms, and roots channel the soil and make it more permeable. Animals also mix the soil materials and contribute organic matter. Worm channels or casts are abundant in the surface layer of the Corwin and Warsaw soils, which are high in organic-matter content. Crawfish channels are most prevalent in the very poorly drained soils, such as the Brookston, Westland, and Patton. Man is a present factor influencing the future development of soils in many areas. Man drains wet soils, irrigates dry soils, changes the dominant vegetation, and influences soil chemistry by adding lime and fertilizer. He moves and removes soils to suit his purposes.

Time

The length of time the parent material was in place and exposed to the active forces of climate and vegetation is an important factor in soil formation. It influenced the degree of weathering of minerals and the formation of soil structure.

All of the glacial till and outwash materials have weathered for approximately the same amount of time. Differences in the soils, therefore, are caused by differences in microclimate, topography, and vegetation. The Ross, Medway, and other soils on the flood plains are constantly being renewed by flood deposits. Thus, they have little chance to develop horizons other than those of organic-matter accumulation. Different kinds of materials weather at different rates. For example, the glacial till in this county is relatively high in carbonate content (25 to 45 percent). Weathering through a period of time has removed carbonates to a depth of 2 to 3 feet. The Cana soils normally are acid throughout because there has been enough time for the removal of carbonates in the till part of these soils. Also, the underlying shale is very strongly acid to extremely acid.

Processes of Soil Formation

The soils that occupy most of Fayette County have relatively strong profile development. The processes of soil formation have produced very distinct changes in the material from which the soils were derived. These soils are on the undulating to rolling glacial till plain and on glacial outwash terraces along the major valleys. A small percentage of the county has soils that are only slightly modified from the parent material, mainly the soils on flood plains or steep slopes.

All the factors of soil formation act together to control the processes of horizonation. These processes are of four kinds: (1) additions, (2) removals, (3) transfers, and (4) transformations. Some of these changes promote horizon differentiations, but others retard or obliterate differences.

In this region the most evident addition to the soil is organic matter. Soils have a deep, dark-colored surface horizon if they formed under deep-rooted grasses, or where a high water table has restricted decomposition of organic matter. The surface layer is high in organic matter content, has good structure, and has base saturation of more than 50 percent. Brookston and Warsaw soils are of this kind.

Some organic matter accumulates as a thin surface mat on most soils, but this dark layer normally is destroyed by cultivation. Severe erosion may remove all evidence of the thin mat. Crosby and Celina soils are among those that have a surface layer that is thin and light colored or is low in organic-matter content.

Leaching of carbonates from calcareous parent material is one of the most significant losses that precedes many other chemical changes in the solum. Other minerals in the soil are chemically weathered, but their resistance is higher and their removal is slower. After the removal of carbonates, the alteration of minerals, such as biotite and feldspars, changes colors in the profile. Free iron oxides are produced that may be segregated by a fluctuating high water table to produce gray colors and mottling. This occurs in Brookston and Millsdale soils. If ground water is not in the profile, brownish colors develop and have a stronger chroma or redder hue above the C horizon than in it. In the time required for these changes, soil structure generally has developed because of seasonal wetting and drying of the solum.

Where horizon development is not affected by rapid removal or addition of surface material, transformation of primary minerals occurs. More stable minerals, mainly silicate clay minerals, are formed. Most of these latticed-layered clays remain in the profile, but much of the clay from the A horizon is transferred to greater depths in the profile. In studies of the Miamian, Celina, and the Crosby series, illite was found to be the most common clay mineral in the A and B horizons. Montmorillonite and other clay minerals were in smaller quantities. In the A and B horizons of Celina soils the 0- to 0.08-micron clay fraction is largely interstratified illite, montmorillonite, and vermiculite. The B horizon of Crosby soils is dominantly montmorillonite, and there are smaller amounts of illite and kaolinite. Kaolinite clay, which is an indicator of fairly intense weathering, is present only in small amounts in most soils of the county.

Seasonal wetting and drying of the soil profile seems to be one of the essential factors in the transfer of clay from the A horizon to the ped surfaces in the B horizon. The fine clay is suspended in percolating water that moves through the A horizon. It is carried by the water to the B horizon and is deposited on the ped surfaces by drying or by precipitation caused by free carbonates. This transfer of fine clay accounts for the nearly continuous clay coatings on ped surfaces in the B horizon of Miamian, Kendallville, Fox, and similar soils.

Soil Classification

Soils are classified so that we can more easily remember their significant characteristics (*3*, *6*). 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 in understanding their behavior and their response to use. 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. Then, this 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 tracts such as counties and continents.

The system of soil classification currently in use in the United States was adopted for general use by the National Cooperative Soil Survey in 1965 (*8*). The current system is under continual study (*5*). Therefore readers interested in new developments of the current system should search the latest literature. in table 9, the soil series in Fayette County are placed in some of the categories of the current national system of soil classification.

Some of the soils in this county do not fit in a series that has been recognized in the national system, but recognition of a separate series would not serve a useful purpose. Such soils are named for the series they most closely resemble. Soil scientists designate such soils as taxadjuncts to the series for which they are named. In this survey, soils in the Genesee, Henshaw, Medway, Ritchey, and Romeo series are taxadjuncts to those series. The footnotes in table 9 indicate how these soils differ from the recognized soil series.

The current system of classification has six categories. Beginning with the broadest, these categories are 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. These properties are chosen, however, so that soils of similar genesis, or mode of origin, are grouped together.

TABLE 9.—*Classification of the soils in Fayette County according to the current system of classification.*

[Classification of some of the soils at the subgroup and family levels is tentative. Refinement of the system and study of these soils in other areas may result in some later changes]

Series	Family	Subgroup	Order
Algiers	Fine-loamy, mixed, nonacid, mesic	Aquic Udifluvents	Entisols.
Brookston	Fine-loamy, mixed, noncalcareous, mesic	Typic Argiaquolls	Mollisols.
Cana	Fine-loamy, mixed, mesic	Aquic Hapludults	Ultisols.
Casco	Fine-loamy over sandy or sandy skeletal, mixed, mesic	Typic Hapludalfs	Alfisols.
Celina	Fine, mixed, mesic	Aquic Hapludalfs	Alfisols.
Corwin	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Crosby	Fine, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Fox	Fine-loamy over sandy or sandy skeletal, mixed, mesic	Typic Hapludalfs	Alfisols.
Genesee [1]	Fine-loamy, mixed, mesic	Fluventic Eutrochrepts	Inceptisols.
Hennepin	Fine-loamy, mixed, mesic	Typic Eutrochrepts	Inceptisols.
Henshaw [2]	Fine-silty, mixed, mesic	Aquic Hapludalfs	Alfisols.
Henshaw, dark variant	Fine-silty, mixed, mesic	Aquic Argiudolls	Mollisols.
Kendallville	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Medway [3]	Fine-loamy, mixed, mesic	Fluvaquentic Hapludolls	Mollisols.
Medway, moderately shallow variant.	Fine-loamy, mixed, mesic	Fluvaquentic Hapludolls	Mollisols.
Miamian	Fine, mixed, mesic	Typic Hapludalfs	Alfisols.
Millsdale	Fine, mixed, noncalcareous, mesic	Typic Argiaquolls	Mollisols.
Milton	Fine, mixed, mesic	Typic Hapludalfs	Alfisols.
Odell	Fine-loamy, mixed, mesic	Aquic Argiudolls	Mollisols.
Patton	Fine-silty, mixed, noncalcareous, mesic	Typic Haplaquolls	Mollisols.
Randolph	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Ritchey [4]	Loamy, mixed, mesic	Lithic Hapludalfs	Alfisols.
Rodman	Sandy skeletal, mixed, mesic	Typic Hapludolls	Mollisols.
Romeo [5]	Loamy, mixed, noncalcareous, mesic	Lithic Haplaquolls	Mollisols.
Ross	Fine-loamy, mixed, mesic	Cumulic Hapludolls	Mollisols.
Sleeth	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Thackery	Fine-loamy, mixed, mesic	Aquic Hapludalfs	Alfisols.
Warners	Fine-silty, mixed, calcareous, mesic	Typic Haplaquolls	Mollisols.
Warsaw	Fine-loamy over sandy or sandy skeletal, mixed, mesic	Typic Argiudolls	Mollisols.
Wea	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Westland	Fine-loamy, mixed, noncalcareous, mesic	Typic Argiaquolls	Mollisols.

[1] The Genesee soils in Fayette County are calcareous from the surface downward, in contrast to Genesee soils in other survey areas.
[2] The Henshaw soils in Fayette County have grayer coatings and mottles in the B horizon than Henshaw soils in other survey areas.
[3] The Medway soils in Fayette County have a dark-colored A horizon that is commonly thicker than in other survey areas.
[4] The Ritchey soils in Fayette County contain more clay in the solum than Ritchey soils in other survey areas.
[5] The Romeo soils in Fayette County are better drained than the Romeo soils in other survey areas.

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 the soil orders are those that tend to give broad climatic groupings of soils. Two exceptions are Entisols and Histosols, which occur in many different climates. Five of the soil orders are represented in Fayette County. They are Inceptisols, Entisols, Mollisols, Alfisols, and Ultisols.

The Entisols are mineral soils either without natural genetic horizons or with only the beginning of horizons. The only Entisol in this county is Algiers silt loam. It consists of recent alluvium overlying a buried profile.

The Inceptisols are mineral soils in which horizons have started to develop, but they do not have a horizon of accumulated illuvial clay.

Mollisols are mineral soils that have a dark-colored surface layer 10 inches thick or more or one-third the thickness of the solum and a base saturation of more than 50 percent.

Alfisols are mineral soils that have horizons of clay accumulation, or illuvial horizons, and a base saturation of more than 35 percent.

Ultisols are mineral soils that have horizons of clay accumulation and a base saturation of less than 35 percent.

Suborder: Each order is divided into suborders primarily on the basis of those soil characteristics that produce classes having the greatest genetic similarity. The soil properties used to separate suborders are mainly those that indicate the presence or absence of a seasonal high water table or other differences resulting from the climate or vegetation.

Great group: Suborders are separated into groups according to the presence or absence of genetic horizons and the arrangements of these horizons. The horizons used to make separations are those in which clay, iron, or humus have accumulated, or those that have pans that interfere with the growth of roots or the movement of water. The great group is not shown separately in table 9, because it is the last word in the name of the subgroup.

Subgroup: Great groups are subdivided into subgroups, one that represents the central or typic segment of a group and the others, called intergrades, that have properties of one great group and also one or more properties of another great group, suborder, or order. Subgroups may also be made if soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Hapludalfs, representing the central concept of the group. Aquic Hapludalfs are an intergrade subgroup. They intergrade to the Aqualfs suborder.

Family: Families are separated within a subgroup primarily on the basis of properties important to the growth of plants or to the behavior of soils that are used for engineering. Among the properties considered are texture, reaction, soil temperature, mineralogy, permeability, thickness of horizons, and consistence.

Laboratory Data

Ten soil profiles were sampled and analyzed by the laboratory of the Ohio Agricultural Research and Development Center (OARDC) during the period 1955 through 1961. Three profiles of the Brookston series, three profiles of the Miamian series, and one profile each of the Celina, Crosby, Odell, and Patton series were sampled. Laboratory data for particle-size distribution, pH, organic carbon, and calcium carbonate equivalent are available from these profiles. These data are on file at the Agronomy Department, Ohio State University; Ohio Department of Natural Resources, Division of Lands and Soil; and the State Office of the Soil Conservation Service, Columbus, Ohio.

General Nature of the County

Fayette County was formed in March 1810 from parts of Ross and Highland Counties. Early settlers were from Virginia and Kentucky. One of these early settlers, Benjamin Temple, gave the land for the city of Washington Court House. Originally, the city was called Washington. The county was named for the Marquis De LaFayette.

This section describes the physiography, relief, and drainage, gives some facts about the climate and geology, and discusses the farming, transportation, and industry of Fayette County.

Physiography, Relief, and Drainage

The county lies within the Central Lowlands physiographic province. The surface relief ranges from nearly level to undulating on the till plain, but on the terminal moraines it ranges from gently rolling to hilly. Along the streams, the valley walls to the uplands are steep in places. The land surface gently slopes from an elevation of approximately 1,120 feet above sea level at the western boundary to an elevation of about 900 feet along the eastern boundary. Where Deer Creek leaves the county along the eastern boundary, the elevation is 800 feet, the lowest point in the county. The highest point is slightly more than 1,140 feet above sea level in the vicinity of Dumpling Hill in Jefferson Township.

The entire drainage system of the county lies in the Scioto River drainage basin. Except for a small area in the northeast corner of the county, which is drained by Deer Creek flowing directly into the Scioto River, the county lies in the upper reaches of the Paint Creek drainage system.

Paint Creek flows generally from northwest to southeast and bisects the county. Six branches that are more or less equally spaced and somewhat parallel to Paint Creek dissect the plain in the northern two-thirds of the county. This area is characterized by poorly defined valleys with low divides cut by many intermittent tributary streams. Except for North Fork Paint Creek and Compton Creek, which leave the county near the junction of the Fayette, Ross, and Pickaway County boundaries, the remaining parallel streams converge in the southern part of the county. In places these streams cut through the glacial drift into the underlying dolomite to form well-defined, deep, narrow valleys that have steep walls.

Climate [4]

Climatic data for Washington Court House, as shown in table 10, are fairly representative of the weather conditions in Fayette County. The climate of Fayette County is classified as continental. Such a climate is characteristic of a land mass the size of North America and is marked by large annual, daily, and day-to-day ranges in temperature. Summers are moderately warm and humid and have an average of 21 days with temperatures equal to or higher than 90° F. In 1 year in 10, the highest temperature during the year will be equal to or less than 90°, and in the same number of years this temperature will be equal to or greater than 101°. Winters are reasonably cold and cloudy with an average of 4 days with subzero temperatures. Lowest temperature during the year is less than or equal to 13° in 9 years in 10, 5° in 5 years in 10, and 3° in 1 year in 10. Average temperature for the year is less than or equal to 50.6° in 1 year of 10, and is greater than or equal to 53.7° in 1 year in 10.

Since the terrain of Fayette County is level to rolling, the occurrence of selected spring and fall temperatures may vary from those dates shown in table 11. Valley locations generally will have the latest spring and earliest fall freezes because on nights having clear skies and calm winds, cool air drains down the slopes into the valleys.

As is characteristic of a continental climate, precipitation in Fayette County varies widely from year to year. It is, however, normally abundant and well distributed throughout the year. Fall is the driest season. Showers and thundershowers account for most of the rainfall during the growing season. Thunderstorms occur on about 40 days each year and are most frequent from April through August. Most precipitation during winter comes in the form of rain, as is typical for much of Ohio.

The following lists heavy rains, in inches, and the frequencies, in years, that the rains fall in 24 hours:

Rains in inches	*Frequencies in years*
2.2	2
3.0	5
3.5	10
4.2	25
4.7	50
5.2	100

[4] By MARVIN E. MILLER, State climatologist, National Weather Service, U.S. Department of Commerce, Columbus, Ohio.

TABLE 10.—*Temperature and precipitation, Fayette County, Ohio*

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Average monthly maximum	Average monthly minimum	Average total	1 year in 10 will have— Less than—	1 year in 10 will have— More than—	Average monthly snowfall	Average number of days with 1.0 inch or more of snow on ground
	°F.	°F.	°F.	°F.	Inches	Inches	Inches	Inches	
January	37.8	20.9	60	−1	3.17	0.90	6.06	7.3	9
February	40.9	22.5	63	2	2.71	1.00	4.80	5.4	9
March	50.2	29.7	73	12	4.20	1.41	7.67	4.0	5
April	62.6	39.9	81	24	4.20	1.91	6.92	.3	0
May	73.8	50.2	87	34	3.62	1.64	5.96	0	0
June	82.0	59.1	92	45	3.93	1.53	6.83	0	0
July	85.4	62.3	94	51	3.79	1.36	6.75	0	0
August	84.5	60.8	94	48	2.68	1.06	4.63	0	0
September	78.7	53.4	92	36	2.47	.85	4.47	0	0
October	67.8	42.9	84	25	2.05	.59	3.91	0	0
November	52.0	31.9	72	14	2.60	1.23	4.21	2.4	1
December	40.2	23.2	61	3	2.51	1.04	4.27	5.8	5
Year	62.9	41.4	96	−5	37.93	31.06	45.31	25.2	29

TABLE 11.—*Probabilities of last freezing temperatures in spring and first in fall, Fayette County, Ohio*

[All data from Washington Court House]

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
Spring:					
1 year in 10 later than	March 26	April 8	April 13	April 28	May 10
2 years in 10 later than	March 20	April 1	April 9	April 24	May 6
5 years in 10 later than	March 7	March 18	March 29	April 14	April 25
Fall:					
1 year in 10 earlier than	November 7	October 29	October 23	October 13	September 28
2 years in 10 earlier than	November 11	November 3	October 27	October 17	October 3
5 years in 10 earlier than	November 27	November 14	November 5	October 26	October 13

Except for small grains and hay, crops generally are planted from late in April through early in June. During a 10-year period, one can expect rainfall in excess of 1.2 inches per week 9 times in April, 12 times in May, and 12 times in June. Rains of this magnitude delay field operations and may cause soil loss because this is the season of the year when plant cover is most lacking.

Soil moisture goes through a seasonal cycle each year. It reaches its lowest point in October and is replenished during winter and spring when precipitation exceeds water loss by evaporation. Since the water needs of most crops reach a maximum in July and August, and rainfall is generally insufficient to meet those needs, there is a progressive drying of all soils.

Generally, humidity rises and falls inversely with the daily temperature and is lowest in summer and highest in winter. During most summer days, the relative humidity in the afternoon most often ranges from 45 to 55 percent. For the year, relative humidity averages about 80 percent at 1:00 and 7:00 a.m., 60 percent at 1:00 p.m., and 70 percent at 7:00 p.m. Heavy fog that restricts visibility to less than one-fourth mile occurs most frequently in the cold half of the year. The prevailing wind for the year is from the southwest and averages about 8 miles per hour. Damaging winds of 35 to 85 miles per hour occur most often during spring and summer. Such storms usually are associated with migrating thunderstorms. Since 1900, eight tornadoes have been reported in Fayette County. During the last decade, Ohio has averaged slightly more than 11 tornadoes a year.

Geology

The bedrocks of the area are all of sedimentary origin. They are largely dolomitic limestone, but some black, acid carbonaceous shale occurs.

Finding a good exposure of these various bedrocks generally is difficult because they are mostly covered with glacial drift. Unweathered Ohio Shale is somewhat massive, has a few vertical joints, and is dark brown to black. Upon weathering, the color usually turns to light gray, and thin vertical beds become apparent. The Greenfield Dolomite ranges from dense to open crystalline in texture and from thin bedded to massive in character. Generally, the thin-bedded zones are more dense, and the massive zones are more crystalline and porous. The Cedarville Dolomite, the oldest formation in the county, normally is massive and crystalline.

During the Pleistocene epoch, the county was invaded by at least two continental ice sheets that formed from great accumulations of snow. These ice sheets spread from several centers in what is now Canada and covered much of the northern part of the United States. The final glaciation only slightly modified the previous land surface. Old drainage lines were modified or new ones developed and former areas of high relief were levelled, but in other areas the relief was accentuated. The last ice sheet that covered Fayette County is called the Late Wisconsin glacier. This glacier encroached upon the county primarily from a northeast direction.

The deposits that were left after the glaciers receded are called glacial drift and cover the county in a layer that ranges from less than a foot to as much as 150 feet in thickness. The average thickness is 60 feet. Generally, the drift cover is thicker in the northern half of the county than elsewhere.

The three main types of glacial deposits in Fayette County are ground moraines or till plains, terminal and recessional moraines, and terrace deposits.

The till plains, which are the largest deposit in the county, consist largely of till, which is a heterogeneous mixture of boulders, pebbles, and finer materials such as sand, silt, and clay. These plains are characterized by a level to undulating surface. The till is firm, highly calcareous, and generally loamy.

Traversing the till plain in a northwest-southeast direction are three recessional moraines and one terminal moraine (Reesville) that passes through the northwest corner and southern border of the county. The recessional moraines do not represent a significant time lapse, but a terminal moraine does. These moraines, characterized by hummocky relief, consist of till and some stratified, calcareous sand and gravel.

The terrace deposits are along most of the larger stream valleys and consist of stratified, calcareous sand and gravel and lacustrine silt and clay. The terrace deposits do not make up a very large part of the county.

Farming, Transportation, and Industry

Fayette County is one of the most highly developed farm counties in Ohio. Its level to undulating relief is adapted to intensive farming. Except for the urban areas and some of the steeper parts of the terminal and recessional moraines and valley walls, the county is almost completely tillable. Untillable parts are in woodlots or pasture. Corn is the main grain crop, swine the main livestock, and beef cattle next to swine. Wheat, soybeans, and forage are other dominant crops.

Farm statistics selected from the 1959 and 1964 census of agriculture are given in Table 12.

TABLE 12.—*Selected farm characteristics*

Farm characteristics	1959	1964
Acres cropland harvested	168, 083	163, 431
Acres corn harvested for all purposes	73, 552	68, 850
Acres soybeans harvested for beans	24, 265	37, 898
Wheat, acres harvested	27, 073	28, 642
Estimated number of commercial farms	1, 127	740
Cattle and calves on farms	28, 836	28, 658
Hogs and pigs	130, 758	107, 509

The transportation facilities consist of four Federal and two State highways, together with an all-weather system of county and township roads. All Federal and State highways pass through Washington Court House, the county seat. Three main lines of railroads pass through the county; namely, the Detroit, Toledo, and Ironton Railroad, the Penn Central, and the Baltimore and Ohio.

Fayette County has over 20 industrial concerns. Two of the largest ones each employ over 400 people. Also, a food processing company employs over 300 people with daily truck deliveries to surrounding counties. In addition, there are several other smaller food processors. Two staircase manufacturing companies are in the county. Other products manufactured include farm fertilizers, livestock feeds, livestock feeding and housing equipment, shoes, gloves, boxes, electric motors, aluminum castings, concrete blocks, house trailers, and mortuary supplies.

Limestone is quarried and processed by three companies. Their products include agricultural limestone and crushed rock for construction materials that are distributed to several counties.

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Glossary

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

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.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

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 residues.

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 therefore is 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 (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. 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. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Mottling, soil. 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.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Natural soil drainage. Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and in Podzolic soils commonly have mottlings below 6 to 16 inches, in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the 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 permeability are as follows: *very slow*, *slow*, *moderately slow*, *moderate*, *moderately rapid*, *rapid*, and *very rapid*.

pH value. A numerical means for designating relatively weak acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality; a higher value, alkalinity; and a lower value, acidity.

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	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

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.

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.

Site index. A numerical means of expressing the quality of a forest site that is based on the height of the dominant stand at an arbitrarily chosen age; for example, the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years.

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 soil 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.

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 solum below plow depth.

Substratum. Technically the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or, "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

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 may be separated from a lower one by a dry zone.