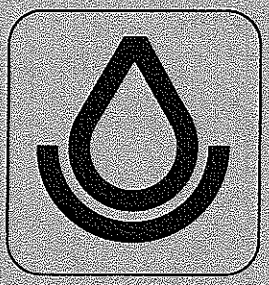
SOIL SURVEY

Stark County Ohio



Issued October 1971

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

Major fieldwork for this soil survey was done in the period 1962–65. Soil names and descriptions were approved in 1967. 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 and 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 Stark Soil Conservation District.

Preparation of this soil survey was partly financed through an urban planning grant from the Department of Housing and Urban Development, under the provisions of Section 701 of the Housing Act of 1954 as amended.

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 farms, industry, and recreation.

Locating Soils

All of the soils in Stark 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 numbers 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 in this survey. 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 also the page for the capability unit in which the soil has been placed.

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 units.

Foresters and others can refer to the section "Woodland," where the soils of the county are grouped according to their suitability for trees.

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

Community planners and others can read about soil properties that affect the choice of sites for homes and small industrial buildings and for recreational areas in the section "Town and Country Planning."

Engineers and builders can find, under "Engineering Uses of 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 Stark County may be especially interested in the section "General Soil Map," where broad patterns of soil are described. They may also be interested in the section "General Nature of the County."

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Issued October 1971

SOIL SURVEY OF STARK COUNTY, OHIO

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

STARK COUNTY, in the northeastern part of Ohio (fig. 1), has a total land area of 366,720 acres, or about 573 square miles. Canton, the county seat and largest city, is near the center of the county and lies about 50 miles south of Cleveland. In 1960 the population of the county was 340,345, and that of Canton was about 113,631.

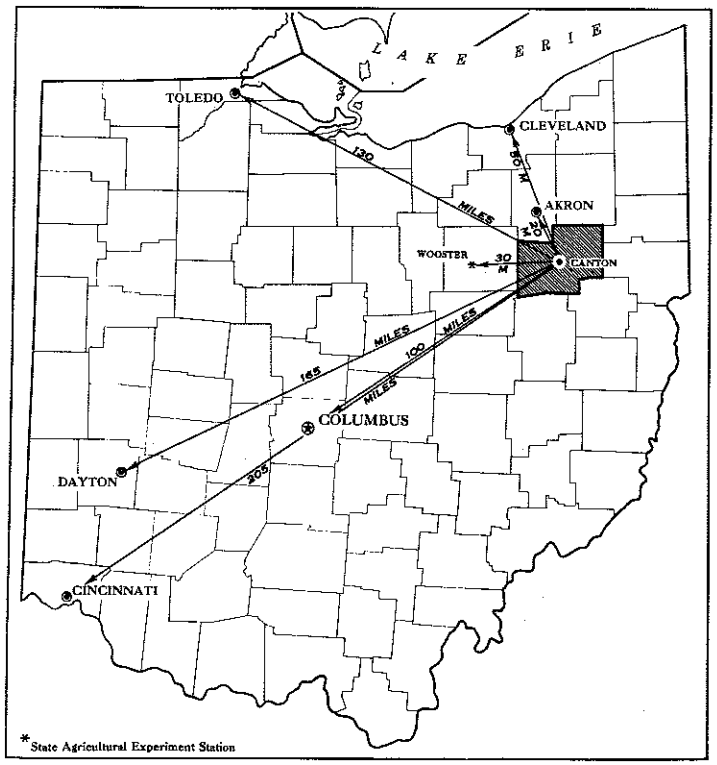

Figure 1.—Location of Stark County in Ohio.

Most of the land area in the county is farmland, but the county is in the expanding metropolitan and industrialized area of northeastern Ohio, and an increasingly large acreage is being diverted to nonfarm uses. Dairying is the main farm enterprise in the county. Industries related to iron and steel are dominant.

How This Survey Was Made

This survey was made to learn what kinds of soils are in Stark 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.

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

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all of 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. Chili and Wheeling, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, 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, Chili silt loam, 0 to 2 percent slopes, is one of several phases within the Chili series.

After a guide for classifying and naming the soils

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had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication was prepared on 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. Two such kinds of mapping units are shown on the soil map of Stark County: the soil complex and the undifferentiated group.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Chili-Urban land complex, undulating, is an example.

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 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." Chili and Conotton gravelly loams, 25 to 50 percent slopes, moderately eroded, is an example.

In most areas surveyed there are places where the soil material is so rocky, 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. Cut and fill land and Made land are examples of two land types in Stark County.

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

The soil scientists set up trial groups of soils on the basis of the data they have collected. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. Then they adjust the groups according to the results of their studies and consultations. 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 soil survey shows, in color, the soil associations in Stark 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 minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is a useful general guide in 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 soil associations in Stark County are discussed in the following pages.

1. Fitchville-Sebring Association

Deep, nearly level, somewhat poorly drained and poorly drained soils that have a loamy subsoil; formed in glacial lake sediments

This association of nearly level soils is in scattered areas throughout the county. These areas are old glacial lake beds that generally are lower than the surrounding topography.

This association occupies about 7 percent of the county. About 26 percent of the association is Fitchville soils, 24 percent is Sebring soils, and the remaining 50 percent is soils of minor extent.

The Fitchville soils are slightly higher than the Sebring soils in most places. Fitchville soils are somewhat poorly drained, and the Sebring soils are poorly drained. Both kinds of soils have a silt loam surface layer and a seasonal high water table. They are soft and compressible when wet.

The minor soils in this association are the very poorly drained Luray and Montgomery soils and the moderately well drained Glenford soils.

Undrained areas of this association are swampy, but most areas have been cleared and drained. The poor or somewhat poor natural drainage is the main limitation to use of the major soils for farming and for most other purposes. Flooding and ponding are common in winter and early in spring. It is essential that an artificial drainage system be maintained on these soils to keep them from reverting to swamp.

This association is used mainly for pasture, but some local areas are used for cultivated crops. If the Fitchville and Sebring soils are intensively managed, they are well suited to the field crops commonly grown in the county. Use for many nonfarm purposes is limited

by a seasonal high water table and, in some areas, by unstable soil material. Undrained areas are valuable as habitat for wetland wildlife.

2. Chili-Wheeling-Shoals Association

Deep, nearly level to steep, well-drained and somewhat poorly drained soils that have a loamy subsoil; formed mainly in glacial outwash

Most of this association is in an irregularly shaped area that surrounds Canton and extends northward to Portage County, northwestward to Summit County, and westward to Wayne County. Many smaller areas of other associations lie within this large area. This association also is along the main streams throughout the county. It occupies sloping and steep hills in Lake, Plain, Jackson, and Lawrence Townships. South of Massillon the soils are nearly level to gently sloping.

This association occupies about 27 percent of the county. About 55 percent of the association is Chili soils, 10 percent is Wheeling soils, 10 percent is Shoals soils, and the remaining 25 percent is minor soils.

The Chili and Wheeling soils formed in silty material underlain by gravelly outwash, and they are well drained. The Shoals soils formed in recent alluvium and are somewhat poorly drained.

Among the minor soils in this association are the well-drained Arkport and Plainfield soils, the very poorly drained Sloan soils, and the poorly drained Wayland soils.

This association is used mainly for general farming and dairying. The Chili and Wheeling soils are well suited to cultivated crops. Potatoes and melons could be grown on these soils, particularly where water for irrigation is available. Erosion is a hazard in the more sloping areas. Because flooding is a hazard, the Shoals soils are used mainly for pasture.

The Chili and Wheeling soils have few limitations to use as homesites, and in many areas community development is competing with farming. In these soils, however, there is a danger of contaminating underground water because septic tank effluent is not adequately filtered. This danger is greatest where septic tanks are concentrated in a small area. Because they are subject to flooding, the Shoals soils have severe limitations for most nonfarm uses.

3. Ravenna-Canfield Association

Deep, nearly level to sloping, somewhat poorly drained and moderately well drained soils that have a fragipan in the subsoil; formed in loam or silt loam glacial till

This association occupies large undulating to rolling areas in Marlboro, Nimishillen, and Tuscarawas Townships. Smaller, irregularly shaped areas are scattered throughout most of the county. Topography is typical of that in glacial till areas.

This association occupies about 20 percent of the county. About 45 percent of the association is Ravenna soils, 45 percent is Canfield soils, and the remaining 10 percent is minor soils.

The Ravenna soils are less sloping than the Canfield soils and are somewhat poorly drained. The Canfield soils are moderately well drained. Both kinds of soils have a dense, compact subsoil that restricts the internal movement of water and the growth of roots.

Among the minor soils in this association are the well-drained Wooster soils, which are steeper than the Canfield soils. Other minor soils are the somewhat poorly drained Fitchville soils and the poorly drained Sebring soils.

This association is used mainly for general farming and dairying. Use of the major soils is limited by seasonal wetness and, in cultiviated areas, by a hazard of erosion. Artificial drainage is needed for the good growth of crops. Wetness is generally caused by the lateral movement of water along the top of the dense, compact subsoil.

Buildings constructed on these soils tend to have wet foundations and basements unless adequate drainage is provided. Because the dominant soils have moderately slow permeability, filter fields do not function well during wet periods.

4. Canfield-Wooster Association

Deep, sloping to steep, moderately well drained and well drained soils that have a fragipan in the subsoil; formed in loamy glacial till

This association occurs through all the county except the extreme southeastern corner. It is in large and small areas of various shapes. Slopes are smooth and rounded.

This association occupies about 26 percent of the county. About 65 percent of the association is Canfield soils, 25 percent is Wooster soils, and the remaining 10 percent is minor soils.

The Canfield and Wooster soils formed in deep, loamy glacial till. The Canfield soils are moderately well drained. They have a dense, compact subsoil that slows the movement of water and the growth of roots. Wooster soils are well drained. They generally are higher and steeper than the Canfield soils.

Among the minor soils in this association are the moderately well drained and well drained, steep Loudonville soils and the nearly level, somewhat poorly drained Ravenna soils.

This association is used mostly for general farming and dairying, though the acreage in community development is increasing. The hazard of erosion is the main limitation to the use of the Canfield and Wooster soils for farming, but wetness commonly delays tillage in spring in less sloping areas of the Canfield soils.

Wetness is a less serious limitation for community development in this association than in the Wadsworth-Rittman, the Ravenna-Canfield, and the Remsen associations. But unless adequate drainage is provided in the Canfield soils, basements are wet and septic tanks do not function well because water seeps along the top of the dense, compact subsoil. For many nonfarm uses, the major soils in this association are limited by moderately slow permeability and, in some places, by steep slopes.

5. Glenford-Licking Association

Deep, gently sloping to steep, moderately well drained soils that have a loamy and clayey subsoil; formed in water-deposited sediments

This association is on benchlike terraces along small streams in the south-central part of the county. It lies in the valleys between the adjacent uplands and the flood plains.

This association occupies about 1 percent of the county. About 40 percent of the association is Glenford soils, 25 percent is Licking soils, and the remaining 35 percent is minor soils.

The Glenford soils formed in water-deposited sediments, mainly silt but some clay. They are moderately well drained and have moderately slow permeability. The Licking soils formed in silty clay and clay sediments. They also are moderately well drained, but they have slow permeability. Both the Glenford and Licking soils have a high water table in winter and spring.

Among the minor soils in this association are the poorly drained Sebring soils and the moderately well drained Rainsboro soils.

In this association seasonal wetness and, in some areas, the hazard of erosion are the main limitations to use of the soils for farming. Some local areas receive runoff from the adjacent uplands. Use for many nonfarm purposes is limited by a seasonal high water table and restricted permeability.

More than half of this association is wooded or is in unimproved pasture. Most of the remaining acreage is used for general farming and dairy farming (fig. 2). Community development has not been extensive.

Figure 2.—An area in the Glenford-Licking soil association. In the background are pine trees growing on a Licking silt loam, and in the foreground is a poorly drained Sebring silt loam.

6. Carlisle-Willette-Linwood Association

Very poorly drained organic soils that are mainly in depressions

This association occurs in scattered nearly level and depressional areas in the north-central and central parts of the county. It consists of muck soils that are underlain by mineral soil material at various depths. Undrained areas of these soils are swampy.

This association occupies about 2 percent of the county. About 80 percent of this association is Carlisle soils, 10 percent is Willette soils, and 10 percent is Linwood soils.

The Carlisle, Willette, and Linwood soils are dark colored, very poorly drained, and nearly level. These soils have a muck surface layer. Depth to the mineral material is 5 to 30 feet or more in the Carlisle soils, about 26 inches in the Willette soils, and about 23 inches in the Linwood soils. The thinner Linwood and Willette soils commonly occur at the outer edge of the association.

Poor natural drainage is the main limitation to use of this association for farming. The muck tends to oxidize and subside when the water table is lowered. This subsidence is particularly serious where the muck is thin. When dry, all areas of these mucks can be damaged or destroyed by fire. Dry areas are also subject to soil blowing. If these soils are used for farming, they need intensive management that includes artificial drainage and control of the water table.

About 60 percent of this association is used for truck farming. The remaining acreage is unimproved and swampy. Under good management these soils are well suited to endive, radishes, onions, lettuce, and other truck crops. They have severe limitations to use in community development because the muck is unstable and tends to subside.

7. Wadsworth-Rittman Association

Deep, nearly level to sloping, somewhat poorly drained and moderately well drained soils that have a fragipan in the subsoil; formed in clay loam or silty clay loam glacial till

This association is in the northeastern part of the county. It consists of soils that formed in clay loam or silty clay loam glacial till and that have a compact layer in the subsoil that restricts the movement of water.

This association occupies about 2 percent of the county. About 65 percent of the association is Wadsworth soils, 25 percent is Rittman soils, and the remaining 10 percent is minor soils.

The Wadsworth soils are mainly nearly level and are somewhat poorly drained. The Rittman soils are sloping and moderately well drained. In addition to the restrictive subsoil, both kinds of soils have a seasonal high water table.

Among the minor soils in this association are the moderately well drained Canfield, the somewhat poorly drained Fitchville, and the poorly drained Sebring soils.

General farming and dairying are the major farming enterprises in this association. The main limitation to farming is seasonal wetness. Artificial drainage is needed for good growth of crops, particularly on the Wadsworth soils. Erosion is a hazard in cultivated areas of Rittman soils.

For community development, use of most of the soils is severely limited by a seasonal high water table and slow permeability. On these soils septic tank filter fields do not function properly, even in dry periods.

8. Loudonville-Wooster Association

Moderately deep and deep, sloping to very steep, well-drained soils that have a loamy subsoil; formed in loamy glacial till over sandstone

This association occurs in widely separated areas throughout the county, mainly in the southern half. In most areas the glacial till is less than 4 feet thick over residuum from shale and sandstone.

This association occupies about 5 percent of the county. About 80 percent of the association is Loudonville soils, 15 percent is Wooster soils, and the remaining 5 percent is minor soils.

The Loudonville soils formed in glacial till 20 to 40 inches thick over bedrock. They are well drained. The Wooster soils formed in glacial till more than 40 inches thick. They are well drained and contain a fragipan.

Among the minor soils in this association are the well drained Latham and Muskingum soils and the moderately well drained Keene soils.

The main farming on the soils of this association is general farming, dairying, and producing fruit. Much of the acreage is used for pasture. The main limitation to farming is steep or very steep slopes. In many areas these soils are so steep that erosion would be a severe hazard if they were cultivated. In these areas runoff is very rapid. Community development is limited by steep slopes, but many areas have scenic value. Locally, many nonfarm uses are limited by shallowness to bedrock.

9. Remsen Association

Deep, mainly nearly level to gently sloping, somewhat poorly drained soils that have a dominantly clayey subsoil; formed in silty clay glacial till

This association occurs in the northeastern part of the county, where it practically surrounds the Berlin Reservoir. The soils are mainly nearly level to gently sloping, but they are steeper along streams and drainageways.

This association occupies about 1 percent of the county. About 80 percent is Remsen soils, and the remaining 20 percent is minor soils.

The Remsen soils occur on uplands. They are somewhat poorly drained and have a slowly permeable, clayey subsoil.

The minor soils in this association are the moderately well drained Geeburg soils, the very poorly drained, dark-colored Montgomery soils, and the poorly drained Trumbull soils.

Because this association is adjacent to the Berlin Reservoir, it is used mainly as recreational and wildlife areas. Some areas are pastured. Seasonal wetness and slow permeability are the main limitations to use. Because the soils in this association are difficult to drain and are low in natural fertility, use for farming is limited. The clayey subsoil of the Remsen soils prevents septic tank filter fields from functioning properly.

10. Latham-Keene Association

Moderately deep and deep, sloping to steep, well drained and moderately well drained soils that have a loamy and clayey subsoil; formed over shale

This association occupies scattered areas in the south-central part of the county. It occurs in the unglaciated part of the county and consists of sloping to steep soils.

This association occupies about 2 percent of the county. About 50 percent of this association is Latham soils, 40 percent is Keene soils, and the remaining 10 percent is minor soils.

The Latham soils formed in place from weathered shale. They are well drained and have a slowly permeable subsoil. The Keene soils formed in place from weathered shale and thin strata of siltstone bedrock. They generally are not so steep as the Latham soils. Keene soils are moderately well drained; permeability is moderately slow in the upper part of the subsoil and slow in the lower part.

The minor soils in this association are the well drained Brooke, Gilpin, and Muskingum soils and the moderately well drained Tilsit soils.

This association is used mainly for general farming. Much of the acreage is wooded or pastured, but some local areas are strip mined for coal and shale. Because of steep slopes and rapid runoff, erosion is a severe hazard in cultivated areas.

Little of this association has been used for community development. Some areas that have attractive views are suitable for homesites, but use of the major soils for septic tank filter fields is severely limited by moderately slow and slow permeability.

11. Muskingum-Gilpin-Dekalb Association

Moderately deep, sloping to very steep, well-drained soils that have a loamy subsoil; formed mainly over sandstone and shale

This association occurs in unglaciated areas in the southern and southeastern parts of the county (fig. 3).

This association occupies 7 percent of the county. About 40 percent of the association is Muskingum soils, 20 percent is Gilpin soils, 20 percent is Dekalb soils, and the remaining 20 percent is minor soils.

The Muskingum soils formed in the residuum from siltstone, sandstone, and shale. The Gilpin soils formed in the residuum from thin beds of siltstone, shale, and sandstone. The Dekalb soils formed in the resi-

Figure 3.—Typical landscape in the Muskingum-Gilpin-Dekalb soil association

duum from sandstone and thin beds of siltstone. All of these soils are well drained, low in natural fertility, and droughty.

The minor soils in this association are the moderately well drained Keene and Tilsit soils and the well drained Ramsey, Wellston, and Weikert soils.

Large areas of this association have been strip mined for coal. General farming and producing fruit are the main farm enterprises. The less sloping soils are used mainly for pasture, but row crops are grown in a few areas. The soils suited to cultivated crops are in such small areas that use of farm machines is restricted. Intensive practices of erosion control are needed in cultivated areas. The steeper soils are used for apple orchards, for pasture, and as woodland. Because runoff is very rapid on these soils, the hazard of erosion is severe.

Use of the soils in this association for many nonfarm purposes is limited by slopes and, in some areas, by bedrock near the surface. Community development is not extensive in this association.

Use and Management of Soils

This section contains information on the use and management of soils in the county for crops and pasture and also as woodland, for wildlife, in engineering, and for town and country planning. Also given are estimated yields of the principal crops.

In presenting information about the use of soils for crops and pasture, the procedure is to describe a group of similar soils that are suitable for those purposes and to suggest use and management for the group. To determine the soils in each capability unit, refer to the "Guide to Mapping Units" at the back of this survey. In the subsection on woodland, a table lists the woodland suitability groups into which the

soils have been placed. The subsection on wildlife gives information about the suitability of the soils for the elements of wildlife habitat. In the subsection on engineering, the soils are not grouped but are placed in tables so that properties significant to engineering work can be given readily. In the subsection on town and country planning, the soils are rated according to their limitations for selected uses.

Crops and Pasture

In this section general practices of soil management are discussed, the system of capability classification used by the Soil Conservation Service is described, and suggested management for capability groups of soils is given. Also, a table lists estimated yields of principal crops under two levels of management. Special crops grown for commercial use are discussed, and the suitability of the soils for irrigated crops.

Field crops commonly grown in Stark County are corn, wheat, oats, and other small grains. Plants suitable for pasture and hay are alfalfa, alsike clover, Ladino clover, red clover, timothy, orchardgrass, bromegrass and bluegrass. Special crops commonly grown are sweet corn, celery, lettuce, radishes, strawberries and other crops adapted to the climate. The crops just mentioned serve to indicate the kind of crops that are adapted to conditions in the county.

General practices of management

Although the soils in Stark County vary in their suitability for specific crops and require widely different management, some basic, or general, management practices are needed on practically all of the soils.

This section discusses the basic practices of maintaining fertility, utilizing crop residue, improving drainage, and controlling erosion. The management of specified groups of soils is discussed under "Management by capability units," and more specific information can be obtained by consulting a representative of the Soil Conservation Service or the Ohio Agricultural Extension Service.

Maintenance of adequate levels of fertility.—Because most of the soils in the county, particularly the light-colored ones, are naturally acid and low in content of plant nutrients, additions of lime and fertilizer are needed. Such additions should be based on the results of soil tests, on the need of the crop, and on the expected level of yields. For assistance in determining the kinds and amounts of fertilizer and lime to apply, farmers should consult the Ohio Agricultural Extension Service.

Figure 4.—**A tile drainage system on a Fitchville silt loam.**

Utilization of crop residue.—Most of the soils in this county, particularly the light-colored ones, are not naturally high in organic-matter content. All crop residues should be incorporated into the soil. If crops that produce little residue are grown, the cropping system should provide cover crops and sod crops.

Drainage.—In this county wetness is a hazard on about 34 percent of the acreage suitable for cultivated crops. Few or no practices are needed for improving drainage on the moderately well drained soils. Crops grow well on most of the somewhat poorly drained, poorly drained, and very poorly drained soils where excess water has been removed by tile, surface drains, or both (fig. 4). Land smoothing is also needed in some areas.

Control of erosion.—Controlling erosion is one of the main management needs in Stark County (fig. 5). Erosion is a hazard on gently sloping to very steep soils. About 62 percent of the acreage that is suitable for cultivated crops is susceptible to erosion. Practices of erosion control commonly used in the county are constructing diversions, terraces, and waterways, contour stripcropping, contour tillage, minimum tillage, utilizing crop residue, and planting close-growing crops.

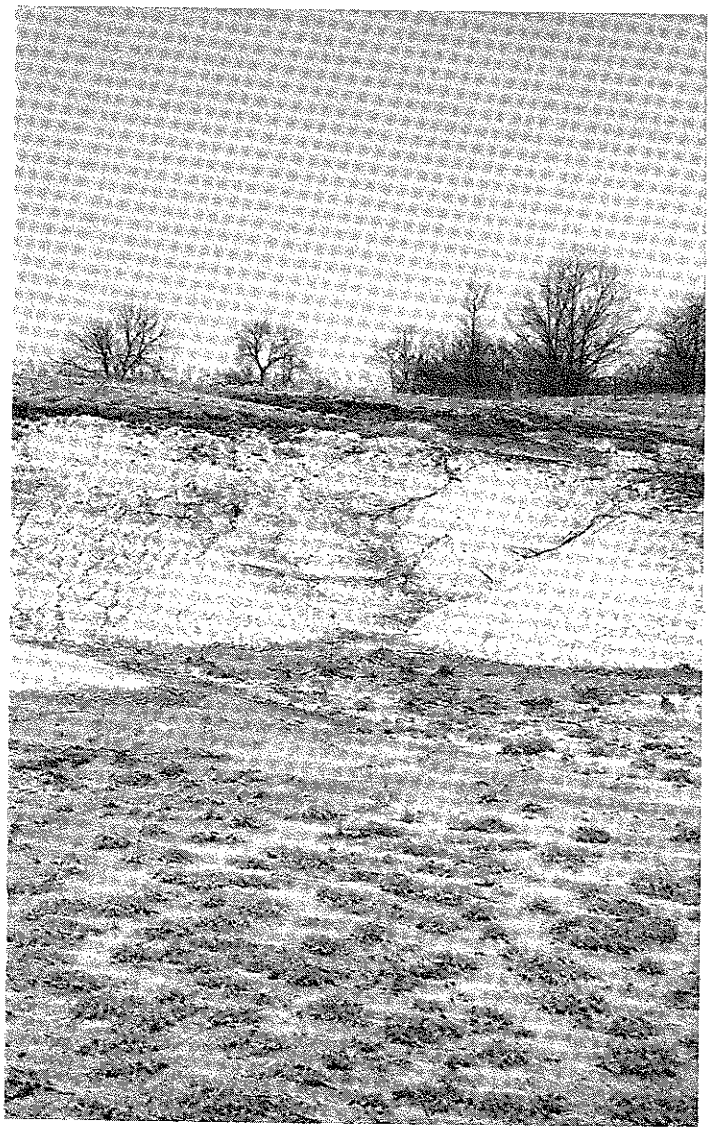

Figure 5.—An area of a Licking silt loam that has been eroded.

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 rice, cranberries, 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 groups of soils for forest trees or for engineering.

In the capability system, all kinds of soils 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. Classes are defined as follows:

Class I soils have few limitations that restrict their use.

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

Class III soils have severe limitations that reduce the choice of plants, 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 Stark County.)

Class VI soils have very severe limitations that make them generally unsuited to cultivation and that restrict their use largely to pasture, 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.

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.

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 and not in Ohio, shows that the chief limitation is climate that is too cold or dry.

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

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-5. 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 Stark County are described and suggestions for the use and management of the soils are given.

Management by capability units [2]

The soils in Stark County have been placed in 46 capability units. The soils in each unit have about the same limitations, are subject to similar risks of damage, need about the same kind of management, and respond to management in about the same way. Borrow pits, Gravel pits, Quarries, Urban land, and the 16 mapping units that include Urban land have not been placed in a capability unit because they, except Borrow pits, Gravel pits, and Quarries, are generally the sites for industrial, residential, or other community development.

In the following pages each capability unit is described, and management for each is discussed. The names of the soil series represented are given in the description of each capability unit, but this does not mean that all of the soils in a given series are in the unit. To determine the soils in each capability unit, refer to the "Guide to Mapping Units" at the back of this survey. Also, the capability unit assigned to any soil is listed at the end of the description of that soil in the section "Descriptions of the Soils."

[2] By MARVIN BUREAU, soil scientist, Soil Conservation Service.

In the discussions of the capability units, improved and intensive levels of management are mentioned for cropland and pasture. These levels of management are defined in the subsection "Estimated Yields."

Also in the descriptions of the capability units, depth of the root zone refers to the depth of the soil to a high water table, a fragipan layer, a layer of dense clay or compact till, bedrock, or other material that restricts the growth of roots. Reference to low, medium, or high available moisture capacity is related to the normal depth of roots of corn, small grain, or other commonly grown field crops.

These descriptions also point out soil features that limit the use of soils for crops or pasture. Only general recommendations for overcoming the limitations are given. Erosion control or drainage, for example, can be achieved by many methods or combinations of practices on any given field of any kind of soil. For specific information regarding erosion control, artificial drainage, recommended crop varieties, or other management practices, the reader should contact the nearest Soil Conservation Service Office or the Ohio Agricultural Extension Service.

CAPABILITY UNIT I–1

This unit consists of moderately well drained and well drained, nearly level soils on stream terraces. These soils are in the Glenford, Mentor, and Wheeling series. They generally are above the level of flooding but are subject to occasional flooding in some areas. Erosion, however, is not likely. These soils have a silt loam or loam surface layer.

The soils in this unit have a moderately deep or deep root zone and medium to high available moisture capacity. Water moves through these soils easily, and they seldom are too wet or too dry to be cropped.

These soils are easily worked, and crops on them can be planted fairly early in spring. They have no limitation to use for field crops and pasture. Soil structure can be maintained by using crops that produce large amounts of residue.

The soils in this unit are suited to the field crops and hay and pasture plants commonly grown in the county and to adapted special crops. If management is intensive, cultivated crops can be grown year after year. These soils, particularly the Wheeling soils, are well suited to irrigation by the sprinkler system.

CAPABILITY UNIT IIe–1

This unit consists of moderately well drained and well drained, gently sloping soils on terraces and uplands. These soils are in the Glenford, Mentor, Wellston, Wheeling, and Wooster series. They have a silt loam or loam surface layer.

These soils have a deep root zone and are easy to work. Available moisture capacity is medium to high, and permeability is moderate to moderately slow. Runoff is rapid.

The hazard of erosion is the major limitation to use of these soils. In cultivated areas, particularly on long slopes, practices of erosion control are needed. In frequently cultivated areas, practices also are needed for

maintaining fertility, good soil structure, and organic-matter content.

The soils in this unit are suited to the crops and the hay and pasture plants commonly grown in the county. If management is intensive, cultivated crops, including special crops, can be grown frequently. Where management is less than intensive, the cropping sequence should include close-growing crops, grasses, and legumes. Returning large amounts of crop residue to the soil is necessary for maintaining tilth and controlling erosion. These soils are well suited to early pasture and to irrigation by the sprinkler system.

CAPABILITY UNIT IIe-2

In this unit are moderately well drained, gently sloping soils that occur on terraces and uplands and have a fragipan. These soils are in the Canfield and Rainsboro series. They have a silt loam surface layer.

In these soils the root zone and the available moisture capacity are limited by the dense, firm fragipan in the lower part of the subsoil. Permeability is moderate to a depth of 15 to 30 inches, but it is moderately slow in the fragipan. Runoff is rapid. Good tilth is easy to maintain on these soils.

The hazard of erosion limits the use of these soils for row crops, particularly on long slopes that have a gradient of about 6 percent. Seasonal wet spots occur near the base of some slopes and along waterways.

The soils in this unit are suited to the field crops, special crops, and the hay and pasture plants commonly grown in the county. If management is intensive, cultivated crops, including special crops, can be grown frequently. Where management is less than intensive, the cropping sequence should include a small grain or another close-growing crop, and sod or pasture crops that help to maintain soil structure and organic-matter content and to control erosion.

The general farm crops grow better on these soils if the seep spots are drained by a random tile system. Areas used for special crops of high value generally require a complete tile system of drainage. Grasses and legumes that tolerate some wetness should be included in the seeding mixture.

CAPABILITY UNIT IIe-3

This unit consists of well-drained, gently sloping soils that occur on outwash plains or on stream terraces that normally are above flood stage. These soils are in the Bogart and Chili series. They have a silt loam or loam surface layer and are underlain by sandy and gravelly material.

Water moves through these soils at a moderately rapid rate. Their available moisture capacity and root zone are limited by the depth to coarse-textured material. These soils warm up early in spring, are easy to work, and crops on them respond well to good management. Erosion is a moderate hazard. Plant nutrients are easily removed from these soils by leaching.

The soils in this unit need management that controls erosion, conserves moisture, maintains or improves the content of organic matter, and maintains fertility. Mechanical practices for controlling erosion are difficult or impractical in many areas because of the complex slopes.

These soils are suited to the crops commonly grown in the county and to adapted special crops. Because the available moisture capacity is limited, crops that mature early are better suited than crops that mature late in summer. Row crops can be grown frequently if erosion is controlled, if crop residue is used, and if fertility is maintained at the highest possible level. These soils are well suited to sprinkler irrigation. To provide forage in dry periods, the seeding mixture for hay or pasture should include grasses and legumes that are deep rooted and drought tolerant.

CAPABILITY UNIT IIe-4

The soils in this capability unit are moderately well drained or well drained and are gently sloping. These soils are in the Canfield, Dekalb, Gilpin, Loudonville, and Muskingum series. They occur in the glaciated and the unglaciated areas of uplands, and they have a sandy loam or silt loam surface layer.

The soils in this unit have a moderately deep root zone and medium to low available moisture capacity. Except for the Canfield soil, permeability is moderate to rapid throughout the profile; it is moderately slow in the fragipan of the Canfield soil. Erosion is a moderate hazard, particularly on long slopes that have a gradient of about 6 percent.

In addition to controlling erosion on all the soils, artificial drainage is needed in areas of the Canfield and Loudonville soils that are subject to seepage. In some places bedrock interferes with the installation of tile drains.

This group of soils is suited to the crops generally grown in the county. Because available moisture capacity is limited, plants do not grow well in some areas in summer. Cultivated crops can be grown frequently if the level of management is intensive. Where management is less than intensive, the cropping sequence should include a small grain or some other close-growing crop, and a sod crop or pasture. This cropping sequence helps to control erosion and to maintain soil structure and organic-matter content. Seeding hay and pasture plants that can withstand drought helps to increase the production of forage during dry periods.

CAPABILITY UNIT IIe-5

Keene silt loam, 2 to 6 percent slopes, is the only soil in this capability unit. It occurs on terraces and uplands in the unglaciated part of the county and is moderately well drained.

This soil has a moderately deep to deep root zone and medium available moisture capacity. Permeability is moderately slow in the surface layer and slow in the subsoil. Runoff is rapid, and erosion is a moderate hazard. Crops grown on this soil generally do not respond so well to good management as those grown on the other soils in capability subclass IIe.

The hazard of erosion limits the use of this soil for cultivated crops, particularly on long slopes that have a gradient of about 6 percent. Wetness caused by seeps

is also a limitation in some areas, and tile lines are needed to drain these areas. In cultivated areas, practices are needed for maintaining fertility at a high level and for producing large amounts of crop residue. Also needed are practices that dispose of excess water safely and that help to control erosion.

This soil is only moderately well suited to cultivated crops, but it is well suited to adapted grasses and legumes grown for hay and pasture. Because this soil is slow to warm in spring, planting is frequently delayed. Moisture that is available to plants is likely to be limited late in the growing season.

CAPABILITY UNIT IIe–6

Only Arkport fine sandy loam, 0 to 6 percent slopes, is in this capability unit. It occurs on kames, terraces, and glacial outwash plains and is well drained.

This soil has a deep root zone and low or very low available moisture capacity. Permeability is rapid. This soil dries out and warms up early in spring, but it tends to be droughty in summer and is easily leached of plant nutrients. Water erosion and soil blowing are hazards.

A moderate hazard of erosion is the major limitation to use of this soil for cultivated crops, and its control is of primary importance, but other concerns are conserving moisture and maintaining the organic-matter content. Vegetation, in addition to helping control erosion, helps to conserve moisture and to maintain the organic-matter content.

The crops that are commonly grown in the county can be grown on this soil. Because the soil tends to be droughty, crops that mature early are better suited than crops that mature late in summer. If erosion is controlled, cultivated crops can be grown frequently. Special crops generally require irrigation. Deep-rooted plants that can withstand droughts should be seeded for good production of hay and pasture.

CAPABILITY UNIT IIe–7

The only soil in this unit is Rittman silt loam, 2 to 6 percent slopes. It is moderately well drained and has a fragipan.

This soil has a moderately deep root zone and medium available moisture capacity within the root zone. Permeability is slow. The dense, compact fragipan in the subsoil restricts the penetration of roots and the movement of water. Runoff is rapid. Surface crusting is likely in cultivated areas.

A moderate hazard of erosion is the major limitation to the use of this soil for field crops, but seasonal wetness caused by seepage is also a limitation in some areas. Random tile lines can be used to drain seeps, but water moves slowly into the tile lines.

This soil is suited to the field crops and the hay and pasture plants commonly grown in the county. It is less well suited to special crops than are the soils in capability unit IIe–2. Cultivated crops can be grown frequently on this soil if management is intensive. Grasses and legumes that withstand some wetness are suitable for hay and pasture.

CAPABILITY UNIT IIw–1

This unit consists of somewhat poorly drained, level to gently sloping Fitchville soils that occur on low stream terraces and in drainageways and basins on uplands. These soils have a silt loam surface layer. Some of the lower lying areas are subject to flooding.

The soils in this unit have a deep root zone, a seasonal high water table, and medium to high available moisture capacity. Water moves through these soils at a moderately slow rate.

Poor natural drainage is the main limitation to the use of these soils, but erosion is a hazard in the gently sloping areas. Tile lines generally provide adequate drainage, but a combination of diversion terraces, shallow ditches, and tile drains are needed in some places.

If drainage is adequate, these soils are suited to most crops commonly grown in the county. If management is intensive, cultivated crops can be grown frequently. Returning large amounts of residue to the soil is necessary for maintaining soil structure, good tilth, and the content of organic matter. If these soils are worked or grazed when they are too wet, they are compacted, soil structure breaks down, tillage is more difficult, and the pasture is less productive. In the gently sloping, cultivated areas, practices used for controlling erosion should not cause additional wetness. If drainage is inadequate, these soils are better suited to pasture or hay than to row crops. In these areas seeding mixtures should include grasses and legumes that tolerate some wetness.

CAPABILITY UNIT IIw–2

This unit consists of somewhat poorly drained, level to gently sloping soils that have a fragipan. These soils are in the Ravenna and Weinbach series. They occur on uplands and on outwash plains and terraces. These soils have a silt loam surface layer. In a few areas the Weinbach soils are shallow to fine-textured material.

The soils in this unit have a high water table in winter and spring. Available moisture capacity is medium. Permeability is moderately slow in the dense, firm fragipan; internal drainage and the penetration of roots are also restricted in this layer.

Somewhat poor natural drainage is the main limitation to the use of these soils, but they generally can be drained adequately by installing tile lines. Erosion is a slight hazard in cultivated areas of the gently sloping soils.

This group of soils is suited to most of the crops commonly grown in the county if drainage is adequate. These soils are also suited to adapted hay and pasture plants. If management is intensive, cultivated crops can be grown frequently. Soil structure, tilth, and organic-matter content can be maintained by using crops that produce large amounts of residue. The control of erosion should be stressed in the management of the gently sloping soils, but these practices should not add to the wetness of the soils. Grasses and legumes grow better where excess water has been removed by shallow ditches, furrows, or tile lines.

CAPABILITY UNIT IIw–3

Shoals silt loam is the only soil in this unit. It is level or nearly level and somewhat poorly drained. It occurs on bottom lands and is subject to occasional flooding, particularly in winter and early in spring.

This soil has a deep root zone when the water table is low. Available moisture capacity is high. Runoff is slow, and the water table is seasonally high.

Flooding and the resulting wetness are the major limitations to use of this soil. The water table, particularly in the early part of the growing season, can be lowered by installing tile drains where outlets are available. Diversion terraces or ditches can be used to intercept excessive runoff from nearby higher areas.

Where floods are not damaging and drainage is adequate, this soil is well suited to most of the crops commonly grown in the county. Crops grown in summer are seldom damaged by flooding. If management is intensive, cultivated crops can be grown year after year.

Hay and pasture plants grow well on this soil. The seeding mixtures should include water-tolerant plants. In dry weather, plants grow better on this soil than on most soils of the uplands, but controlling weeds is difficult in many places.

CAPABILITY UNIT IIw–4

Canfield silt loam, 0 to 2 percent slopes, is the only soil in this unit. It occurs on uplands and has a fragipan. This soil is moderately well drained.

This soil has a dense, firm layer in the lower part of the subsoil that restricts the penetration of roots and limits the amount of moisture available to plants. Permeability is moderate in the upper part of the subsoil, is moderately slow in the lower part, and is moderately slow to moderate in the underlying glacial till. This soil has a perched water table during long wet periods.

Wetness limits the use of this soil for cultivated crops. Generally, the soil is slower in drying out and warming up in spring than the other nearly level, moderately well drained soils in the county. Tile drains are needed in some places, particularly where special crops are grown.

This soil is suited to the field crops and the hay and pasture plants commonly grown in the county. If management is intensive, cultivated crops can be grown year after year. Good tilth and soil structure can be maintained by using crops that produce large amounts of crop residue. The grasses and legumes that are seeded for hay and pasture should include some plants that can withstand wetness.

CAPABILITY UNIT IIw–5

This unit consists of moderately well drained and well drained, nearly level soils on bottom lands. These soils are in the Chagrin and Lobdell series. They have a loam or silt loam surface layer. These soils are subject to occasional flooding, especially in winter and early in spring.

The soils in the unit have a deep root zone. Available moisture capacity is high. These soils are easy to work and to maintain, and they are suitable for planting fairly early in spring.

Flooding is the only limitation to use of these soils for field crops and pasture. The Lobdell soils are generally wetter in winter than the Chagrin soils and are somewhat slower to dry out in spring. Crusting is less likely on the loams than on the silt loams. Diversion terraces or ditches along the base of slopes help to intercept runoff from higher, nearby areas.

The soils in this unit are suited to the field crops and the hay and pasture plants commonly grown in the county. They can be cultivated continuously if management is intensive. In dry periods plants generally grow better on these soils than on most of the other soils on uplands in the county, but controlling weeds is likely to be more difficult. These soils are well suited to irrigation by the sprinkler system.

CAPABILITY UNIT IIw–6

In this unit are dark-colored, very poorly drained, nearly level soils in the Luray series. These soils formed in material deposited by water. They have a silt loam surface layer. Flooding is a hazard in some local areas.

These soils have a moderately deep to deep root zone. The available moisture is high, and permeability is moderately slow in the subsoil. Surface runoff is slow, and the water table is high most of the year. These soils have a high content of organic matter.

Excessive wetness is the main limitation to use of these soils, but maintaining soil structure and tilth is also important if they are cropped. These soils can be worked only within a narrow range of moisture content. They are easily compacted or made cloddy if they are worked with heavy machinery or grazed when too wet. Tile lines and open ditches are generally needed for drainage. In many places runoff from adjacent, higher areas can be intercepted and diverted from these soils.

Unless these soils are drained, they generally are too wet for cultivated crops. If drainage is adequate and management is intensive, cultivated crops can be grown frequently or even year after year. Pasture and hay plants grow well in areas that have been drained by ditches, tile, or both. The seeding mixtures should contain water-tolerant grasses and legumes. Trees and plants that provide food and cover for wildlife can be grown where crops or pasture are not feasible.

CAPABILITY UNIT IIs–1

This unit consists of well-drained, nearly level soils on outwash plains and terraces that are normally above flood stage. These soils are in the Bogart and Chili series. They have a loam or silt loam surface layer and are relatively shallow to sand and gravel.

The soils in this unit have a moderately deep root zone. The available moisture capacity is low in all of these soils, but it is significantly higher in the Chili silt loam than in the Chili loam. All of these soils are easy to work, and crops on them respond well to good management.

Conserving moisture is the chief concern in managing these soils, but practices are also needed for maintaining or improving fertility and the organic-matter content. Plant nutrients are more easily leached from these soils than from the finer textured soils in the county.

This group of soils is suited to the field crops and hay and pasture plants commonly grown in the county, and to adapted special crops. If management is intensive, cultivated crops can be grown frequently. Because of droughtiness, crops that mature early grow better on these soils than crops that mature late in summer and early in fall. Crop growth is less than normal in dry periods. Returning large amounts of crop residue to the soil and maintaining fertility should be stressed in the management of these soils. Seeding mixtures for hay and pasture should include drought-resistant plants. These soils are well suited to irrigation by the sprinkler system.

CAPABILITY UNIT IIIe–1

This unit consists of well drained and moderately well drained, sloping soils on terraces and uplands. These soils are in the Arkport, Bogart, Chili, Loudonville, Wellston, and Wooster series. They have a surface layer of silt loam, gravelly loam, or fine sandy loam. The Chili and Arkport soils are underlain by sand, gravel, or both. A few of the soils are moderately eroded.

These soils have a moderately deep or deep root zone. The available moisture capacity is very low to high. It is lowest in the Arkport and Chili soils and highest in the Wooster soils. Runoff is moderately rapid from all of these soils.

A hazard of erosion is the main limitation to use of these soils. In addition to controlling erosion, practices are needed to maintain soil structure and fertility. Because the Chili soils are on irregular, complex slopes, controlling erosion is more difficult on them than on the other soils in this unit.

This group of soils is suited to most of the crops commonly grown in the county and to adapted hay and pasture plants. They are poorly suited to special crops unless management is very intensive. If erosion is controlled and management is intensive, cultivated crops can be grown frequently. Intensive management for field crops provides close-growing crops, grasses, and legumes and returns large amounts of crop residue to the soil. In hay meadows and in pastures, erosion is controlled by maintaining an adequate plant cover. In dry periods, forage yields are generally lower on the Arkport and Chili soils than on the other soils in this unit.

CAPABILITY UNIT IIIe–2

This unit consists of somewhat poorly drained and moderately well drained, sloping soils that have a fragipan. These soils occur on uplands. They are in the Canfield, Rainsboro, Tilsit, and Wadsworth series. They have a silt loam surface layer, and some are moderately eroded.

These soils have a fragipan in the lower part of the subsoil that restricts the penetration of roots and the movement of water. It also limits the amount of moisture that is available to plants. Runoff is rapid from these soils.

A hazard of erosion, particularly on long slopes, is the major limitation to the use of these soils. Wetness caused by seepage is also a limitation, especially on the Wadsworth soils. Wet spots generally occur at the base of slopes early in spring, but these areas can be drained by tile. In cultivated areas, practices also are needed for maintaining fertility, good soil structure, and the content of organic matter.

The soils in this unit are suited to most of the field crops and the hay and pasture plants commonly grown in the county. Unless management is very intensive, they are not well suited to special crops. If management is intensive, cultivated crops can be grown frequently. Intensive management provides close-growing crops, grasses, and legumes and returns large amounts of crop residue to the soil. In areas used for hay or pasture, erosion is controlled by maintaining an adequate plant cover for protection. Seeding mixtures should include grasses and legumes that tolerate some wetness.

CAPABILITY UNIT IIIe–3

This unit consists of moderately well drained and well drained, sloping soils on uplands in the unglaciated southern part of the county. These soils are in the Brooke, Canfield, Dekalb, Gilpin, and Muskingum series. They have a silty clay loam, silt loam, or sandy loam surface layer. These soils are relatively shallow to bedrock. The Brooke soil is moderately eroded.

The soils in this unit have a moderately deep root zone. The available moisture capacity is low to medium.

A severe hazard of erosion is the main limitation to use of these soils for cultivated crops. Practices for the control of erosion should be those that also help to improve the available moisture capacity of the soil. Seep spots occur in some areas of Canfield soils early in spring. These areas, however, can be drained by tile if bedrock does not interfere with the installation of the tile.

The soils in this unit are suited to most of the crops commonly grown in the county, and to hay and pasture plants. Cultivated crops can be grown frequently if erosion is controlled. Erosion is reduced by intensive management that provides close-growing crops, grasses, and legumes and returns large amounts of crop residue to the soil. Seeding mixtures should include some drought-tolerant plants.

CAPABILITY UNIT IIIe–4

Latham silt loam, 2 to 6 percent slopes, is the only soil in this unit. It is well drained and moderately deep to shale bedrock.

This soil has a moderately deep root zone in most places. The available moisture capacity is medium to low. Permeability is slow in the subsoil, and water moves slowly through the soil. This soil is slow to warm up in spring, but it tends to be droughty in dry periods.

Erosion is the main limitation to use of this soil for cultivated crops; another limitation is droughti-

ness. Maintaining good soil structure and tilth are also concerns of management.

This soil is suited to most of the crops commonly grown in the county. It is well suited to adapted hay and pasture plants. If management is intensive, cultivated crops can be grown frequently. The cropping system should include close-growing crops, grasses, and legumes. Seeding mixtures should contain some grasses and legumes that can withstand wetness and some that are drought tolerant.

CAPABILITY UNIT IIIe–5

This unit consists of well-drained to somewhat poorly drained, sloping soils on stream terraces and in dissected areas of slack water. These soils are in the Fitchville, Glenford, Licking, Mentor, and Wheeling series. They have a loam or silt loam surface layer. Some areas are moderately eroded.

The soils in this unit have a moderately deep or deep root zone. The available moisture capacity is medium to high. Permeability is moderate to slow. Surface crusting is likely.

A severe hazard of erosion is the main limitation to the use of these soils for cultivated crops, and its control is important. Also needed are practices that help to maintain soil structure and good tilth.

These soils are well suited to most field crops and to the hay and pasture plants commonly grown in the county. If erosion is controlled, cultivated crops can be grown frequently. The cropping system should include close-growing crops, grasses, and legumes.

CAPABILITY UNIT IIIe–6

This unit consists of moderately well drained, sloping soils in the Keene series. These soils are on uplands and old high terraces. They have a silt loam surface layer and a clayey subsoil. Some areas are moderately eroded.

These soils have a clayey subsoil that restricts the penetration of roots and slows the movement of water. Permeability is moderately slow to slow in the subsoil. Runoff is moderately rapid, and only a limited amount of water is absorbed by the soil. These soils are slow to warm up in spring. They can be worked only within a narrow range of moisture content.

A severe hazard of erosion is the major limitation to use of these soils, and its control is important, particularly on long slopes. Some wet spots may need drainage early in spring; tile can be used for drainage. The surface layer of the moderately eroded soil has a high content of clay, is low in organic-matter content, and is difficult to work.

This group of soils is only moderately well suited to cultivated crops but is well suited to adapted hay and pasture plants. If management is intensive, cultivated crops can be grown frequently. Practices for controlling erosion, conserving moisture, and maintaining good tilth should be stressed in the management of these soils. Seeding mixtures for hay and pasture should contain water-tolerant and drought-tolerant grasses and legumes. Forage plants are more likely to be killed on these soils in winter than on the other moderately well drained, sloping soils in the county.

CAPABILITY UNIT IIIe–7

This unit consists of moderately well drained, light-colored, sloping soils that have a fragipan. These soils are in the Rittman series. They have a silt loam surface layer, and some of them are moderately eroded.

These soils have a moderately deep root zone, a seasonal high water table, and medium available moisture capacity. Permeability is slow in the subsoil and the underlying material. Runoff is rapid. The organic-matter content is low, and surface crusting is common.

The use of these soils for cultivated crops is limited mainly by a severe hazard of erosion, but seep spots and seasonal wetness are also limitations.

If management is intensive, the soils in this unit are suited to most field crops and hay and pasture plants. They are not well suited to special crops. In areas used for hay or pasture, an adequate plant cover must be maintained for the control of erosion. Grasses and legumes that can withstand some wetness should be grown on these soils.

CAPABILITY UNIT IIIw–1

This unit consists of somewhat poorly drained and moderately well drained, nearly level to gently sloping soils in the Licking and Remsen series. These soils have a silt loam surface layer and a moderately fine textured to fine textured subsoil.

The soils in this unit have a moderately deep or deep root zone. Available moisture capacity is medium to high. Permeability is slow in the subsoil, and water moves slowly through these soils.

Wetness is the main limitation to the use of these soils. In addition to drainage, practices that help to maintain soil structure and tilth are desirable. Erosion is a hazard on the gently sloping Remsen soil. The soils in this unit puddle and become cloddy if they are worked or grazed when wet. Tile and open ditches can be used for drainage, but drainage by tile is slow.

Drained areas of these soils are suited to most of the crops commonly grown in the county and to adapted hay and pasture plants. If management is intensive, cultivated crops can be grown frequently. Drainage and returning large amounts of crop residue to the soil should be stressed in the management of these soils.

CAPABILITY UNIT IIIw–2

This unit consists of somewhat poorly drained, level to sloping soils that have a fragipan. These soils are in the Wadsworth series and Wadsworth series, moderately shallow variant. They have a silt loam surface layer.

The soils in this unit have a moderately deep root zone. Permeability is slow, and available moisture capacity is medium.

A seasonal high water table is the main limitation to the use of these soils for cultivated crops, but erosion is a hazard on the stronger slopes. Practices are needed for maintaining good soil structure and tilth. The soils in this unit are generally more difficult to drain than are the soils in capability unit IIw–2.

If these soils are adequately drained, they are

suited to most of the crops grown in the county. If management is intensive, cultivated crops can be grown frequently. Returning large amounts of crop residue to the soil is necessary for maintaining good soil structure, tilth, and organic-matter content. If these soils are worked or pastured when too wet, they become compacted and soil structure breaks down, which makes tillage more difficult and the pasture less productive. Practices for controlling erosion should not cause additional wetness.

These soils are suited to adapted grasses and legumes grown for hay and pasture, but forage grows better in drained areas than in undrained areas.

CAPABILITY UNIT IIIw–3

This unit consists of poorly drained and very poorly drained, nearly level soils. These soils are in the Killbuck, Sloan, Wallkill, and Wayland series. They occur on bottom lands and are subject to flooding. Their surface layer is silt loam. The Sloan and Wallkill soils are dark colored.

The soils in this unit have a deep root zone when the water table is low. The water table is at or near the surface most of the year. Available moisture capacity is high. Permeability is moderate to slow, and runoff is very slow or ponded. These soils have a high capacity for storing and releasing plant nutrients.

Excessive wetness is the primary limitation to the use of these soils for cultivated crops. In addition to drainage, practices are needed to maintain good soil structure and tilth. Because these soils are in low areas, they are difficult to drain in many places. Tile and surface drains are generally needed for adequate drainage. Wetness can be reduced by diverting runoff from nearby high areas. These soils are damaged if they are tilled or pastured when too wet.

In areas where flooding is infrequent and drainage is adequate, these soils are suited to row crops and to adapted pasture plants. Flooding can damage winter grain. If management is intensive, cultivated crops can be grown year after year. Shallow-rooted plants that can tolerate wetness are the most suitable for seeding pasture. Areas that cannot be drained are suited to adapted plants that provide food and cover for wildlife.

CAPABILITY UNIT IIIw–4

The soils in this unit are poorly drained and nearly level or depressional. They occur on terraces and uplands and are in the Ginat and Sebring series. These soils have a silt loam surface layer.

The soils in this unit have a moderately deep or deep root zone. The available moisture capacity is medium. Permeability is moderately slow or slow in the subsoil. These soils have a seasonal high water table and are very slow to dry. Runoff is slow or very slow.

Poor natural drainage and the resulting wetness are the main limitations to use of these soils, but maintaining soil structure, tilth, and a high level of fertility are also concerns in cultivated areas. Surface wetness can be reduced by digging shallow ditches and by installing diversions where runoff from higher areas is a hazard. Tile drains are generally needed in areas used for cultivated crops. These soils can be drained moderately well by tile drains where adequate outlets are available.

Drained areas of these soils are moderately well suited to most crops grown in the county, but these soils are poorly suited to special crops. Intensive management includes growing crops that produce large amounts of residue and returning the residue to the soil. Water-tolerant pasture and hay plants can be grown on these soils, but they grow better in drained or partly drained areas. Areas that are too wet for pasture are suited to adapted plants that provide food and cover for wildlife.

CAPABILITY UNIT IIIw–5

This unit consists of very poorly drained, dark-colored, organic soils that have a muck surface layer. These soils are in the Carlisle, Edwards, Linwood, and Willette series. They occupy level and basinlike areas in the glaciated part of the county. The Carlisle, Linwood, and Willette soils are underlain by mineral material, and the Edwards soil is underlain by marl.

These soils have a moderately deep or deep root zone and high or very high available moisture capacity. Under natural conditions, they have a high water table most of the year. Permeability is variable. These soils are subject to soil blowing and to damage by fire during dry periods.

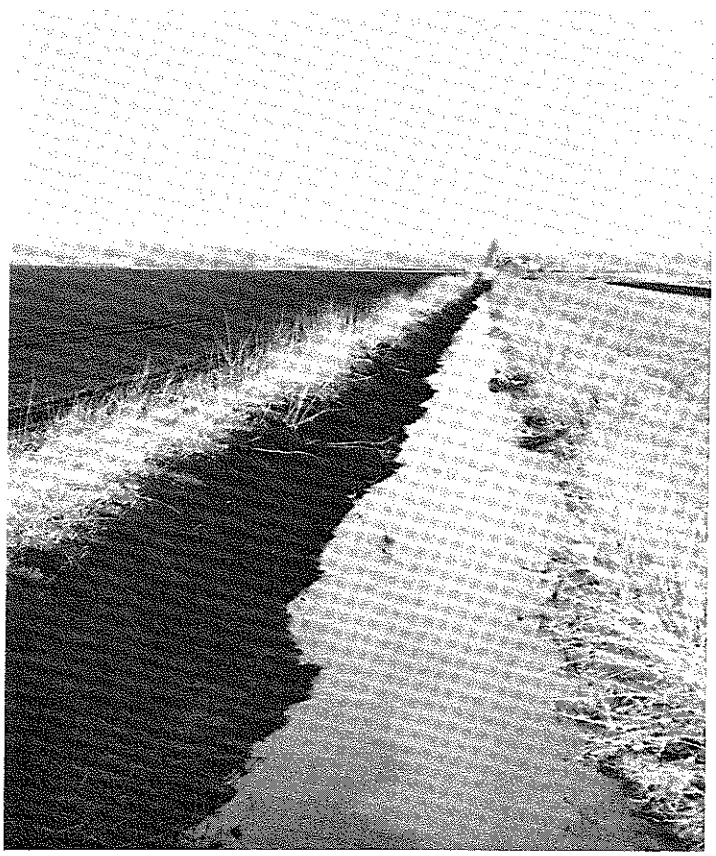

Figure 6.—**An open ditch draining an area of Carlisle muck near Hartville.**

These soils mainly need management that provides artificial drainage and the control of the water table so that subsidence of the muck is reduced. Tile, open ditches, or both of these, generally are suitable for drainage (fig. 6). Diversion ditches or waterways can be constructed to intercept the runoff from adjacent higher areas and to prevent temporary flooding. Because several variable factors affect drainage on these muck soils, a drainage specialist generally needs to be consulted so that the drainage system is properly designed and installed.

Where adequately drained, these soils are suited to most crops commonly grown in the county and to adapted special crops. If managed intensively, these soils can be continuously cultivated. Intensive management should include cover crops between row crops for protection against soil blowing. Frost damage is more likely on these low-lying soils than on higher soils. These soils generally are well suited to irrigation.

Partly drained areas of these soils are suited to adapted hay and pasture plants. Some areas that cannot be drained, or that are subject to frequent flooding, can be developed for permanent pasture. Areas that are too wet for pasture are well suited to plants that provide food and cover for wildlife.

CAPABILITY UNIT IIIw–6

Montgomery silty clay loam is the only soil in this unit. It is very poorly drained, dark colored, and nearly level. This soil occurs on stream terraces and in areas of old glacial fill deposited by slack water.

This soil has a deep root zone when the water table is low. The available moisture capacity is high within the root zone. Permeability is slow. The water table is at or near the surface in winter and spring, and the surface is ponded in some places. This soil can be worked only within a narrow range of moisture content. Its content of organic matter is high, and surface crusting is not likely.

Excessive wetness is the major limitation to the use of this soil for cultivated crops. Artificial drainage is needed. Tile can be used for drainage in most places, and ponding can be reduced by digging shallow ditches.

If this soil is drained, it is suited to the field crops commonly grown in the county. It is suited to adapted hay and pasture plants that can withstand wetness. If management is intensive, cultivated crops can be grown year after year. This soil is likely to become cloddy if it is worked when too wet.

CAPABILITY UNIT IIIs–1

This unit consists of well-drained, level to sloping Conotton soils on outwash plains and terraces. These soils have a loam or gravelly loam surface layer, and they are underlain by sand and gravel.

These soils have a moderately deep to deep root zone and are easy to work. Available moisture capacity is low. Permeability is rapid, and water moves rapidly through the soil. These soils have a low capacity for storing and releasing plant nutrients. They dry out rapidly and warm up early in spring.

Droughtiness is the principal limitation to use of these soils, but erosion is a slight hazard on the gently sloping soils. Returning large amounts of crop residue to these soils is necessary for maintaining moisture.

The soils in this unit are suited to most crops commonly grown in the county and to adapted special crops. If management is intensive, cultivated crops can be grown frequently, and they grow well. Conserving moisture should be stressed in the management of these soils. Because of droughtiness, crops that mature early are better suited than crops that mature late in summer, unless irrigation is provided. Drought-resistant hay and pasture plants can be grown on these soils, but they do not grow well in dry periods unless they are irrigated.

CAPABILITY UNIT IVe–1

This unit consists of well drained and moderately well drained, moderately steep soils on terraces and uplands. These soils are in the Arkport, Chili, Glenford, Mentor, Wheeling, and Wooster series. They have a fine sandy loam, gravelly loam, or silt loam surface layer. Most of the soils are moderately eroded.

The soils in this unit have a moderately deep or deep root zone. Available moisture capacity is very low to high. Permeability is moderately rapid in the Arkport soil, moderately rapid in the Chili soil, moderately slow in the Glenford soil, and moderate in the Mentor, Wheeling, and Wooster soils. Runoff is rapid.

A very severe hazard of erosion is the primary limitation to the use of these soils for cultivated crops, but other concerns include maintaining good tilth and a high level of fertility.

The soils in this unit are suited to the crops commonly grown in the county. If management is intensive, cultivated crops can be grown at infrequent intervals, but grasses and legumes should be grown most of the time so as to help to control erosion. A row crop can be grown occasionally if erosion is controlled. An adequate protective cover is needed in winter. Row crops grown on these soils are more likely to be damaged by drought than are row crops grown on the less sloping soils of the same series.

These soils are well suited to adapted grasses and legumes grown for hay and pasture. If management is good, these plants provide excellent cover that helps to control erosion. During dry periods, however, especially on the Chili and Arkport soils, growth of these plants is limited.

CAPABILITY UNIT IVe–2

This unit consists of moderately well drained, strongly sloping soils that have a fragipan. These soils are in the Canfield, Rittman, and Tilsit series. They occur mainly on uplands, but some are on old terraces in the southern part of the county. These soils have a silt loam surface layer, and some of them are moderately eroded.

The soils in this unit have a dense, firm fragipan in the subsoil that restricts the penetration of roots and the movement of water and limits the amount of moisture that is available to plants. Runoff is rapid.

A severe hazard of erosion is the primary limitation

to the use of these soils. In addition to erosion control, practices are needed for maintaining fertility and good soil tilth.

These soils are suited to the crops commonly grown in the county. They are well suited to adapted grasses and legumes grown for hay and pasture. If management is intensive, cultivated crops can be grown occasionally. However, close-growing crops, grasses, and legumes should be grown most of the time to help control erosion. Returning large amounts of crop residue to the soil improves soil structure and the infiltration of water and helps to control erosion. Because a good plant cover is needed in hay meadows and pastures, grazing should be regulated so as to maintain enough vegetation for the control of erosion.

CAPABILITY UNIT IVe–3

In this unit are moderately well drained and well drained, sloping to steep soils on uplands, mainly in the unglaciated southern part of the county. These soils are in the Dekalb, Gilpin, Loudonville, and Muskingum series. They have a sandy loam or silt loam surface layer. Most of these soils are moderately deep to bedrock, and some are moderately eroded.

The soils in this unit have a moderately deep root zone and low available moisture capacity. They are strongly acid.

A very severe hazard of erosion is the major limitation to use of these soils, but droughtiness is also a concern. Practices that will help to increase the amount of moisture available to plants are needed for the control of erosion. Also needed are practices that help to maintain a high level of fertility and that return large amounts of crop residue to the soil.

If management is intensive, the soils in this unit are suited to most crops commonly grown in the county and to adapted grasses and legumes grown for hay or pasture. Because of the limited moisture capacity and the hazard of erosion on these soils, winter grain and close-growing forage crops are better suited than row crops. Close-growing crops, grasses, and legumes should be grown most of the time. Drought-resistant grasses and legumes should be included in the seeding mixtures.

CAPABILITY UNIT IVe–4

This unit consists of moderately well drained and well drained, sloping to moderately steep soils on uplands and old high terraces. These soils are in the Geeburg, Keene, Latham, and Licking series. They have a silt loam surface layer. Some of these soils are moderately eroded.

The soils in this unit have a clayey subsoil through which the penetration of roots and the movement of water is restricted. Permeability is slow in the subsoil. Runoff is rapid from these soils, and they absorb a very limited amount of rainfall. These soils are slow to warm up in spring. If worked or pastured when too wet, they become compacted and cloddy. The moderately eroded soils have a clayey surface layer, are low in organic-matter content, and are difficult to till.

The major limitation to the use of the soils in this unit is a very severe hazard of erosion, particularly on the longer slopes. In some places wetness caused by seepage is a concern early in spring.

The soils in this unit are moderately well suited to the crops commonly grown in the county. A row crop can be grown occasionally, provided management is intensive and includes practices for controlling erosion. Close-growing crops, grasses, and legumes should be kept on the soils most of the time. Large amounts of crop residue are needed to maintain soil structure, tilth, and content of organic matter and to help control erosion.

CAPABILITY UNIT IVw–1

This unit consists of poorly drained, nearly level soils. These soils are in the Canadice and Trumbull series. They occupy low-lying areas scattered throughout the glaciated part of the county. These soils have a silt loam surface layer and a clayey subsoil.

The soils in this unit have a moderately deep or deep root zone when the water table is low. Available moisture capacity is medium. Permeability is slow in the subsoil. Runoff is slow or ponded. These soils have a high water table most of the year, and they dry out and warm up very slowly. If they are tilled or grazed when too wet, they become compacted and cloddy.

Excessive wetness is a primary limitation to the use of these soils. In addition to drainage, practices are needed to maintain soil structure, tilth, and an adequate level of fertility. These soils are poorly suited to drainage by tile, but surface water generally can be reduced by ditches and by intercepting and diverting runoff from nearby higher areas.

Drained areas of these soils are moderately well suited to most of the general farm crops commonly grown in the county. They are poorly suited to special crops, but they are suited to hay and pasture plants. Cultivated crops can be grown at infrequent intervals, provided management is intensive. Grasses and legumes should be grown frequently to provide enough crop residue to help maintain soil structure and tilth. Areas used for hay and pasture generally need some drainage, and they should be seeded to grasses and legumes that can withstand some wetness. Areas that cannot be drained are suited to permanent pasture and to plants that provide food and cover for wildlife.

CAPABILITY UNIT IVs–1

This unit consists of well-drained, nearly level to sloping soils in the Plainfield series. These soils occur on terraces and in outwash areas. They have a loamy sand surface layer and are underlain by sand and gravel.

The soils in this unit have a moderately deep to deep root zone. The available moisture capacity is low or very low. Permeability is rapid. These soils have a low or very low capacity for storing and releasing plant nutrients. They dry out and warm up rapidly in spring, and they are droughty in dry periods.

Droughtiness is the major limitation to the use of

these soils, but water erosion and soil blowing are also hazards. These porous soils are easily leached of plant nutrients. Practices are needed that will help to increase the content of organic matter, to replace plant nutrients, and to control water erosion and soil blowing.

The soils in this unit are suited to adapted hay and pasture plants. They are limited, particularly those on the steeper slopes, in their use for general farm crops and special crops. These soils need intensive management. Unless irrigated, they are better suited to crops that are planted early in spring and that mature before dry periods than they are to crops that mature late in summer. Maintaining a high level of fertility and returning crop residue to the soil should be stressed in the management of these soils. Drought-resistant grasses and legumes should be grown for hay and pasture. During summer, however, growth of these plants is limited unless irrigation is provided.

CAPABILITY UNIT VIe–1

In this unit are well-drained, sloping to steep soils on terraces and uplands. These soils are in the Chili, Conotton, and Wooster series. They have a gravelly loam or silt loam surface layer. Except for the Wooster soils, which are underlain by glacial till, these soils are underlain by sand or gravel. All of the soils are moderately eroded.

These soils have a moderately deep to shallow root zone in most places. Available moisture capacity is low in the Chili and Conotton soils, but it is medium to high in the Wooster soils. Permeability is moderately rapid to very rapid in all of these soils.

Erosion is a severe limitation to use of all of these soils. The Chili and Conotton soils are also limited by droughtiness.

The soils in this unit generally are not suited to cultivated crops. They are suited to drought-resistant hay and pasture plants. Management is needed that maintains fertility and a good plant cover. Care should be taken not to overgraze pasture.

CAPABILITY UNIT VIe–2

This unit consists of moderately well drained and well drained, sloping to steep soils on terraces and uplands. These soils are in the Brooke, Geeburg, Keene, Latham, and Licking series. They have a silt loam or silty clay loam surface layer and a clayey subsoil. Some of these soils are moderately eroded.

The soils in this unit have a moderately deep to shallow root zone. Permeability is slow in the subsoil. Because runoff is rapid from these soils, little water is absorbed. The water that does move into the soil is held tightly in the clayey subsoil. Consequently, these soils tend to be droughty during much of the growing season.

Because the soils in this unit are sloping to steep and have a severe hazard of erosion, they are not suited to cultivated crops. They are, however, suited to adapted grasses and legumes grown for hay or permanent pasture, provided management is intensive. This management includes practices that maintain an adequate level of fertility and control grazing so as to maintain enough vegetation to control erosion.

CAPABILITY UNIT VIe–3

This unit consists of well-drained, moderately deep, steep soils on uplands, mainly in the unglaciated southern part of the county. These soils are in the Dekalb, Gilpin, Loudonville, and Muskingum series. They have a sandy loam or silt loam surface layer and are underlain mainly by sandstone and siltstone. Some of these soils are moderately eroded, and some are severely eroded.

The soils in this unit have a moderately deep to shallow root zone. Permeability is moderate to moderately rapid above the bedrock. Available moisture capacity is low. These soils dry out rapidly in spring and are likely to be droughty in summer.

Because the soils in this unit are steep and highly susceptible to erosion, they are not suited to cultivated crops. If management is intensive, these soils are suited to drought-resistant grasses and legumes grown for permanent pasture. Erosion is a very severe hazard when pastures are reseeded and when adequate cover is not maintained. Controlling grazing and maintaining fertility are essential on these soils. The use of heavy machinery in the steeper areas is hazardous.

CAPABILITY UNIT VIs–1

The soils in this unit are sloping and moderately steep, shallow, and well drained. They are in the Ramsey and Weikert series and occur in the unglaciated southern part of the county. They have a channery sandy loam and silt loam surface layer.

These soils have a shallow root zone and low to very low available moisture capacity. Permeability is rapid above the bedrock. These soils are droughty during dry periods.

A hazard of erosion and shallowness to bedrock are major limitations to use of these soils. Stones on the surface are likely to interfere with the use of machinery in some places.

The soils in this unit are better suited to permanent vegetation than to other uses, especially the moderately steep soils. All of these soils are moderately well suited to drought-resistant plants grown for pasture, but a good stand is difficult to establish. Permanent pasture does not do well during dry periods and is easily damaged by overgrazing. Maintaining adequate fertility and a protective cover should be stressed in the management of these soils.

CAPABILITY UNIT VIs–2

This unit consists of Strip mine spoil in undulating and rolling areas. The spoil consists of sandstone and shale material and nonacid glacial till material that has been excavated during mining operations. This spoil contains many rock fragments, but it has enough fine material at the surface to support some vegetation. The spoil has been graded to some extent, which has disposed of the largest rocks. The spoil consisting of shale and sandstone material is toxic in some areas.

The Strip mine spoil in this unit has slow to rapid permeability and, in most places, has medium available moisture capacity. The depth of the root zone varies.

The poor physical condition of the spoil material is the major limitation to the use of this spoil. This material is droughty during dry periods, and erosion is a hazard in the steeper areas. The surface of this spoil generally is too rough for the operation of equipment used for harvesting hay.

This Strip mine spoil is not suited to general farm crops. It has been seeded to grasses or planted to trees. If these areas are pastured, an adequate plant cover should be maintained for the control of erosion.

CAPABILITY UNIT VIIe–1

This unit consists of well-drained, steep and very steep soils on terraces and uplands. These soils are in the Chili and Conotton series. They have a gravelly loam surface layer and are underlain by sand and gravel. These soils are moderately eroded.

The soils in this unit have a moderately deep to shallow root zone and very low available moisture capacity. Permeability is rapid or very rapid.

These soils are highly susceptible to erosion unless they are protected by permanent vegetation. Their suitability for pasture is limited by steepness, roughness, and difficulty in the use of machinery. Some areas can be renovated and reseeded to adapted grasses and legumes, but grazing should be restricted in dry periods so as to maintain the stand. Management is needed that provides an adequate protective cover. These soils are suited to adapted trees and to other vegetation grown for wildlife developments.

CAPABILITY UNIT VIIe–2

The soils in this unit are well drained, moderately deep to shallow, and very steep. They are in the Gilpin and Muskingum series. These soils occur on uplands, mainly in the unglaciated southern part of the county. They have a silt loam surface layer and are underlain by sandstone and siltstone.

These soils have a moderately deep to shallow root zone. The available moisture capacity is low.

The hazard of erosion is very severe on these soils unless a protective cover is maintained. Their suitability for pasture is limited. Because of the slope the use of machines is very difficult in most places and is impossible in some areas. The growth of pasture plants is slow in dry periods. and the pasture is easily damaged by overgrazing. Management is needed that provides an adequate plant cover at all times. Adapted trees and other vegetation can be planted to help control erosion and to provide food and cover for wildlife.

CAPABILITY UNIT VIIs–1

This unit consists of shallow, well-drained, steep and very steep soils on uplands in the unglaciated southern part of the county. These soils are in the Ramsey and Weikert series. They have a channery sandy loam and silt loam surface layer and are moderately eroded.

The soils in this unit have a shallow root zone and very low available moisture capacity. They are extremely droughty.

These soils are highly susceptible to erosion unless a protective cover is maintained. Their use for pasture is limited by steepness, shallowness, and stones on the surface. Maintaining a sod is difficult on these soils, and care should be taken not to overgraze the pasture. Adapted trees and other vegetation can be planted to help control erosion and for wildlife developments. An adequate protective cover is essential on these soils.

CAPABILITY UNIT VIIs–2

This unit consists of Strip mine spoil in undulating, rolling, or steep areas. This spoil is mainly acid clay shale material, but some is sandstone and shale material, and some is nonacid material. All of this spoil material has very low available moisture capacity and is very stony.

The physical condition of the spoil material limits the use of the Strip mine spoil in this unit. Erosion is a severe hazard in the steeper areas. Silty material is washed from areas that are bare and is deposited in adjacent lower areas and streams.

The spoil material in this unit is suited only to trees. Black locust is suitable for planting.

CAPABILITY UNIT VIIIw–1

Only Alluvial land is in this unit. It occupies areas at the edges of the larger streams in the county and is flooded frequently. For esthetic or recreational use, this land has little or no value.

CAPABILITY UNIT VIIIs–1

This unit consists of Cut and fill land and Made land. This land consists of areas where the soil material has been leveled, moved, or removed and of areas where earth or trash, or both, have been dumped. In these areas onsite investigation generally is needed to determine the most suitable use.

Estimated yields

Table 1 shows, for most soils in the county, the estimated average acre yield of principal crops. The yields are the averages of those expected over a period of years under improved and intensive management. Yields are not listed in the table for Alluvial land, Borrow pits, Cut and fill land, Gravel pits, Made land, Quarries, Strip mine spoil, Urban land, and the 16 complexes that include Urban land. These mapping units are not suitable for farming.

In table 1, yields in columns A are those obtained under improved management, and those in columns B are obtained under intensive management. An intensive level of management includes: (1) Practices that increase the intake of water and the water-holding capacity of the soils; (2) the disposal of excess water by approximate means; (3) practices that help to control erosion; (4) suitable methods of plowing, preparing the seedbed, and cultivating; (5) controlling weeds, diseases, and insects; (6) maintaining fertility and the pH content at an optimum level; (7) ap-

plying the trace elements, such as zinc, cobalt, manganese, and copper, if they are needed; (8) selecting high-yielding crop varieties suited to the soil; and (9) planting, cultivating, and harvesting at the proper time and in the proper way.

In an improved level of management the farmer uses some, but not all, of the practices listed under intensive management, or the practices used are not adequate for the crop. This is the management ordinarily followed by most farmers in the county.

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

[Yields in columns A are to be expected under an improved level of management; those in columns B, under an intensive level of management. Absence of yield indicates that crop is not commonly grown at that level of management, or that the soil is not suited to the crop specified]

Soil	Corn		Wheat		Oats		Hay		Rotation pasture	
	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Arkport fine sandy loam, 0 to 6 percent slopes	57	97	23	35	50	72	3.0	3.5	150	180
Arkport fine sandy loam, 6 to 12 percent slopes	56	95	23	35	48	70	3.0	3.5	150	180
Arkport fine sandy loam, 12 to 18 percent slopes	53	93	23	35	46	68	3.0	3.5	150	180
Bogart loam, 0 to 2 percent slopes	64	104	25	38	53	75	3.0	4.5	150	230
Bogart loam, 2 to 6 percent slopes	64	104	25	38	53	75	3.0	4.5	150	230
Bogart silt loam, 0 to 2 percent slopes	65	105	25	39	55	76	3.0	4.5	150	230
Bogart silt loam, 2 to 6 percent slopes	65	105	25	39	55	76	3.0	4.5	150	230
Bogart silt loam, 6 to 12 percent slopes	65	105	25	39	55	76	3.0	4.5	150	230
Brooke silty clay loam, 4 to 12 percent slopes, moderately eroded	70	105	26	41	50	63	3.0	4.5	150	230
Brooke silty clay loam, 12 to 25 percent slopes, moderately eroded	68	100	24	40	49	62	3.0	4.5	150	230
Canadice silt loam	43	81	18	28	36	60	1.5	3.0	80	150
Canfield silt loam, 0 to 2 percent slopes	71	105	26	40	60	76	3.0	4.0	150	200
Canfield silt loam, 2 to 6 percent slopes	71	105	26	40	60	76	3.0	4.0	150	200
Canfield silt loam, 6 to 12 percent slopes	70	103	25	39	58	74	3.0	4.0	150	200
Canfield silt loam, 6 to 12 percent slopes, moderately eroded	64	101	23	37	55	70	3.0	4.0	150	200
Canfield silt loam, 12 to 18 percent slopes	67	105	23	37	56	72	3.0	4.0	150	200
Canfield silt loam, 12 to 18 percent slopes, moderately eroded	60	93	21	35	53	68	3.0	4.0	150	200
Canfield silt loam, moderately shallow variant, 2 to 6 percent slopes	69	105	24	38	58	74	3.0	4.0	150	200
Canfield silt loam, moderately shallow variant, 6 to 12 percent slopes	68	94	22	37	56	72	3.0	4.0	150	200
Carlisle muck	85	130	--	--	--	--	--	--	---	---
Chagrin loam, alkaline phase	77	110	26	42	50	74	2.5	4.5	130	230
Chagrin silt loam, alkaline phase	77	115	26	42	50	74	2.5	4.5	130	230
Chili loam, 0 to 2 percent slopes	62	102	25	37	55	74	3.0	4.5	150	230
Chili loam, 2 to 6 percent slopes	62	102	25	37	55	74	3.0	4.5	150	230
Chili gravelly loam, 6 to 12 percent slopes	60	100	24	36	51	68	3.0	4.5	150	230
Chili gravelly loam, 6 to 12 percent slopes, moderately eroded	53	90	22	34	48	66	3.0	4.5	150	230
Chili gravelly loam, 12 to 18 percent slopes, moderately eroded	52	89	21	33	46	64	3.0	4.5	150	230
Chili gravelly loam, 18 to 25 percent slopes, moderately eroded	--	---	--	--	--	--	3.0	4.5	150	230
Chili silt loam, 0 to 2 percent slopes	65	105	26	38	57	76	3.0	4.5	150	230
Chili silt loam, 2 to 6 percent slopes	65	105	26	38	57	76	3.0	4.5	150	230
Chili silt loam, 6 to 12 percent slopes	63	103	25	37	55	72	3.0	4.5	150	230
Chili silt loam, 6 to 12 percent slopes, moderately eroded	57	95	23	35	52	70	3.0	4.5	150	230
Chili and Conotton gravelly loams, 25 to 50 percent slopes, moderately eroded	--	---	--	--	--	--	2.5	4.0	130	200
Conotton loam, 0 to 2 percent slopes	57	97	23	35	50	72	3.0	3.5	150	180
Conotton gravelly loam, 2 to 6 percent slopes	52	90	21	33	45	67	3.0	3.5	150	180
Conotton gravelly loam, 6 to 12 percent slopes	52	90	21	33	45	67	3.0	3.5	150	180
Conotton gravelly loam, 12 to 18 percent slopes, moderately eroded	--	---	--	--	--	--	3.0	3.5	150	180
Conotton gravelly loam, 18 to 25 percent slopes, moderately eroded	--	---	--	--	--	--	2.5	3.0	130	150
Dekalb sandy loam, 2 to 6 percent slopes	60	90	15	35	46	60	2.5	3.0	130	150

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

Soil	Corn		Wheat		Oats		Hay		Rotation pasture	
	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Dekalb sandy loam, 6 to 12 percent slopes	60	90	15	35	46	60	2.5	3.0	130	150
Dekalb sandy loam, 12 to 25 percent slopes, moderately eroded	56	85	15	33	44	56	2.5	3.0	130	150
Dekalb sandy loam, 25 to 50 percent slopes, moderately eroded	--	---	--	--	--	--	--	--	100	150
Edwards muck	85	135	--	--	--	--	--	--	---	---
Fitchville silt loam, 0 to 2 percent slopes	60	105	22	36	46	74	2.5	4.0	130	200
Fitchville silt loam, 2 to 6 percent slopes	60	105	22	36	46	74	2.5	4.0	130	200
Fitchville silt loam, 6 to 12 percent slopes	59	100	22	36	46	74	2.5	4.0	130	200
Geeburg silt loam, 6 to 12 percent slopes, moderately eroded	45	65	20	31	40	62	2.0	3.0	100	150
Geeburg silt loam, 12 to 25 percent slopes, moderately eroded	--	---	--	--	--	--	2.0	3.0	200	250
Gilpin silt loam, 2 to 6 percent slopes	68	105	20	40	50	65	2.5	4.5	130	230
Gilpin silt loam, 6 to 12 percent slopes	66	103	20	40	48	65	2.5	4.5	130	230
Gilpin silt loam, 12 to 18 percent slopes	64	101	19	38	47	63	2.5	4.5	130	230
Ginat silt loam	60	83	20	30	40	62	2.0	3.0	100	150
Glenford silt loam, 0 to 2 percent slopes	66	105	24	40	50	76	3.0	4.0	150	200
Glenford silt loam, 2 to 6 percent slopes	66	105	24	40	50	76	3.0	4.0	150	200
Glenford silt loam, 6 to 12 percent slopes	66	105	24	40	50	76	3.0	4.0	150	200
Glenford silt loam, 6 to 12 percent slopes, moderately eroded	64	102	22	37	47	73	3.0	4.0	150	200
Glenford silt loam, 12 to 18 percent slopes, moderately eroded	63	100	21	36	45	70	3.0	4.0	150	200
Keene silt loam, 2 to 6 percent slopes	63	95	21	37	53	63	2.0	3.5	100	180
Keene silt loam, 6 to 12 percent slopes	63	95	21	37	53	63	2.0	3.5	100	180
Keene silt loam, 6 to 12 percent slopes, moderately eroded	60	93	20	36	50	60	2.0	3.5	100	180
Keene silt loam, 12 to 18 percent slopes	62	94	20	36	50	60	2.0	3.5	100	180
Keene silt loam, 12 to 18 percent slopes, moderately eroded	58	90	19	34	48	58	2.0	3.5	100	180
Keene silt loam, 18 to 25 percent slopes	--	---	--	--	--	--	2.0	3.5	100	180
Killbuck silt loam	70	125	24	42	46	70	2.0	3.5	100	180
Latham silt loam, 2 to 6 percent slopes	57	95	22	36	40	50	2.0	3.0	100	180
Latham silt loam, 6 to 12 percent slopes	57	95	22	36	40	50	2.0	3.5	100	180
Latham silt loam, 6 to 12 percent slopes, moderately eroded	55	90	21	35	38	48	2.0	3.5	100	180
Latham silt loam, 12 to 18 percent slopes	--	---	--	--	--	--	2.0	3.5	100	180
Latham silt loam, 12 to 18 percent slopes, moderately eroded	--	---	--	--	--	--	2.0	3.5	100	180
Latham silt loam, 18 to 35 percent slopes	--	---	--	--	--	--	2.0	3.5	100	180
Licking silt loam, 0 to 2 percent slopes	60	93	22	36	48	70	2.5	3.5	130	180
Licking silt loam, 2 to 6 percent slopes	60	93	22	36	48	70	2.5	3.5	130	180
Licking silt loam, 6 to 12 percent slopes	60	93	22	36	48	70	2.5	3.5	130	180
Licking silt loam, 6 to 12 percent slopes, moderately eroded	57	90	21	35	46	66	2.5	3.5	130	180
Licking silt loam, 12 to 25 percent slopes, moderately eroded	--	---	--	--	--	--	2.5	3.5	130	180
Linwood muck	83	130	--	--	--	--	--	--	---	---
Lobdell silt loam, alkaline phase	80	120	26	40	50	74	2.5	4.5	130	230
Loudonville silt loam, 2 to 6 percent slopes	68	95	24	42	53	72	3.0	4.0	150	200
Loudonville silt loam, 6 to 12 percent slopes	68	95	24	42	53	72	3.0	4.0	150	200
Loudonville silt loam, 6 to 12 percent slopes, moderately eroded	65	90	22	40	46	68	3.0	4.0	150	200
Loudonville silt loam, 12 to 18 percent slopes	68	85	24	40	48	70	3.0	4.0	150	200
Loudonville silt loam, 12 to 18 percent slopes, moderately eroded	63	85	22	38	45	66	3.0	4.0	150	200
Loudonville silt loam, 18 to 25 percent slopes, moderately eroded	62	80	20	36	43	64	3.0	4.0	150	200
Loudonville silt loam, 25 to 35 percent slopes, moderately eroded	--	---	--	--	--	--	2.5	3.5	130	180
Luray silt loam	80	120	22	44	50	74	3.5	4.5	180	230
Luray silt loam, gravelly subsoil variant	80	120	22	50	53	88	3.5	5.0	180	250
Mentor silt loam, 0 to 2 percent slopes	75	120	24	38	50	76	3.0	4.0	150	200
Mentor silt loam, 2 to 6 percent slopes	75	120	24	38	50	76	3.0	4.0	150	200
Mentor silt loam, 6 to 12 percent slopes	73	115	24	38	50	76	3.0	4.0	150	200
Mentor silt loam, 12 to 18 percent slopes	70	112	23	37	49	75	3.0	4.0	150	200
Montgomery silty clay loam	80	120	24	40	55	70	3.5	4.5	180	230

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

Soil	Corn		Wheat		Oats		Hay		Rotation pasture	
	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Muskingum silt loam, 2 to 6 percent slopes	65	95	18	38	46	60	2.5	4.0	130	200
Muskingum silt loam, 6 to 12 percent slopes	64	95	18	38	46	60	2.5	4.0	130	200
Muskingum silt loam, 12 to 18 percent slopes	62	90	18	38	44	60	2.5	4.0	130	200
Muskingum and Gilpin silt loams, 18 to 25 percent slopes	58	90	18	37	44	60	2.5	4.0	130	200
Muskingum and Gilpin silt loams, 18 to 25 percent slopes, severely eroded	--	---	--	--	--	--	2.0	3.5	100	180
Muskingum and Gilpin silt loams, 25 to 35 percent slopes	--	---	--	--	--	--	2.5	4.0	130	200
Muskingum and Gilpin silt loams, 35 to 50 percent slopes	--	---	--	--	--	--	2.5	4.0	130	200
Plainfield loamy sand, 0 to 6 percent slopes	50	80	24	34	46	68	2.0	3.5	100	180
Plainfield loamy sand, 6 to 12 percent slopes	50	80	24	34	46	68	2.0	3.5	100	180
Rainsboro silt loam, 2 to 6 percent slopes	90	110	22	38	50	70	3.0	3.5	150	180
Rainsboro silt loam, 6 to 12 percent slopes	88	108	22	38	50	70	3.0	3.5	150	180
Ramsey channery sandy loam, 6 to 12 percent slopes	50	70	15	30	40	50	2.0	3.0	100	150
Ramsey channery sandy loam, 12 to 18 percent slopes	50	70	15	30	40	50	2.0	3.0	100	150
Ramsey channery sandy loam, 18 to 25 percent slopes, moderately eroded	45	65	14	28	38	48	2.0	3.0	100	150
Ramsey channery sandy loam, 25 to 50 percent slopes, moderately eroded	--	---	--	--	--	--	--	--	100	150
Ravenna silt loam, 0 to 2 percent slopes	70	95	24	36	50	74	2.5	3.5	130	180
Ravenna silt loam, 2 to 6 percent slopes	70	100	24	36	50	74	2.5	3.5	130	180
Remsen silt loam, 0 to 2 percent slopes	42	95	18	30	38	62	2.0	3.0	100	150
Remsen silt loam, 2 to 6 percent slopes	45	95	20	30	40	62	2.0	3.0	100	150
Rittman silt loam, 2 to 6 percent slopes	60	90	22	38	50	70	2.5	3.5	130	180
Rittman silt loam, 6 to 12 percent slopes	60	90	22	38	50	70	2.5	3.5	130	180
Rittman silt loam, 6 to 12 percent slopes, moderately eroded	55	80	20	36	45	65	2.5	3.5	130	180
Rittman silt loam, 12 to 18 percent slopes, moderately eroded	--	---	--	--	--	--	2.5	3.5	130	180
Sebring silt loam	60	95	22	30	40	68	2.0	3.5	100	180
Sebring silt loam, till substratum	55	90	20	30	35	65	2.0	3.5	100	180
Shoals silt loam	60	110	22	34	46	70	2.0	3.5	100	180
Sloan silt loam	65	120	24	44	46	74	2.5	4.5	130	230
Tilsit silt loam, 6 to 12 percent slopes	60	95	22	38	48	60	2.5	3.5	130	180
Tilsit silt loam, 12 to 18 percent slopes	58	92	21	36	46	58	2.5	3.5	130	180
Trumbull silt loam	45	80	18	28	36	60	1.5	2.5	80	130
Wadsworth silt loam, 0 to 2 percent slopes	48	92	19	30	44	64	2.0	3.5	100	180
Wadsworth silt loam, 2 to 6 percent slopes	50	95	20	32	46	66	2.0	3.5	100	180
Wadsworth silt loam, 6 to 12 percent slopes	48	92	19	30	44	64	2.0	3.5	100	180
Wadsworth silt loam, 6 to 12 percent slopes, moderately eroded	46	90	18	29	42	63	2.0	3.5	100	180
Wadsworth silt loam, moderately shallow variant, 2 to 6 percent slopes	50	95	20	32	46	66	2.0	3.5	100	180
Wallkill silt loam, clayey subsoil variant	80	120	36	42	56	74	3.5	4.5	180	230
Wayland silt loam	55	90	20	33	40	65	1.5	3.0	80	150
Weikert channery silt loam, 6 to 12 percent slopes	50	70	15	30	40	50	2.0	3.0	100	150
Weikert channery silt loam, 12 to 18 percent slopes	45	65	15	30	40	50	2.0	3.0	100	150
Weikert channery silt loam, 18 to 25 percent slopes, moderately eroded	40	60	15	30	38	48	2.0	3.0	100	150
Weikert channery silt loam, 25 to 50 percent slopes, moderately eroded	--	---	--	--	--	--	1.5	2.5	80	230
Weinbach silt loam, 0 to 2 percent slopes	65	115	22	38	46	70	2.5	4.0	130	200
Weinbach silt loam, 2 to 6 percent slopes	65	115	22	38	46	70	2.5	4.0	130	200
Wellston silt loam, 2 to 6 percent slopes	65	105	22	44	50	62	3.0	4.5	150	230
Wellston silt loam, 6 to 12 percent slopes	65	105	22	44	50	62	3.0	4.5	150	230
Wheeling loam, 0 to 2 percent slopes	70	120	28	40	50	76	3.0	4.0	150	200
Wheeling loam, 2 to 6 percent slopes	70	120	28	40	50	76	3.0	4.0	150	200
Wheeling loam, 6 to 12 percent slopes, moderately eroded	65	110	26	38	48	74	3.0	4.0	150	200
Wheeling silt loam, 0 to 2 percent slopes	70	120	28	40	50	76	3.0	4.0	150	200

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

Soil	Corn		Wheat		Oats		Hay		Rotation pasture	
	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Wheeling silt loam, 2 to 6 percent slopes	70	120	28	40	50	76	3.0	4.0	150	200
Wheeling silt loam, 6 to 12 percent slopes	70	120	28	40	50	76	3.0	4.0	150	200
Wheeling silt loam, 6 to 12 percent slopes, moderately eroded	65	110	26	38	48	74	3.0	4.0	150	200
Wheeling soils, 12 to 18 percent slopes, moderately eroded	64	108	26	38	48	74	3.0	4.0	150	200
Willette muck	80	125	--	--	--	--	--	--	---	---
Wooster silt loam, 2 to 6 percent slopes	75	100	30	48	53	85	3.0	4.0	150	200
Wooster silt loam, 6 to 12 percent slopes	75	100	30	48	53	85	3.0	4.0	150	200
Wooster silt loam, 6 to 12 percent slopes, moderately eroded	71	105	26	44	50	78	3.0	4.0	150	200
Wooster silt loam, 12 to 18 percent slopes, moderately eroded	70	100	25	43	49	76	3.0	4.0	150	200
Wooster silt loam, 18 to 25 percent slopes, moderately eroded	--	---	--	--	--	--	2.5	4.0	130	200
Wooster silt loam, 25 to 50 percent slopes, moderately eroded	--	---	--	--	--	--	2.5	4.0	130	200

[1] Cow-acre-days is a term used to express the carrying capacity of the pasture. It is the number of animal units carried per acre multiplied by the number of days the pasture is grazed during a single grazing season without injury to the sod. An acre of pasture that provides 30 days of grazing for two cows has a carrying capacity of 60 cow-acre-days.

The yields given in table 1 do not apply to a specific field for any particular year because the soils vary from place to place, management practices vary from farm to farm, and weather conditions are variable from year to year. These yields are intended only as a general guide that shows the relative productivity of the soils, the response of soils to management, and the relationship of soils to each other. Although the general level of crop yields may change as new methods and new crop varieties are developed, the relative reponse of the different soils is not likely to change much.

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

Special crops

Special crops grown for commercial use in Stark County include vegetables, small fruits, tree fruits, and nursery plants. Radishes, onions, and lettuce are grown in the large mucky areas east of Hartville. Smaller areas throughout the county are used for celery, sweet corn, tomatoes, peppers, melons, strawberries, raspberries, and other vegetables and small fruits. Apples and peaches are the more important tree fruits grown in the county.

In this county the soils in capability units I-1, IIe-1, IIe-3, and IIs-1 are especially well suited to vegetables and small fruits. They have good natural drainage, warm up early in spring and, if moisture is favorable throughout the growing season. crops grown on them can generally be harvested earlier than crops on the other soils. Managing and harvesting special crops on these soils are difficult in some local areas because slopes and soil patterns are complex. If the muck soils in capability unit IIIw-5 are adequately drained, they are suited to radishes, onions, lettuce, and other vegetable crops.

Many of the well-drained soils in the county have properties that make them suitable for orchards and nursery plants. Soils that are frequently subject to frost, however, should not be used for early vegetables, small fruits, and orchards.

Suggestions for growing special crops are not given in this survey, but the latest and more complete information can be obtained from a representative of the Ohio Agricultural Extension Service and the Soil Conservation Service.

Irrigation

In Stark County irrigation is increasing in importance, particularly for the production of crops of high value and of turf of high quality. Some of the soils in the county are well suited to irrigation, but others are very poorly suited. Soil features that affect the suitability of individual soils for irrigation are given in table 6 in the section "Engineering Uses of Soils."

For a soil to be suitable for irrigation, the surface layer should be porous, or able to absorb water readily, the soil should have a good water-holding capacity, and the water and air in the subsoil or underlying material should be able to move freely to prevent waterlogging.

The well-drained soils on outwash plains and terraces such as the Chili, Mentor, and Wheeling soils that have slopes of less than 6 percent are well suited to sprinkler irrigation where vegetables are grown. The Chili soils dry out quickly and warm up early in spring, but they have limited available moisture capacity and are likely to have insufficient moisture dur-

ing the growing season unless they are irrigated frequently. The Wooster, Wellston, and other well-drained soils on uplands are suitable for irrigation. The Chagrin, Lobdell, and other well drained and moderately well drained soils on first bottoms are well suited to irrigation if crops on them are not damaged by flooding.

The deep, well-drained soils that are excellent for orchards have few limitations that affect use for irrigated crops (fig. 7). If the sloping soils are irrigated, however, the rate of water application must be regulated for the control of runoff and erosion. Developing a dependable supply of water for irrigation is a serious concern in some areas.

Crop yields on nearly all soils in Stark County can be improved by supplemental irrigation in dry periods during the growing season. Soil characteristics should be studied carefully before an irrigation system is installed. In addition, a qualified engineer should carefully evaluate the water supply, the crop or crops to be irrigated, the cost of equipment, and the economy of the operation. Additional information on irrigation is available from local representatives of the Agricultural Extension Service and the Soil Conservation Service.

Woodland

The original forest in Stark County has been cut, and most of the acreage has been cleared for farming. According to the 1966–67 Conservation Needs Inventory, woodland occupied about 67,120 acres, or about 18 percent of the total land area of the county. Woodland is in the largest tracts in the southern part of the county, but much of it is scattered throughout the county in small woodlots. Many of the existing stands of trees are similar to the original forest, which con-

Figure 7.—An apple orchard on Muskingum and Gilpin silt loams.

sisted mainly of beech, maple, hickory, and oak. Beech and maple were dominant in the northeastern one-third of the county.

The wooded acreage in this county is slowly increasing as more farmland in the southern part is abandoned and reverts to forest, and as other areas throughout the county are replanted to trees. Each year, however, some woodland is lost to community development and, in the southern half of the county, to strip mining.

In most areas that are reverting naturally to woodland, the plant cover first is grasses. The grasses are followed by blackberry, thornapple, and finally mixed forest. This forest consists mainly of black cherry, red maple, hickory, elm, white ash, dogwood, sassafras, spicebush, blue beech, ironwood, and in some places, black locust. Eroded soils revert to woodland more slowly and to less desirable trees than do uneroded soils.

Generally, native and planted trees grow best on deep soils that have high available moisture capacity and north- and east-facing slopes that are protected from the wind and sun. Trees grow more poorly on soils having slopes that face south and west.

Black walnut grows best on the better drained, neutral soils on bottom lands. Yellow-poplar is most productive on the moderately moist, deep, better drained soils in coves and in other of the less exposed areas. Black cherry is most common in cutover areas of well-drained soils. Black locust grows well in eroded areas and on Strip mine spoil, but it is subject to damage by the locust borer.

Sugar maple and beech grow well on the moderately well drained and somewhat poorly drained soils that developed over glacial drift or that occur on north-facing slopes in the unglaciated part of the county. White oak, red oak, and black oak are dominant on the well-drained soils that have south- and west-facing slopes. White oak is dominant in many of the old stands. Hickory grows well on most of the better drained soils in the county.

White ash is common in second-growth stands on the moderately well drained and somewhat poorly drained soils on uplands in the glaciated part of the county. Sycamore and American elm are prominent on the somewhat poorly drained soils of the bottom lands. Blackgum, elm, red maple, pin oak, and swamp white oak are the main trees on the poorly drained soils in all areas.

Woodland suitability groups

Some of the soils in Stark County have been grouped according to those characteristics that affect the growth of trees and management of the stand. Each group is made up of soils that are similar in potential productivity for trees, that have about the same suitability for trees, and that require about the same management.

Listed in table 2 are the 19 woodland suitability groups into which most of the soils of the county have been placed. The soils in each group are designated by their map symbols. Because trees suitable for commercial use do not grow on them, Alluvial land, Alluvial land-Urban land complex, Borrow pits, Made land, Quarries, Strip mine spoil, Carlisle muck, Edwards muck, Linwood muck, and Willette muck have not been placed in woodland groups. The woodland group assigned to any soil is listed in the "Guide to Mapping Units" at the back of this survey and at the end of the description of that soil in the section "Descriptions of the Soils."

TABLE 2.—*Woodland suitability groups, potential productivity, trees*

Woodland suitability group, series, and map symbols	Potential productivity [1]		Trees preferred—		
	Site index for upland oaks [2]	Mean annual growth per acre	In natural stands	For planting	For Christmas trees
		Bd. ft.			
Group 1o1 Bogart: BgA, BgB, BoA, BoB, BoC, Bu. Canfield: CdA, CdB, CdC, CdC2, CdD, CdD2, CeB, CeC, CfB, CfC. Chagrin: Ck, Cm. Chili: CnA, CnB, CoC, CoC2, CuB, CuC, CoD2, CpA, CpB, CpC, CpC2. Glenford: GfA, GfB, GfC, GfC2, GfD2. Lobdell: Le. Mentor: MeA, MeB, MeC, MeD. Rittman: RsB, RsC, RsC2, RsD2. Wooster: WuB, WuC, WuC2, WuD2, WvD.	85–95(19)	423	White oak, tulip-poplar, black walnut, black cherry, white oak, red oak, sugar maple.	White pine, Austrian pine, tulip-poplar, black walnut.	Scotch pine, Norway spruce, Douglas fir, white pine.
Group 1w1 Canadice: Ca. Fitchville: FcA, FcB, FcC, Fu. Ginat: Ge. Sebring: Sb, Se, Sg. Trumbull: Tr. Wadsworth: WaA, WaB, WaC, WaC2, WbB.	85–95(17)	423	Swamp white oak, red oak, pin oak, red maple, sycamore.	Northern white-cedar, cottonwood, sycamore.	Not suited
Group 1r1 Wooster: WuE2, WuF2.	85–95(69)	423	White oak, tulip-poplar, black walnut, black cherry, white ash, red oak, sugar maple.	White pine, Austrian pine, tulip-poplar.	Scotch pine, Norway spruce, white pine, Douglas fir.
Group 2o1 Loudonville: LoB, LoC, LoC2, LoD, LoD2, LuB, LuC. Wellston: WlB, WlC. Wheeling: WmA, WmB, WmC2, WrA, WrB, WrC, WrC2, WsD2	76–85(32)	341	White oak, tulip-poplar, red oak, black cherry, black walnut.	White pine, black walnut, tulip-poplar.	Scotch pine, Norway spruce, Douglas fir, white pine.
Group 2w1 Killbuck: Kk. Luray: Ly, Lz. Montgomery: Mg. Sloan: Sl. Wallkill: Wc. Wayland: Wd.	76–85(2)	341	Swamp white oak, red oak, red maple, sycamore, pin oak.	Northern white-cedar, cottonwood, sycamore.	Not suited
Group 2w2 Ravenna: ReA, ReB, Rn. Remsen: RoA, RoB, Rr. Shoals: Sh. Weinbach: WhA, WhB, Wk.	76–85(2)	341	Swamp white oak, red oak, red maple, sycamore.	Northern white-cedar, cottonwood, sycamore.	Not suited
Group 2c1 Geeburg: GbC2, GbE2. Licking: LcA, LcB, LcC, LcC2, LcE2.	[3] 76–85	341	Red oak, white oak, tulip-poplar, white ash, black cherry.	White pine, tulip-poplar, Norway spruce.	Scotch pine, white pine, Austrian pine.
Group 2s1 Arkport: ArB, ArC, ArD. Plainfield: PlB, PlC.	76–85(1)	341	White pine, red oak, white oak, black oak, sugar maple, black cherry.	White pine, red pine	Not suited

preferred, and hazards and limitations that affect management

Erosion hazard	Equipment limitations	Seedling mortality	Plant competition for—		Windthrow hazard	Remarks
			Conifers	Hardwoods		
Slight	Slight	Slight	Severe	Moderate	Slight	Canfield and Rittman soils have a fragipan. Chagrin and Lobdell soils are subject to occasional flooding.
Slight	Severe for Ca, FcA, FcB, FcC, Fu, Ge, Sb, Se, Sg, and Tr. Moderate for WaA, WaB, WaC, WaC2, and WbB.	Severe for Ca, FcA, FcB, FcC, Fu, Ge, Sb, Se, Sg, and Tr. Moderate for WaA, WaB, WaC, WaC2, and WbB.	Severe	Severe	Moderate	Soils are subject to ponding; wet late in spring.
Moderate for WuE2. Moderate to severe for WuF2.	Moderate for WuE2. Moderate to severe for WuF2.	Slight	Moderate	Slight	Slight	
Slight	Slight	Slight	Severe	Moderate	Slight	
Slight	Severe	Severe	Severe	Severe	Severe	Soils are soft and wet for long periods. Occasional flooding in most areas.
Slight	Moderate	Slight	Severe	Severe	Slight	Ravenna soils have a fragipan. Shoal soils are subject to flooding.
Moderate for GbC2, LcA, LcB, LcC, LcC2, and LcE2. Severe for GbE2.	Moderate for GbC2, LcA, LcB, LcC, LcC2, and LcE2. Severe for GbE2.	Moderate	Severe	Moderate	Slight	
Slight	Slight	Moderate	Severe	Severe	Slight	Sandy soils that have low available moisture capacity.

TABLE 2.—*Woodland suitability groups, potential productivity, trees*

Woodland suitability group, series, and map symbols	Potential productivity [1]		Trees preferred—		
	Site index for upland oaks [2]	Mean annual growth per acre	In natural stands	For planting	For Christmas trees
		Bd. ft.			
Group 2r1 Chili: CoE2. Dekalb: DkE2, DkF2 (on north- and east-facing slopes). Loudonville: LoE2, LoF2. Muskingum: MvE, MvE3, MvF, MvG, MwF (on north- and east-facing slopes).	76–85 (48)	341	Red oak, white oak, tulip-poplar, black walnut, Virginia pine, black cherry, sugar maple, white pine.	White pine, black walnut.	Scotch pine, Virginia pine.
Group 3w1 Keene: KeB. Rainsboro: RaB, RaC.	66–75 (9)	265	Red oak, tulip-poplar, black oak, white oak.	White pine, Virginia pine, tulip-poplar.	Not suited
Group 3w2 Keene: KeC, KeC2, KeD, KeD2, KeE. Tilsit: TlC, TlD.	66–75 (9)	265	Red oak, tulip-poplar, black oak, white oak.	White pine, Virginia pine, tulip-poplar.	Not suited
Group 3r1 Dekalb: DkE2, DkF2 (on south- and west-facing slopes). Muskingum: MvE, MvE3, MvF, MvG, MwF (on south- and west-facing slopes).	66–75 (56)	265	Tulip-poplar, red oak, white oak, black cherry, sugar maple, black walnut.	Virginia pine	Not suited
Group 3o1 Dekalb: DkB, DkC. Gilpin: GdB, GdC, GdD. Muskingum: MsB, MsC, MsD.	66–75 (63)	265	Tulip-poplar, red oak, white oak, black cherry, sugar maple.	Tulip-poplar, white pine.	White pine, scotch pine, Austrian pine.
Group 3c1 Brooke: BwC2. Brooke: BwE2 (on north- and east-facing slopes). Latham: LaB, LaC, LaC2, LaD, LaD2. Latham: LaF (on north- and east-facing slopes).	66–75 (24)	265	Red oak, tulip-poplar, white ash, white oak.	White pine, tulip-poplar, black oak.	Not suited
Group 3f1 Chili: CvF2, CuF. Conotton: CwA, CyB, CyC, CyD2, CyE2.	66–75 (1)	265	Red oak, tulip-poplar, white oak, black cherry.	White pine, red oak, Norway spruce.	Not suited
Group 4c1 Brooke: BwE2 (on south- and west-facing slopes). Latham: LaF (on south- and west-facing slopes).	56–65 (5)	196	Red oak, tulip-poplar, black walnut, white ash, white oak.	White pine, black locust.	Not suited
Group 4d1 Ramsey: RcC, RcD, RcE2 (on north- and east-facing slopes). Weikert: WeC. Weikert: WeD, WeE2 (on north- and east-facing slopes).	56–65 (2)	196	Chestnut oak, black oak, Virginia pine.	White pine, Virginia pine.	Not suited

preferred, and hazards and limitations that affect management—Continued

Erosion hazard	Equipment limitations	Seedling mortality	Plant competition for—		Windthrow hazard	Remarks
			Conifers	Hardwoods		
Moderate	Moderate for CoE2, DkE2, LoE2, LoF2, MvE, MvE3, and MvF. Severe for DkF2, MvG, and MwF.	Slight	Severe	Moderate	Slight	
Slight	Moderate	Slight	Moderate to severe.	Slight	Slight	
Moderate to severe.	Moderate	Slight	Moderate to severe.	Slight to moderate.	Slight	
Moderate	Moderate to severe.	Slight to moderate.	Moderate	Slight	Slight	
Slight	Slight	Slight	Moderate	Slight	Slight	Soils are droughty.
Severe	Moderate for LaB, LaC, LaC2, LaD, LaD2, and LaF. Severe for BwC2 and BwE2.	Slight	Moderate for LaB, LaC, LaC2, LaD, LaD2, and LaF. Severe for BwC2 and BwE2.	Slight	Slight	Subsoil is clayey.
Slight for CwA, CyB, CyC, CyD2, and CyE2. Severe for CvF2 and CuF.	Slight for CwA, CyB, CyC, CyD2, and CyE2. Severe for CvF2 and CuF.	Moderate	Moderate	Slight	Slight	
Severe	Moderate to severe.	Severe	Severe	Moderate	Slight	
Slight	Slight to moderate.	Severe	Slight	Slight	Slight	

TABLE 2.—*Woodland suitability groups, potential productivity, trees*

Woodland suitability group, series, and map symbols	Potential productivity [1]		Trees preferred—		
	Site index for upland oaks [2]	Mean annual growth per acre	In natural stands	For planting	For Christmas trees
		Bd. ft.			
Group 4d2 Ramsey: RcF2 (on north- and east-facing slopes). Weikert: WeF2 (on north- and east-facing slopes).	56–65 (2)	196	Chestnut oak, black oak, Virginia pine.	White pine, Virginia pine.	Not suited
Group 5d1 Ramsey: RcC, RcD, RcE2, RcF2 (on south- and west-facing slopes). Weikert: WeD, WeE2, WeF2 (on south-and west-facing slopes).	46–55 (4)	131	Chestnut oak, black oak, Virginia pine.	White pine, Virginia pine.	Not suited

[1] Based on data in USDA Technical Bulletin No. 560 (*9*).
[2] Numbers in parentheses following site index are the number of plots on which studies were made of the growth rate. These studies were used to determine site index.

Each woodland group is identified by a three-part symbol, such as 1o1, 2w2, or 3r1. The first part of the symbol is a number that indicates relative potential productivity of the soils in the group; 1 means very high; 2, high; 3, moderately high; 4, moderate; and 5, low. These ratings are based on field determinations of average site indexes.

The second part of the symbol identifying a woodland group is a small letter. Except for the letter *o* this letter indicates an important soil property that imposes a moderate or severe hazard or limitation that affects managing the soils of the group for trees. The letter *o* shows that the soils have few limitations that restrict their use for trees. The letter *c* indicates that the main limitation is the kind or amount of clay in the upper part of the soils in the group; *d* means that rooting depth is restricted because the soils are shallow to a hardpan, to hard rock, or to some other restrictive material; *f* denotes that the main limitation is large amounts of fragments in the soil that are more than 2 millimeters but less than 10 inches in size; *r* shows that the main limitation is steep slopes; *s* indicates that the soils are sandy and dry, have little or no difference in texture between surface layer and subsoil, have low moisture holding capacity, and generally have a low supply of plant nutrients; *t* denotes that the soils are excessively alkaline, excessively acid, or contain sodium salts or other toxic substances in amounts that limit or impede tree growth; *w* means that water in or on the soil, either seasonally or year round, is the chief limitation; and *x* shows that stones or rocks in and on the soils are the chief limiting factor.

The last part of the symbol, another number, merely differentiates one woodland suitability group from others that have identical first and second parts in their identifying symbol. For example, the last number in the symbol *1o1* differentiates the woodland suitability group bearing the last number from all other groups having *1o* as the first two parts of their identifying symbol.

Given for each woodland group listed in table 2 are potential productivity, expressed as site index and as annual growth; the trees generally preferred in management of the existing stands, for planting, and for Christmas trees; and some hazards and limitations that affect management. The terms used in table 2 are explained in the following paragraphs.

In table 2 potential productivity is expressed as site index and as mean annual growth. A site index for a given soil is the height, in feet, that a tree growing on that soil will reach in 50 years. The site indexes and the mean annual growth for upland oaks given in table 2 were based on data from the USDA Technical Bulletin No. 560 (*9*).[3]

The site indexes are given as a range in table 2, for example, 85 to 95. They are based on data obtained by measuring the height and age of a number of trees growing on the same kind of soil. The mean annual growth, to 50 years of age expressed in board feet per acre, was calculated by site index, according to the ⅛ inch International rule to a top diameter of 5 inches, inside bark. The potential yield to 80 years of age can be estimated by using data given in table 28 in USDA Bulletin 560 (*9*).

Slope position, the direction toward which the slopes face, soil depth, and moisture content of a soil affect the productivity of a site for trees. If all other factors are favorable, sites on the lower slopes and those on slopes that face north or east generally are the most productive.

Listed in table 2 for each woodland suitability group are the trees that are preferred in managing the existing stands, trees preferred for planting, and trees

[3] Italicized numbers in parentheses refer to Literature Cited, p. 155.

preferred, and hazards and limitations that affect management—Continued

Erosion hazard	Equipment limitations	Seedling mortality	Plant competition for—		Windthrow hazard	Remarks
			Conifers	Hardwoods		
Moderate	Severe	Severe	Slight	Slight	Slight	
Slight for RcC, RcD, RcE2, WeD, and WeE2. Moderate for RcF2 and WeF2.	Moderate for RcC, RcD, RcE2, WeD, and WeE2. Severe for RcF2 and WeF2.	Slight for RcC, RcD, RcE2, WeD, and WeE2. Moderate for RcF2 and WeF2.	Slight	Slight	Slight	

[3] Site index was estimated for this woodland group.

preferred for Christmas trees. Trees preferred in existing stands and for planting are hardy, are long lived, provide shade for recreational use, and are suitable for wood crops. As trees in immature stands grow and become crowded, the preferred species, if of good quality, are favored over other trees when the stand is thinned. Not all species, notably species of broad-leaved trees, have been successfully transplanted. The conifers and broad-leaved trees listed as preferred for planting on the soils in a woodland suitability group are suited to those soils and have been successfully planted on them. Other species that are not listed in table 2 may be suited to the soils in the woodland suitability groups.

Specific information about planting trees and woodland management can be obtained from the local Soil Conservation Service representative or a farm forester.

On the soils of each woodland suitability group are varying degrees of hazards and limitations that affect management. These limitations and hazards are rated slight, moderate, or severe. The ratings are shown for each woodland group in table 2 and are explained in the following paragraphs.

Erosion hazard refers to the potential hazard of soil losses in managed woodland. The hazard is *slight* if no special practices are needed. It is *moderate* if some practices are needed to reduce the risk of erosion. The erosion hazard is *severe* if intensive practices, special equipment, and special methods of operation are needed to reduce soil losses. Generally, the risk of erosion is slight on slopes of 25 percent or less and is moderate or severe on slopes of more than 25 percent.

Equipment limitations are rated on the basis of soil characteristics and topographic features that restrict or prohibit the use of conventional equipment needed in woodland management. Considered in the ratings are slope, stoniness, rockiness, seasonal wetness, and stability of the soil. *Slight* means that there is no restriction in the kind of equipment or in the time of year it is used. A rating of *moderate* indicates that the use of conventional equipment is restricted by one or more unfavorable characteristics. A *severe* rating means that special equipment is needed, and its use is severely restricted by one or more unfavorable characteristics.

Seedling mortality refers to the expected losses of naturally occurring or planted seedlings that are a result of unfavorable soil characteristics or topographic features, but not a result of plant competition. Mortality is *slight* if less than 25 percent of the seedlings are expected to die and is *moderate* if this percentage is 25 to 50. It is *severe* if the loss of seedlings is more than 50 percent.

Plant competition is rated on the basis of the degree that weeds, grass, and brush are expected to compete with desirable trees when openings are made in the tree canopy. Competition tends to be greatest on soils that have poor drainage and those that have high fertility. A rating of *slight* indicates that competition from other plants does not interfere with natural regeneration or with the early growth of planted seedlings. Competition is *moderate* if competing plants delay but do not prevent the establishment and early growth of a normal fully stocked stand of desirable trees. It is *severe* if undesirable plants prevent adequate restocking of planted seedlings or natural regeneration, unless there is intensive site preparation and maintenance, including weeding.

Windthrow hazard is determined by the resistance of trees to the force of the wind. Soil characteristics that affect the normal development of tree roots include shallowness, stoniness, droughtiness, a restricting layer, and wetness. The hazard of windthrow is *slight* if no trees are expected to be blown down by a normal wind. It is *moderate* if some trees are expected to be blown down when the soil is excessively

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wet and the wind is strong. Windthrow is a *severe* hazard if many trees are expected to be blown down during periods of excessive soil wetness and a moderate or strong wind.

Use of Soils for Wildlife

Stark County is a part of the Appalachian Plateau. The northern two-thirds of the county is glaciated and is undulating and rolling; the southern part is unglaciated and is hilly and steep.

Wildlife is an important natural resource in the county. Ringneck pheasant, quail, squirrel, cottontail rabbit, and white-tailed deer are abundant. All of the soils in the county are suited as habitat for some kind of wildlife.

The survival and increase of any kind of wildlife species depend on the presence and distribution of water and of plants that provide food and cover. If any of these habitat elements is lacking or inadequate, desired wildlife will be absent or scarce. The kinds of wildlife that live in a given area and the number of each kind are closely related to land use, the resulting kinds and patterns of vegetation, and the kinds and distribution of water.

Most wildlife habitat is created or improved by planting suitable vegetation, manipulating existing vegetation so as to increase or improve desirable plants, or by a combination of these measures. For this management, a knowledge of the soils is needed so that the growth of plants suitable for wildlife can be estimated. Water areas also can be established or improved for wetland wildlife. Specific information about managing wildlife areas can be obtained from the local game protector, the county agent, or a representative of the Soil Conservation Service.

Elements of habitat and kinds of wildlife

In table 3 most of the soils of Stark County are rated for their suitability for eight elements of wildlife habitat and for three broad classes of wildlife. More detailed information about the rating system is given in a paper by Allan, Garland, and Dugan (*1*). Not rated in table 3 are the land types and the 16 complexes that include Urban land.

The information given in table 3 is useful in (1) broadly planning for wildlife habitat in parks, in public and private refuges, and in private and commercial shooting preserves; (2) selecting soils that are most suitable as sites for creating, improving, or maintaining a specific kind of element of wildlife habitat; (3) determining the intensity of management needed for a specific habitat element; (4) eliminating sites that are difficult or are not feasible to manage for specific kinds of wildlife; and (5) determining areas that are suitable for acquiring and developing as wildlife habitat.

The numerical ratings used in table 3 are 1 for well suited, 2 for suited, 3 for poorly suited, and 4 for unsuited. A soil is *well suited* to an element of wildlife habitat if there are few limitations to use; it is *suited* if there are moderate limitations to use; and it is *poorly suited* if there are severe limitations to use. Not considered in the ratings given in table 3 are the present land use, the location of a soil in relation to other soils, and the mobility of wildlife.

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

[Not rated are Alluvial land, Borrow pits, Cut and fill land, Gravel pits, Made land, Quarries, Strip mine spoil, Urban land, and the 16 complexes that include Urban land]

Soil series and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Arkport:											
ArB, ArC, ArD	3	2	2	3	1	5	5	5	2	3	4
Bogart:											
BgA, BoA	2	1	1	1–2	3	3	3	3	1	1–2	3
BgB, BoB, BoC	2	1	1	1–2	3	3	[1]4	[1]4	1	1–2	[1]4
Brooke:											
BwC2	2	2	2	2	3	4	4	4	2	3	4
BwE2	3	2	2	2	3	4	4	4	2	3	4
Canadice:											
Ca	3	3	2	2	2	1	1	1	3	2	1
Canfield:											
CdA	2	1	1	1–2	3	3	3	3	1	1–2	3
CdB, CdC, CdC2, CdD, dC2	2	1	1	1–2	3	4	4	4	1	1–2	4
CdD, CdD2	3	2	1	1–2	3	4	4	4	2	2	4
Carlisle:											
Ch	4	3	4	4	1	1	1	1	4	4	1

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

Soil series and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Chagrin:											
Ck, Cm	2	1	1	1	3	4	4	4	1	1	4
Chili:											
CnA, CpA, CnB, CpB, CoC, CpC, CpC2, CoC2	2	2	1–2	2	1	4	4	4	1–2	2	4
CoD2, CoE2	3	2	2	3	1	4	4	4	2	3	4
CvF2	4	3	2	3	1	4	4	4	3	3	4
Conotton:											
CwA, CyB, CyC, CyD2, CyE2	3	3	2	3	1	4	4	4	3	3	4
Dekalb:											
DkB, DkC	3	2	2	2–3	1	4	4	4	2	2–3	4
DkE2	3	2	2	3	1	4	4	4	2	3	4
DkF2	4	3	3	3	1	4	4	4	4	4	4
Edwards:											
Ed	4	3	4	4	1	1	1	1	4	4	1
Fitchville:											
FcB, FcC	2	2	1	1	3	3	4	4	1	2	4
FcA	2	2	1	1	3	2	2	2	1	2	2
Geeburg:											
GbC2	2	2	2	2	2	4	4	4	1	2	4
GbE2	3	2	2	2	2	4	4	4	3	2	4
Gilpin:											
GdB, GdC	2	2	2	2–3	2	4	4	4	2	2	4
GdD	3	2	2	2–3	2	4	4	4	2	2–3	4
Ginat:											
Ge	4	3	3	1	1	1	1	1	3	1	1
Glenford:											
GfA	2	1	1	2	2	3	3	3	1	2	3
GfB, GfC, GfC2	2	1	1	2	2	[1]4	4	[1]4	1	2	[1]4
GfD2	3	2	1	2	2	4	4	4	2	2	4
Keene:											
KeB	2	2	2	2	2	4	4	4	1	1	4
KeC, KeC2	2	2	2	2	2	4	4	4	1	2	4
KeD, KeD2, KeE	3	2	2	2	2	4	4	4	2	2	4
Killbuck:											
Kk	4	3	3	1	1	1	2	4	3	1	2
Latham:											
LaB	2	2	2	2	2	4	4	4	1	1	4
LaC, LaC2	2	2	2	2	2	4	4	4	2	2	4
LaD, LaD2	3	2	2	2	2	4	4	4	2	2	4
LaF	4	2	2	2	2	4	4	4	3	2	4
Licking:											
LcA	2	1	2	1	3	2	2	2	2	3	2
LcB	2	2	2	2	2	4	4	4	1	1	4
LcC, LcC2	2	2	2	2	2	4	4	4	1	2	4
LcE2	3	2	2	1	2	4	4	4	3	2	4
Linwood:											
Ld	4	3	4	4	1	1	1	1	4	4	1
Lobdell:											
Le	2	1	1	1	3	3	3	3	1	1	3

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

Soil series and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Loudonville:											
LoB, LoC, LoC2	2	2	2	2	2	4	4	4	2	2	4
LoD, LoD2	3	2	2	2	2	4	4	4	2	2–3	4
LoE2	3	2	2	2	1–2	4	4	4	2	2	4
LoF2	4	3	3	2–3	1–2	4	4	4	3–4	2–3	4
Luray:											
Ly, Lz	4	3	3	1	1	1	1	1	3	1	1
Mentor:											
MeA	1	1	1	1	3	4	4	4	1	1	4
MeB, MeC	2	1	1	1	3	4	4	4	1	1	4
MeD	3	2	1	1	3	4	4	4	2	2	4
Montgomery:											
Mg	4	3	3	1	1	1	1	1	3	1	1
Muskingum:											
MsB, MsC	3	2	2	2–3	1	4	4	4	2	2	4
MvE, MvE3, MsD	3	2	2	3	1	4	4	4	2	3	4
MvF, MvG	4	3	3	3	1	4	4	4	4	4	4
Plainfield:											
PlB, PlC	3	2	2	3	1	4	4	4	2	3	4
Rainsboro:											
RaB, RaC	2	1	1	1	3	4	4	4	1	2	4
Ramsey:											
RcC, RcD, RcE2 RcF2	4	4	3	4	1	4	4	4	4	4	4
Ravenna:											
ReA	2	2	1	1	3	2	2	2	1	2	2
ReB	2	2	1	1	3	3	4	4	1	2	4
Remsen:											
RoA	2–3	2	2	1	2–3	2	2	2	2	1–2	2
RoB	2–3	2	2	1	2–3	3	[1]4	[1]4	2	1–2	4
Rittman:											
RsB, RsC, RsC2	2	1	1	1–2	3	4	4	4	1	1–2	4
RsD2	3	2	1	1–2	3	4	4	4	2	2	4
Sebring:											
Sb, Se	3	2	2	1	2	1	1	1	2	1	1
Shoals:											
Sh	2	2	1	1	3	2	2	3	1	2	2
Sloan:											
Sl	4	3	3	1	1	1	2	4	3	1	2
Tilsit:											
TlC	2	1	1	1–2	3	4	4	4	1	1–2	4
TlD	3	2	1	1–2	3	4	4	4	1	2	4
Trumbull:											
Tr	3	3	2	2	2	1	1	1	3	2	1
Wadsworth:											
WaA	2	2	1	1	2	2	2	2	1	1	2
WaB, WbB	2	2	1	1	2	3	[1]4	[1]4	1	1	4
WaC, WaC2	2	2	1	2	2	4	4	4	1	2	4
Wallkill:											
Wc	4	3	3	1	1	1	2	4	3	1	2

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

Soil series and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Wayland:											
Wd	3	2	2	1	2	2	2	4	2	1	2
Weikert:											
WeC	3	3	2	2	2	4	4	4	3	2	4
WeD, WeE2	4	3	2	2	2	4	4	4	3	2	4
WeF2	4	4	2	2	2	4	4	4	3	3	4
Weinbach:											
WhA	2	2	1	1	2	2	2	2	1	1	2
WhB	2	2	1	1	2	3	[1]4	[1]4	1	1	4
Wellston:											
WlB, WlC	2	1	1	2	2–3	4	4	4	1	2	4
Wheeling:											
WmA, WrA	1	1	1	1	3	4	4	4	1	1	4
WmB, WrB, WmC2, WrC, WrC2	2	1	1	1	3	4	4	4	1	1	4
	3	2	1	1	3	4	4	4	2	2	4
Willette:											
Wt	4	3	4	4	1	1	1	1	4	4	1
Wooster:											
WuB, WuC, WuC2	2	1	1	1	3	4	4	4	1	1	4
WuD2	3	2	1	1	3	4	4	4	2	2	4
WuE2, WuF2	4	2	1	1	3	4	4	4	2	2	4

[1] Rating is 3 on slopes of less than 4 percent.

The eight elements of wildlife habitat listed in table 3 are discussed in the following paragraphs.

Grain and seed crops.—These crops include corn, wheat, barley, oats, rye, buckwheat, and other seed-producing annuals used by wildlife. These crops can be grown each year on the soils rated *well suited* in table 3. Such soils are deep, nearly level or very gently sloping, medium textured, well drained, and free or nearly free of stones. They have high available moisture capacity and are not subject to frequent flooding. The soils that are not rated well suited require more intensive management than those rated well suited.

Grasses and legumes.—These plants are domestic grasses and legumes that are planted to furnish food and cover for wildlife. They include bluegrass, fescue, bromegrass, timothy, redtop, orchardgrass, reed canarygrass, clover, trefoil, and alfalfa. A rating of *well suited* means that adequate stands of these plants can be maintained for at least 10 years. Soils that are well suited to these plants have slopes of not more than 15 percent, are well drained or moderately well drained, and have moderately high or high available moisture capacity. Occasional floods and surface stones are not serious concerns, for these soils are seldom tilled.

Wild herbaceous upland plants.—These plants are perennial grasses and weeds that generally are established naturally. They include switchgrass, milkweed, daisy, goldenrod, strawberry, nightshade, and dandelion. The soils that are *well suited* to these plants vary widely in texture, drainage, and slope. If these soils are well drained to somewhat poorly drained, slope is not limiting. Stoniness and occasional flooding are not serious concerns.

Hardwood woody plants.—These plants are nonconiferous trees, shrubs, and woody vines that produce nuts, fruits, buds, catkins, twigs, or foliage that wildlife eat. They are generally established naturally, but they also may be planted. Among the native plants are oak, beech, cherry, maple, hickory, poplar, aspen, walnut, dogwood, roses, and briers. Soils that are *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 kinds of fruiting shrubs that are raised commercially for planting. They include autumn-olive, Amur honeysuckle, Tatarian honeysuckle, crabapple, multiflora rose, and dogwood. These shrubs generally are available and can be planted on soils that are rated *well suited* in table 3. Hardwoods that are not available commercially commonly can be transplanted successfully.

Coniferous woody plants.—These are cone-bearing evergreen trees and shrubs that are used by wildlife

primarily as cover, though they also provide food in the form of browse and seeds. Examples are Norway spruce, white pine, arborvitae, redcedar, and juniper. These trees and shrubs are established naturally in areas where the cover of weeds and sod is thin. In table 3 the soils are rated *well suited* if the trees and shrubs grow slowly and have delayed canopy closure. 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 die.

On soils rated *poorly suited* for coniferous woody plants, the widely spaced plants may grow quickly but temporarily, and establishment or maintenance is difficult because these soils are well suited to competing hardwoods. Unless the stand is carefully managed, hardwoods invade and commonly overtop the conifers.

Wetland food and cover plants.—In this group are wild, herbaceous annuals and perennials that grow on moist to wet sites. They include smartweed, wild millet, rush, bulrush, spikerush, burreed, wildrice, buttonbush, rice cutgrass, cattails, and various kinds of sedges. Soils that are rated *well suited* are nearly level and poorly drained or very poorly drained; those 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.—These are impoundments or excavations that provide areas of shallow water near food and cover for wetland wildlife. They are shallow dugouts, level ditches, blasted potholes, or devices that keep the water 6 to 24 inches deep in marshy areas. Soils that are rated *well suited* to this use have slopes of 0 to 1 percent, are more than 36 inches deep to bedrock, and are poorly drained or very poorly drained. Soils rated *suited* are nearly level and somewhat poorly drained. They may be only 20 to 36 inches deep to bedrock.

Excavated ponds.—These are dug-out areas or a combination of these and impoundments behind low dikes. The water is of suitable quality and depth to support fish or wildlife. If fish are produced, part of the pond should be at least 6 feet deep. The soils that are rated *well suited* for excavated ponds are nearly level, more than 72 inches deep, and poorly drained or very poorly drained. The degree of limitation to use of soils for excavated ponds increases with slope, and increasing slope reduces the size of pond that is feasible.

In table 3 the soils are also rated according to their suitability for three kinds of wildlife. The ratings are based on the ratings given to the elements of wildlife habitat shown in the first part of the table. For openland wildlife the ratings are based on the ratings given to grain and seed crops, grasses and legumes, wild herbaceous upland plants, hardwood woody plants, and coniferous woody plants. The ratings for woodland wildlife are based on those shown for all the elements except grain and seed crops. For wetland wildlife the ratings are based on those given to wetland food and cover plants, shallow water developments, and excavated ponds.

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

Openland wildlife.—Examples of openland wildlife are pheasant, quail, meadowlark, field sparrow, dove, cottontail rabbit, red fox, and woodchuck. These birds and mammals normally make their home on cropland, in pastures and meadows, on lawns, and in areas overgrown with grasses, herbs, and shrubs.

Woodland wildlife.—Among the birds and mammals that prefer woodland are ruffed grouse, woodcock, thrush, vireo, scarlet tanager, gray squirrel, fox squirrel, gray fox, white-tailed deer, raccoon, opossum, and woodpecker. They obtain food and cover in areas of hardwood trees and shrubs, coniferous trees and shrubs, or a mixture of these plants.

Wetland wildlife.—Duck, geese, rail, heron, shore birds, mink, and muskrat are examples of birds and mammals that normally make their home in and around ponds, marshes, swamps, and other wet areas.

Engineering Uses of Soils [4]

Much of the information in this section is useful to engineers and others whose work involves the use of soil mechanics or soil engineering data. Some properties of soils are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, water storage facilities, erosion control structures, drainage systems, and sewage disposal systems. Among the properties most important to the engineer are permeability to water, shear strength, compaction characteristics, soil drainage, shrink-swell potential, grain-size distribution, plasticity, and reaction. Depth to water table, depth to bedrock, slope, and available moisture capacity are also important.

The information in this survey can be used to—

1. Make soil and land use studies that will aid in selecting and developing sites for light industry, businesses, residences, and recreation.
2. Make preliminary estimates of the engineering properties of soils that help in planning farm drainage systems, farm ponds, irrigation systems, terraces and diversions, and waterways.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, and cables and in planning detailed investigations at the selected locations.
4. Locate probable sources of sand and gravel and other material suitable for construction.
5. Correlate performance of engineering structures with soil mapping units, and thus develop information that will be useful in designing and maintaining the structures.

[4] This section has been reviewed by LLOYD E. GILLOGLY, construction engineer, Soil Conservation Service, State Office, Columbus, Ohio.

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 from aerial photographs for the purpose of making maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

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

Much of the information in this section is given in tables 4, 5, and 6. Additional information useful to engineers can be found in other sections of this soil survey, particularly the sections "Descriptions of the Soils" and "Formation and Classification of Soils."

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

TABLE 4.—*Engineering test data for soil*

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

Soil and location	Parent material	Ohio report No. So—	Depth	Moisture density [1]		Mechanical analysis [2]	
				Maximum dry density	Optimum moisture	Percentage passing sieve—	
						3 in.	¾ in.
			Inches	*Lbs. per cu. ft.*	*Percent*		
Canfield silt loam:							
NW¼ of section 35 (Lawrence Township)	Glacial till (Wisconsin age).	8472	2–8	108	15	-------	100
		8473	20–50	115	14	100	96
		8474	84–120	122	12	-------	100
NW¼ of section 9 (Tuscarawas Township)	Glacial till (Wisconsin age).	8469	0–8	-------	-------	-------	100
		8470	25–30	-------	-------	-------	100
		8471	90–117	-------	-------	100	97
Chili silt loam:							
SE¼ of section 20 (Perry Township)	Glacial outwash on high terraces (Wisconsin age).	42045	0–9	106	15	-------	100
		42046	12–19	113	15	100	95
		42047	19–29	121	12	100	88
		42048	29–60	121	11	100	77
Fitchville silt loam:							
SW¼ of section 35 (Nimishillen Township)	Slack water deposits.	42049	0–9	97	19	-------	-------
		42050	20–32	100	19	-------	-------
		42051	40–52	103	19	-------	-------
Geeburg silt loam:							
NE¼NE¼ of section 2 (Lexington Township)	Glacial till (Wisconsin age).	81177	0–7	-------	-------	-------	-------
		81178	16–24	-------	-------	-------	-------
		81179	46–72	-------	-------	-------	-------
Luray silt loam:							
SW¼ of section 24 (Perry Township)	Slack water deposits.	42052	0–7	91	26	-------	-------
		42053	15–30	95	21	-------	100
		42054	38–60	112	15	-------	100
Sebring silt loam:							
SE¼NE¼ of section 16 (Washington Township)	Lacustrine sediments on slack water terraces (Wisconsin age).	79875	0–10	-------	-------	-------	-------
		79876	30–42	-------	-------	-------	-------
		79877	42–78	-------	-------	-------	-------
Sebring silt loam, till substratum:							
NE¼ of section 3 (Marlboro Township)	Glacial till (Wisconsin age).	79884	0–8	-------	-------	-------	-------
		79885	26–41	-------	-------	-------	-------
		79886	58–83	-------	-------	-------	100
Weinbach silt loam:							
SW¼SE¼ of section 28 (Lake Township)	Glacial outwash (Wisconsin valley train).	79881	0–8	-------	-------	-------	-------
		79882	19–30	-------	-------	-------	100
		79883	38–60	-------	-------	-------	100
Wheeling silt loam:							
SW¼SW¼ of section 16 (Jackson Township)	Glacial outwash (Wisconsin age).	42042	0–8	99	20	-------	-------
		42043	21–40	107	18	-------	-------
		42044	50–70	107	11	100	60
Wooster silt loam:							
SE¼NE¼ of section 36 (Lake Township)	Glacial till (early Wisconsin age).	79878	0–8	-------	-------	-------	-------
		79879	15–22	-------	-------	-------	100
		79880	39–51	-------	-------	-------	100

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

[2] Mechanical analyses according to AASHO Designation T 88 (*2*). Results obtained by this procedure may differ somewhat from results 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. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses data used in this table are not suitable for naming textural classes for soils.

samples taken from 11 soil profiles

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

Mechanical analysis [3]—Continued					Liquid Limit	Plasticity index	Classification		
Percentage passing sieve—Continued				Percentage smaller than—					
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.005 mm.			AASHO [3]	Unified [4]	Ohio [5]
92	86	81	68	26	[6] NP	NP	A–4(7)	ML	A–4a
91	80	76	64	30	30	8	A–4(6)	ML–CL	A–4a
86	78	71	54	22	23	5	A–4(4)	ML–CL	A–4a
97	95	92	85	32	NP	NP	A–4(8)	ML	A–4b
83	73	68	54	25	28	9	A–4(4)	CL	A–4a
86	78	71	51	22	23	4	A–4(3)	ML–CL	A–4a
90	84	79	70	23	NP	NP	A–4(7)	ML	A–4a
86	79	75	67	28	29	9	A–4(6)	CL	A–4a
73	64	40	14	12	NP	NP	A–1–b(0)	SM	A–1–b
56	48	26	7	0	NP	NP	A–1–a(0)	SW–SM	A–1–a
----------	100	96	89	35	NP	NP	A–4(8)	ML	A–4b
----------	----------	100	99	50	47	25	A–7–6(15)	CL	A–7–6
----------	100	99	98	47	45	23	A–7–6(14)	CL	A–7–6
----------	100	97	88	46	40	12	A–6(9)	ML	A–6a
----------	100	99	95	67	48	23	A–7–6(15)	CL	A–7–6
----------	100	99	96	61	40	20	A–6(12)	CL	A–6b
----------	100	99	95	47	43	15	A–7–6(11)	ML–CL	A–7–6
99	92	91	87	42	55	30	A–7–6(19)	CH	A–7–6
98	90	87	83	33	31	9	A–4(8)	ML–CL	A–4b
----------	100	99	95	47	39	11	A–6(8)	ML	A–6a
----------	100	98	91	54	42	16	A–7–6(11)	ML–CL	A–7–6
----------	100	98	96	58	44	16	A–7–6(11)	ML–CL	A–7–6
----------	100	96	81	21	33	7	A–4(8)	ML	A–4b
----------	100	98	92	54	46	22	A–7–6(14)	CL	A–7–6
93	85	77	57	29	24	7	A–4(4)	ML–CL	A–4a
----------	100	98	92	35	NP	NP	A–4(8)	ML	A–4b
----------	81	73	45	20	26	7	A–4(2)	SM–SC	A–4a
----------	57	36	20	11	NP	NP	A–1–b(0)	SM	A–1–b
----------	100	99	96	30	NP	NP	A–4(8)	ML	A–4b
----------	----------	100	98	34	33	11	A–6(8)	ML–CL	A–6a
42	29	7	3	0	NP	NP	A–1–a(0)	GW	A–1–a
----------	100	96	83	31	32	6	A–4(8)	ML	A–4b
94	83	74	46	24	25	6	A–4(2)	SM–SC	A–4a
90	82	75	50	21	21	5	A–4(3)	SM–SC	A–4a

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

[4] Based on the Unified Soil Classification System, Tech. Memo. No. 3–357, v. 1, Corps of Engineers (*15*). SCS and Bureau of Public Roads have agreed to consider that all soils having plasticity indexes within two points of the A-line are to be given a borderline classification. Examples of borderline classifications obtained by this use are ML–CL and SM–SC.

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

[6] NP = Nonplastic.

TABLE 5.—*Estimated engineering*

[Absence of data indicates estimate was not made. The sign < means less than, and > means more than. Estimates were not made

Soil and map symbols	Depth to seasonal high water table	Depth to bedrock	Depth from surface	Coarse fraction greater than 3 inches	Percentage passing sieve—		
					No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)
	Feet	*Feet*	*Inches*	*Percent*			
Arkport: ArB, ArC, ArD	>4	>6	0–9		100	95–100	40–55
			9–55		100	95–100	15–45
Bogart: BgA, BgB, BoA, BoB, BoC, Bu. (The Urban land part of mapping unit Bu is too variable to rate.)	1½–3	>6	0–7		100	90–100	70–90
			7–22		100	90–100	75–90
			22–28	1–5	70–85	50–60	35–50
			28–42	1–5	30–100	25–35	15–25
			42–60	1–5	50–100	30–50	5–15
Brooke: BwC2, BwE2	>3	1⅔–3	0–7	0–10	85–95	80–90	70–80
			7–23	5–15	80–90	65–75	60–70
			23–30				
Canadice: Ca	0–½	>10	0–7		100	96–100	70–90
			7–45		100	95–100	90–100
			45–60		100	95–100	90–100
Canfield: CdA, CdB, CdC, CdC2, CdD, CdD2, CeB, CeC. (The Urban land part of mapping units CeB and CeC is too variable to rate.)	1½–3	>10	0–8		90–100	85–100	65–90
			8–25		85–100	75–90	65–90
			25–55		85–95	70–90	55–70
			55–62	1–5	85–95	75–90	50–65
Canfield, moderately shallow variant: CfB, CfC	>1	1⅔–3⅓	0–7		80–100	80–95	65–90
			7–24		85–95	70–95	55–70
			24–36	1–10	80–90	70–80	65–75
			36–42				
Carlisle: Ch	0–½	>10	0–60	(2)	(2)	(2)	(2)
			60–80	(2)	(2)	(2)	(2)
Chagrin: Ck, Cm	3>3	>4	0–32		95–100	90–100	70–90
			32–48		95–100	90–100	60–75
			48–60				

properties of soils

for Alluvial land, Borrow pits, Cut and fill land, Gravel pits, Made land, Quarries, Strip mine spoil, and Urban land]

Classification			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
Dominant USDA texture	Unified	AASHO					Steel	Concrete
			Inches per hour	*Inches per inch of soil*	*pH*			
Fine sandy loam.	SM or ML	A–4	2.0–6.3	0.05–0.10	5.0–6.0	Low	Low	Moderate.
Fine sandy loam, loamy fine sand, and fine sand.	SM	A–2 or A–4	6.3–12.0	.05–.10	5.0–5.5	Low	Low	Moderate.
Silt loam	ML	A–4	.63–2.0	.17–.20	5.5–6.5	Low		Moderate to low.
Silt loam	ML or CL	A–4, A–6	.63–2.0	.16–.18	5.1–5.5	Low	Moderate	Moderate.
Gravelly clay loam.	SC	A–6	.63–2.0	.12–.15	5.1–5.5	Low	Moderate	Moderate.
Gravelly sandy loam.	SM or GM	A–2	2.0–6.3	.04–.07	5.1–5.5	Low	Moderate	Moderate to high.
Gravel and sand.	SW–SM, SM, GW–GM, GM	A–1, A–2	6.3–12.0	<.05	5.0–6.0	Low	Moderate	Moderate to high.
Silty clay loam.	MH or CH	A–7	.2–.63	.17–.22	5.6–7.3	Moderate		Moderate to low.
Channery silty clay or clay.	CH	A–7	.063–.2	.13–.15	5.6–7.3	High	High	Moderate to low.
Limestone with thin strata of clay shale and siltstone.								
Silt loam	ML or CL	A–4, A–6	.2–.63	.17–.19	5.6–7.3	Moderate		Moderate to low.
Silty clay or clay	CH	A–7	<.063	.13–.15	5.6–7.3	Moderate to high.	High	Moderate to low.
Silty clay [1]	CH or MH	A–7	<.063	.13–.15	6.1–7.7	Moderate to high.	High	Low.
Silt loam	ML, ML–CL	A–4	.63–2.0	.18–.22	4.6–5.5	Low		Moderate to high.
Silt loam	ML or CL	A–4	.63–2.0	.17–.21	4.6–5.5	Low	Moderate	Moderate to high.
Loam (fragipan).	ML, CL–ML	A–4	.2–.63	.07–.10	5.1–6.0	Low	Moderate	Moderate.
Loam	CL–ML	A–4	.2–.63	.10–.14	5.6–6.0	Low	Moderate	Moderate.
Silt loam	ML, ML–CL	A–4	.63–2.0	.18–.22	4.6–5.0	Low	Moderate	Moderate.
Silt loam and loam	ML or CL–ML.	A–4	.63–12.0	.10–.18	4.6–5.0	Low	Moderate	High.
Silty clay loam	CH	A–7	.063–.20	.07–.10	4.6–5.0	Moderate	High	High.
Shale with thin strata of siltstone.								
Muck	Pt		>6.3	.20–.25	5.1–6.6	[2]	High	Moderate to low.
Variable mineral soil material.	ML–CL, CH	A–6, A–7	.063–.2	.07–.10	7.4–8.4	Moderate	High	Low.
Silt loam	CL or ML	A–6 or A–4	.63–2.0	.19–.23	5.6–7.8	Low	Low	Low.
Loam	CL or ML–CL.	A–6 or A–4	2.0–6.3	.15–.19	5.6–7.8	Low	Low	Low.
Gravelly and sandy loam.			6.3–12.0					

TABLE 5.—*Estimated engineering*

Soil and map symbols	Depth to seasonal high water table	Depth to bedrock	Depth from surface	Coarse fraction greater than 3 inches	Percentage passing sieve—		
					No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)
	Feet	*Feet*	*Inches*	*Percent*			
Chili: CnA, CnB, CpA, CpB, CpC, CpC2, CuB, CuC, CuF. (The Urban land part of mapping units CuB, CuC, and CuF is too variable to rate.)	>4	>10	0–9	.....	80–100	75–95	55–75
			9–19	.....	80–100	75–95	55–75
			19–36	1–10	40–75	30–65	10–20
			36–60	1–10	20–75	20–60	0–25
Chili gravelly loam: CoC, CoC2, CoD2, CoE2, CvF2. (For Conotton part of mapping unit CvF2, refer to Conotton series.)	>4	>10	0–8	.....	75–90	55–70	35–55
			8–18	.....	70–85	40–55	25–40
			18–24	1–10	60–80	20–40	0–15
			24–60	1–10	30–75	20–60	0–25
Conotton: CwA, CyB, CyC, CyD2, CyE2 (Mapping unit CwA has less than 20 percent, by volume, of gravel in the uppermost 15 inches.)	5	>10	0–9	1–5	60–80	55–70	25–55
			9–42	1–5	40–55	15–40	5–15
			42–60	1–10	45–70	15–50	0–20
DeKalb: DkB, DkC, DkE2, DkF2	>3	2–3½	0–7	1–10	85–95	80–95	30–40
			7–34	1–20	60–85	40–60	12–40
			34–50	.....	.....	.....	.....
Edwards: Ed	0–½	>10	0–28	(2)	(2)	(2)	(2)
			28–50	.....	.....	.....	.....
Fitchville: FcA, FcB, FcC, Fu (The Urban land part of mapping unit Fu is too variable to rate.)	½–1½	>10	0–9	.....	95–100	90–100	85–100
			9–40	.....	95–100	90–100	85–100
			40–52	.....	95–100	90–100	80–100
Geeburg: GbC2, GbE2	1–3	>5	0–7	.....	95–100	95–100	85–100
			7–27	.....	100	100	90–100
			27–60	.....	100	100	90–100
Gilpin: GdB, GdC, GdD	>3	1 2/3–3	0–9	.....	95–100	90–100	70–90
			9–30	10–15	80–95	70–90	50–75
			30	.....	.....	.....	.....
Ginat: Ge	0–½	>5	0–8	.....	95–100	90–100	70–95
			8–36	.....	95–100	85–95	65–90
			36–60	1–5	80–90	55–70	20–30

properties of soils—Continued

Classification			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
Dominant USDA texture	Unified	AASHO					Steel	Concrete
			Inches per hour	*Inches per inch of soil*	*pH*			
Silt loam	ML	A–4	2.0–6.3	.15–.19	4.5–5.5	Low	Low	Moderate.
Silt loam	CL or ML	A–4	2.0–6.3	.15–.19	4.5–5.5	Low	Low	Moderate.
Gravelly sandy loam.	SM, SW–SM, GM or GW–GM.	A–1	>12.0	.02–.04	4.5–6.0	Low	Low	Moderate.
Loamy coarse sand.	GW, GP, SW, SP, SM, GM.	A–1	>12.0	.02–.04	5.1–5.5	Low	Low	Moderate.
Gravelly loam.	SM or ML	A–2, A–4, A–6.	2.0–6.3	.12–.16	4.5–5.5	Low		Moderate.
Gravelly loam.	SM	A–2, A–4	6.3–12.0	.10–.14	4.5–5.5	Low	Low	Moderate.
Very gravelly sandy loam.	SW or SM	A–1	>12.0	.02–.04	4.5–5.5	Low	Low	Moderate.
Stratified coarse sand and gravel.	GW, GP, SW, SP, GM, SM.	A–1	>12.0	.02–.04	5.1–5.5	Low	Low	Moderate.
Gravelly loam.	ML or SM or GM.	A–4 or A–2	6.3–12.0	.11–.15	5.6–6.0	Low		Moderate.
Very gravelly sandy loam.	GW–GM, or GM.	A–1	6.3–12.0	.06–.10	5.1–6.0	Low	Low	Moderate.
Sand and gravel.	GW, GM or SW, SM.	A–1	>12.0	.02–.04	5.6–6.0	Low	Low	Moderate.
Sandy loam	SM	A–2 or A–4	2.0–6.3	.14–.18	4.5–5.5	Low		High.
Channery sandy loam. Sandstone normally shattered.	SM	A–4 or A–2	2.0–6.3	.08–.12	4.5–5.5	Low	Low	High.
Muck	Pt	(2)	(2)	.20–.25	5.6–7.3	Low	High	Low.
Marl						Low	High	Low.
Silt loam	CL–ML or MH.	A–4	.63–2.0	.17–.20	5.0–6.0	Low		Moderate.
Silt loam or silty clay loam.	CL, CL–ML	A–7, A–6	.20–.63	.17–.20	4.5–6.0	Low to moderate.	High	Moderate.
Silty clay loam.	CL, CL–ML	A–7, A–6	.20–.63	.17–.20	6.1–7.3	Low	High	Low.
Silt loam	CL or ML	A–6	.20–.63	.18–.22	4.5–5.5	Moderate		Moderate.
Silty clay or clay	CH or ML–CL.	A–7	<.063	.13–.15	4.5–6.6	High	High	Moderate.
Clay	CH or CL	A–7, A–6	<.063	.13–.15	7.9–8.2	High	High	Low.
Silt loam	ML, ML–CL	A–4, A–6	.63–2.0	.17–.20	4.5–5.5	Low		High.
Silt loam	ML–CL or CL.	A–4 or A–6	.63–2.0	.14–.17	4.5–5.5	Low	Moderate	High.
Mostly siltstone and fine-grained sandstone.								
Silt loam	ML or CL	A–4, A–6	.63–2.0	.18–.23	5.6–6.0	Low	High	Moderate.
Silt loam or loam (fragipan).	CL	A–6	.20–.63	.10–.16	5.1–6.0	Moderate	High	Moderate.
Gravelly sandy loam.	SM	A–2	.63–2.0	.06–.10	5.1–5.5	Low	High	Moderate.

TABLE 5.—*Estimated engineering*

Soil and map symbols	Depth to seasonal high water table	Depth to bedrock	Depth from surface	Coarse fraction greater than 3 inches	Percentage passing sieve—		
					No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)
	Feet	*Feet*	*Inches*	*Percent*			
Glenford: GfA, GfB, GfC, GfC2, GfD2	1½–3	>10	0–8	.....	95–100	90–100	70–90
			8–40	.....	95–100	90–100	70–90
			40–50	100	95–100	90–100	65–90
Keene: KeB, KeC, KeC2, KeD, KeD2, KeE.	1–3	3–5	0–8	.....	85–100	80–100	70–95
			8–19	.....	85–100	80–100	70–95
			19–34	.....	70–90	70–90	60–90
			34–40	.....	.....	.....	.....
Killbuck: Kk	0–½	>5	0–22	.....	95–100	90–100	70–95
			22–36	.....	95–100	90–100	80–95
			36–40	.....	95–100	90–100	60–75
Latham: LaB, LaC, LaC2, LaD, LaD2, LaF.	1½–>3	2–3½	0–7	.....	85–100	80–100	70–95
			7–38	.....	90–100	80–95	75–95
			38–45	.....	.....	.....	.....
Licking: LcA, LcB, LcC, LcC2, LcE2	1½–3	>5	0–7	.....	100	95–100	75–95
			7–20	.....	.....	100	80–95
			20–44	.....	.....	100	80–95
			44–60	.....	.....	100	70–95
Linwood: Ld	0–½	>10	0–23	.....	(2)	(2)	(2)
			23–50	.....	85–100	80–100	30–60
Lobdell, alkaline phase: Le	[1] 1½–3	>4	0–60	.....	95–100	85–100	60–85
Loudonville: LoB, LoC, LoC2, LoD, LoD2, LoE2, LoF2, LuB, LuC. (The Urban land part of mapping units LuB and LuC is too variable to rate.)	>3	1⅔–3⅓	0–14	1–5	80–95	70–90	50–65
			14–28	1–10	70–90	60–85	50–60
			28–56	.....	.....	.....	.....
Luray: Ly	0–½	>5	0–11	.....	95–100	90–100	85–100
			11–38	.....	95–100	90–100	85–100
			38–60	.....	90–100	90–100	70–90
Luray, gravelly subsoil variant: Lz	0–½	7.5	0–8	.....	95–100	90–100	85–100
			8–18	.....	95–100	90–100	85–100
			18–34	.....	90–100	90–100	70–90
			34–44	1–10	70–85	45–55	30–40
			44–60	10–15	55–70	15–25	5–10

properties of soils—Continued

Classification			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
Dominant USDA texture	Unified	AASHO					Steel	Concrete
			Inches per hour	*Inches per inch of soil*	*pH*			
Silt loam	CL or ML	A–4	.63–2.0	.17–.20	5.1–6.0	Low		Moderate.
Silt loam or silty clay loam.	CL or ML–CL.	A–6, A–4	.20–.63	.10–.15	5.1–6.0	Moderate	Moderate to high.	Moderate.
Silt loam	CL or ML–CL.	A–6 or A–4	.63–2.0	.14–.17	5.1–6.0	Low	Moderate to high.	Moderate to low.
Silt loam	ML, ML–CL	A–4	.63–2.0	.18–.22	5.1–6.5	Low		High.
Silty clay loam.	ML, ML–CL	A–6, A–4	.20–.63	.18–.22	4.5–5.5	Moderate	High	High.
Silty clay	CL, ML or MH–CH.	A–7	.063–.20	.14–.18	4.5–5.5	High	High	High.
Weathered, acid, gray shale.								
Silt loam	CL or ML	A–4 or A–6	.63–2.0	.17–.20	5.6–6.5	Low		Moderate.
Light silty clay loam.	CL	A–6	.20–.63	.18–.22	5.6–7.3	Moderate	High	Moderate to low.
Loam	CL	A–6	.20–.63	.14–.18	5.6–7.3	Low	High	Moderate to low.
Silt loam	ML	A–4	.63–2.0	.18–.22	5.1–5.5	Low		High.
Silty clay loam to clay.	CH	A–7	.063–.20	.14–.17	4.5–5.0	Moderate to high.	High	High.
Fragmented and weathered, acid, gray shale.								
Silt loam	ML, ML–CL	A–4	.63–2.0	.17–.20	5.1–6.0	Low		Moderate.
Silt loam	CL	A–6	.20–.63	.17–.20	4.5–5.5	Low	High	High.
Silty clay to clay.	CH	A–7	<.063	.13–.15	5.6–6.5	Moderate to high.	High	Moderate.
Stratified clay, silty clay, and silt loam.	CH or CL	A–6, A–7	<.063	.13–.15	6.6–7.3	Moderate	High	Low.
Muck	Pt		(2)	.20–.25	5.6–7.3	Low	High	Moderate to low.
Sandy loam	SM or ML	A–2 or A–4	.63–2.0	.10–.14	7.5–7.9	Low	High	Low.
Silt loam	CL or ML	A–4 or A–6	.63–2.0	.19–.23	6.6–7.8	Low	Moderate	Low.
Silt loam	ML, ML–CL	A–4	.63–2.0	.17–.20	4.5–5.5	Low	Low	High.
Loam	ML or ML–CL	A–4	.63–2.0	.14–.18	4.5–5.5	Low to moderate.	Low	High.
Sandstone, normally shattered.								
Silty clay loam.	CL, ML–CL	A–6, A–7	.63–2.0	.20–.23	6.1–6.5	Moderate	High	Low.
Silty clay loam.	CL, CH	A–6, A–7	.20–.63	.17–.20	6.1–7.3	Moderate to high.	High	Low.
Silt loam or loam.	CL or ML–CL	A–6 or A–4	.63–2.0	.18–.21	6.6–7.3	Low	High	Low.
Silty clay loam.	CL, ML	A–6, A–7	.63–2.0	.20–.23	6.1–6.5	Low	High	Low.
Silty clay loam.	CL, CH	A–6, A–7	.20–.63	.17–.20	6.1–7.3	Moderate to high.	High	Low.
Silt loam	CL–ML	A–6, A–4	.63–2.0	.18–.21	6.6–7.3	Low	High	Low.
Gravelly loam.	SM	A–2, A–4	2.0–6.3	.06–.10	6.6–7.3	Low	High	Low.
Very gravelly sandy loam.	GW–GM	A–1	>6.3	.02–.04	6.6–7.3	Low	High	Low.

TABLE 5.—*Estimated engineering*

Soil and map symbols	Depth to seasonal high water table	Depth to bedrock	Depth from surface	Coarse fraction greater than 3 inches	Percentage passing sieve—		
					No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)
	Feet	*Feet*	*Inches*	*Percent*			
Mentor: MeA, MeB, MeC, MeD	>4	>10	0–8		95–100	90–100	70–90
			8–44		95–100	90–100	80–90
			44–50		75–95	70–95	60–75
Montgomery: Mg	0–½	>10	0–9		100	100	85–100
			9–42		100	100	85–100
			42–60		100	100	80–100
Muskingum: MsB, MsC, MsD, MvE, MvE3, MvF, MvG, MwF. (For Gilpin part of mapping units MvE, MvE3, MvF, MvG and MwF, refer to the Gilpin series. The Urban land part of mapping unit MwF is too variable to rate.)	>3	1⅔–3	0–7	1–10	90–100	80–90	50–70
			7–17	1–10	80–90	75–90	50–65
			17–29	1–20	60–75	40–65	30–45
			29–33				
Plainfield: PlB, PlC	>4	>10	0–22		100	95–100	15–35
			22–34		100	95–100	5–15
			34–60		100	50–75	5–10
Rainsboro: RaB, RaC	1½–3	>10	0–8		95–100	95–100	70–90
			8–29		90–100	90–100	70–90
			29–48		75–100	50–85	25–55
			48–60		90–100	90–100	75–90
Ramsey: RcC, RcD, RcE2, RcF2	>3	1–1⅔	0–19	10–50	50–85	20–50	10–20
			19				
Ravenna: ReA, ReB, Rn (The Urban land part of mapping unit Rn is too variable to rate.)	½–1½	>10	0–8		90–100	80–95	70–85
			8–23		90–100	85–100	75–95
			23–43		80–95	70–95	55–80
			43–60	1–5	80–95	70–95	45–60
Remsen RoA, RoB, Rr (The Urban land part of mapping unit Rr is too variable to rate.)	½–1½	>4	0–7		95–100	95–100	80–90
			7–46		95–100	95–100	85–100
			46–72		95–100	95–100	85–95
Rittman: RsB, RsC, RsC2, RsD2	1½–3	>10	0–7		95–100	90–100	70–95
			7–22		90–100	85–100	60–80
			22–41		80–100	80–100	70–80
			41–78		80–95	75–95	

properties of soils—Continued

Classification			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
Dominant USDA texture	Unified	AASHO					Steel	Concrete
			Inches per hour	*Inches per inch of soil*	*pH*			
Silt loam	CL or ML	A–4	.63–2.0	.17–.20	5.1–6.0	Low		Moderate.
Light silty clay loam, silt loam.	CL, ML–CL	A–6	.63–2.0	.16–.19	5.1–6.0	Low to moderate.	Moderate	Moderate.
Loam	ML, CL	A–4	.63–2.0	.14–.18	5.1–6.5	Low	Moderate	Moderate.
Silty clay loam.	CL, ML–CL	A–6, A–7	.20–.63	.17–.22	6.1–6.5	Moderate	High	Low.
Silty clay	CH, CL	A–7	<.063	.13–.15	5.6–7.3	High	High	Low.
Silty clay loam.	CH, CL	A–7, A–6	<.063	.15–.18	7.5–8.0	High to moderate.	High	Low.
Silt loam	ML	A–4	2.0–6.3	.16–.20	4.5–5.5	Low	Low	High.
Silt loam	ML	A–4	2.0–6.3	.13–.17	4.5–5.5	Low	Low	High.
Channery silt loam to fine sandy loam.	GM or SM	A–2, A–4	2.0–6.3	.10–.15	4.5–5.0	Low	Low	High.
Mostly siltstone and fine-grained sandstone.								
Loamy sand, sand.	SM	A–2	>6.3	.06–.08	4.5–5.5	Low	Low	High.
Sand	SP–SM or SM	A–2 or A–3	>6.3	.04–.06	4.5–5.5	Low	Low	High.
Gravelly sand.	SP–SM	A–1, A–2	>6.3	.04–.06	4.5–5.5	Low	Low	High.
Silt loam	ML	A–4	.63–2.0	.17–.20	5.1–6.5	Low		Moderate.
Silt loam	ML or CL	A–4 or A–6	.63–2.0	.17–.20	5.1–6.0	Low	High	Moderate.
Gravelly loam to sandy loam (fragipan).	SM or ML	A–2 or A–4	.20–.63	.10–.15	5.1–6.0	Low	High	Moderate.
Silty clay loam.	ML or CL	A–6	.063–.20	.17–.21	6.6–7.3	Moderate	High	Low.
Channery to very channery sandy loam.	SW–SM, SM or GW–GM or SM.	A–1, A–2	6.3–12.0	.10–.15	4.5–5.5	Low	Low	High.
Sandstone, normally shattered.								
Silt loam	ML, ML–CL	A–4	.63–2.0	.17–.20	5.1–6.0	Low		High.
Silt loam	CL, ML–CL	A–4 or A–6	.20–.63	.17–.19	4.5–5.5	Moderate	High	High.
Loam (fragipan).	CL–ML or CL	A–4 or A–6	.20–.63	.14–.18	4.5–5.5	Low	High	High.
Loam	SM or ML–CL	A–4	.20–.63	.14–.18	4.5–5.5	Low	High	High.
Silt loam	CL or ML	A–6, A–4	0.2–.63	.17–.20	4.5–5.0	Moderate		High.
Clay or silty clay.	CH	A–7, A–6	<.063	.13–.15	4.5–7.9	High	High	Moderate.
Silty clay	CH	A–7	<.063	.13–.15	7.9–8.2	High	High	Low.
Silt loam	ML	A–4	.63–2.0	.17–.20	4.5–5.5	Low	Moderate	High.
Clay loam	CL	A–6	.02–.63	.16–.19	4.5–5.5	Moderate	Moderate	High.
Clay loam (fragipan).	CL, CL–ML	A–6 or A–4	.063–.20	.06–.10	5.0–6.5	Low	Moderate	Moderate.
Clay loam	CL–ML, ML	A–4	.20–.63	.06–.10	7.5–8.0	Low	Moderate	Low.

TABLE 5.—*Estimated engineering*

Soil and map symbols	Depth to seasonal high water table	Depth to bedrock	Depth from surface	Coarse fraction greater than 3 inches	Percentage passing sieve—		
					No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)
	Feet	*Feet*	*Inches*	*Percent*			
Sebring: Sb, Sg	0–½	>10	0–16		100	100	90–100
(The Urban land part of mapping unit Sg is too variable to rate.)			16–40		100	100	90–100
			40–48		100	100	85–100
Sebring silt loam, till substratum: Se	0–½	>10	0–16		100	100	90–100
			16–41		100	100	90–100
	0–½	>10	41–88		80–95	75–90	60–75
Shoals: Sh	[3] ½–1½	>4	0–24		95–100	90–100	65–90
			24–60		95–100	90–100	60–75
Sloan: Sl	[3] 0–½	>4	0–25		100	95–100	70–90
			25–50		95–100	95–100	60–75
Tilsit: TlC, TlD	1½–3	3–5	0–23		100	95–100	75–90
			23–34		100	95–100	80–95
			34–47	1–5	70–80	45–75	30–65
			47				
Trumbull: Tr	0–½	>4	0–6		95–100	95–100	80–90
			6–42		95–100	95–100	85–95
			42–60		95–100	95–100	85–95
Wadsworth: WaA, WaB, WaC, WaC2	½	>5	0–7		95–100	90–100	75–90
			7–20		90–100	85–100	75–90
			20–31		95–100	90–95	70–80
			31–60		85–100	80–100	65–85
Wadsworth silt loam, moderately shallow variant: WbB.	½	1⅔–3½	0–12		95–100	90–100	80–90
			12–24		95–100	90–100	75–90
			24–40		90–100	85–100	75–90
			40–50				
Wallkill: Wc	[3] 0–1½	>5	0–10		95–100	95–100	75–90
			10–25		100	100	90–100
			25–50		([2])	([2])	([2])
Wayland: Wd	[3] 0–½	>4	0–50		95–100	95–100	70–90
Weikert: WeC, WeD, WeE2, WeF2	>3	1–1⅔	0–7	1–10	80–90	60–75	45–60
			7–18	20–70		10–40	10–45
			18–24				

properties of soils—Continued

Classification			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
Dominant USDA texture	Unified	AASHO					Steel	Concrete
			Inches per hour	*Inches per inch of soil*	*pH*			
Silt loam	CL–ML or ML.	A–4, A–6	.63–2.0	.17–.22	4.5–5.5	Low	High	High.
Silty clay loam.	CL, ML–CL	A–6, A–7	.20–.63	.16–.19	5.1–6.0	Moderate	High	High.
Silt loam	CL, CL–ML	A–6 or A–4	.20–.63	.17–.19	5.1–7.3	Low	High	Moderate to low.
Silt loam	CL–ML, ML	A–4, A–6	.63–2.0	.17–.22	4.5–5.5	Low	High	High.
Silty clay loam.	CL, ML–CL	A–6, A–7	.20–.63	.16–.19	5.1–6.0	Moderate	High	High.
Loam	ML	A–4	.20–.63	.06–.10	5.6–7.8	Low	High	Low.
Silt loam	CL or ML	A–4 or A–6	.63–2.0	.18–.22	5.6–8.4	Low	High	Moderate to low.
Loam	CL or ML	A–4 or A–6	.63–2.0	.18–.22	6.6–7.8	Low	High	Low.
Silt loam	CL or ML	A–6 or A–4	.63–2.0	.19–.23	6.6–7.3	Low	High	Low.
Loam	ML or CL	A–6 or A–4	.63–2.0	.15–.21	6.1–8.4	Low	High	Low.
Silt loam	ML, ML–CL	A–4	.63–2.0	.17–.20	5.1–5.5	Low	Low	Moderate.
Silty clay loam (fragipan).	CL	A–6	.063–.20	.07–.12	4.5–5.5	Moderate	Low	Moderate. to high.
Silt loam	ML or SM	A–4 or A–2	.63–2.0	.14–.18	4.5–5.5	Low	Low	Moderate to high.
Stratified siltstone, sandstone, and shale.								
Silt loam	CL or ML	A–6, A–4	.20–.63	.16–.19	<4.5–5.5	Moderate		High.
Silty clay loam to clay.	CH	A–7	.063–.2	.14–.17	4.5–7.0	High	High	High to moderate.
Silty clay	CH	A–7	.063–.2	.14–.17	7.4–7.8	High	High	Low.
Silt loam	ML	A–4	.20–.63	.17–.19	5.1–6.0	Low		Moderate.
Silty clay loam.	CL, ML–CL	A–6	.20–.63	.15–.18	5.1–5.5	Moderate	High	Moderate.
Clay loam (fragipan).	CL	A–6	.063–.20	.06–.10	5.1–6.5	Moderate	High	Moderate.
Clay loam	CL, ML	A–6	.20–.63	.06–.10	6.1–7.3	Low	High	Low.
Silt loam	ML	A–4	.20–.63	.17–.19	5.1–6.0	Low	High	Moderate.
Silt loam (fragipan).	ML	A–4	.063–.20	.10–.16	5.1–5.5	Low	High	Moderate.
Silty clay loam. Shale.	CL, ML–CL	A–6	.20–.63	.15–.18	5.1–6.5	Moderate	High	Moderate.
Silt loam	CL	A–6	.63–2.0	.19–.23	5.6–7.3	Low	High	Low.
Silty clay	CH	A–7	.063–.20	.15–.18	5.6–7.3	Moderate to high.	High	Low.
Muck	Pt		(2)	.20–.25	5.6–7.3	High	High	Low.
Silt loam	CL, ML	A–4 or A–6	.63–2.0	.19–.23	6.1–6.5	Low	High	Low.
Channery silt loam.	SM, ML	A–4	2.0–6.3	.12–.16	4.5–5.5	Low	Moderate to low.	High.
Very channery silt loam. Mostly siltstone, thin strata of sandstone and shale.	GM, GP–GM	A–2, A–4	2.0–6.3	.06–.12	4.5–5.5	Low	Moderate to low.	High.

TABLE 5.—*Estimated engineering*

Soil and map symbols	Depth to seasonal high water table	Depth to bedrock	Depth from surface	Coarse fraction greater than 3 inches	Percentage passing sieve—		
					No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)
	Feet	*Feet*	*Inches*	*Percent*			
Weinbach: WhA, WhB, Wk (The Urban land part of mapping unit Wk is too variable to rate.)	½–1½	>10	0–8	1–2	95–100	90–100	80–100
			8–19	1–2	95–100	85–95	80–90
			19–30	1–5	90–100	80–90	30–40
			30–60	5–10	55–80	45–70	15–30
Wellston: WlB, WlC	>3	2½–4	0–7	.....	90–100	80–100	70–95
			7–31	.....	90–100	80–100	70–95
			31–38	25–50	40–70	15–40	12–30
			38–50	.....	.....	.....	.....
Wheeling: WmA, WmB, WmC2, WrA, WrB, WrC, WrC2, WsD2.	>4	>10	0–8	.....	95–100	90–100	80–95
			8–41	.....	95–100	90–100	80–100
			41–50	0–5	30–65	15–40	0–20
Willette: Wt	0–½	>10	0–26	.....	.....	.....	.....
			26–50	.....	95–100	90–100	70–95
Wooster: WuB, WuC, WuC2, WuD2, WuE2, WuF2, WvD. (The Urban land part of mapping unit WvD is too variable to rate.)	>4	>4	0–21	.....	90–100	80–95	60–85
			21–40	1–5	75–95	70–95	45–70
			40–60	1–5	75–95	70–95	45–70

[1] Contains thin strata of silty clay loam, silt loam, and gravel and sand.
[2] Variable.
[3] Subject to flooding.

properties of soils—Continued

Classification			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
Dominant USDA texture	Unified	AASHO					Steel	Concrete
			Inches per hour	*Inches per inch of soil*	*pH*			
Silt loam	ML, ML–CL	A–4	.63–2.0	.17–.19	4.5–5.0	Low	High	High.
Light silty clay loam.	CL, ML	A–6	.20–.63	.16–.19	4.5–5.0	Low	High	High.
Sandy loam (fragipan).	SM	A–2, A–4	.20–.63	.06–.10	5.1–6.0	Low	High	Moderate.
Gravelly sandy loam or loamy sand.	SM, GM	A–1, A–2	2.0–6.3	.04–.07	6.1–7.8	Low	High	Low.
Silt loam	ML, ML–CL	A–4	.63–2.0	.19–.24	4.5–5.5	Low		Moderate.
Heavy silt loam.	ML–CL or CL.	A–6 or A–4	.63–2.0	.16–.20	4.5–5.5	Low	Moderate to low.	Moderate to high.
Very channery silt loam. Interbedded siltstone, sandstone, and shale.	GM, SM	A–1, A–2	2.0–6.3	.04–.07	4.5–5.5	Low	Low	High.
Silt loam	ML, ML–CL	A–4	.63–2.0	.17–.20	5.6–6.0	Low		Moderate.
Silt loam	ML–CL	A–4, A–6	.63–2.0	.16–.20	4.5–5.5	Low	Low	Moderate to high.
Very gravelly fine sandy loam or coarse sand.	GW, GP, GM or SW, SP, SM	A–1, A–2	6.3–12.0+	.02–.04	4.5–5.5	Low	Low	Moderate to high.
Muck	Pt			.20–.25	5.1–6.5	Low	High	Moderate.
Heavy clay loam.	CL, CH	A–6, A–7	.20–.63	.12–.15	6.1–7.8	Moderate	High	Low.
Silt loam to loam.	ML, ML–CL	A–4	.63–2.0	.17–.20	4.5–6.0	Low	Low	Moderate to high.
Loam (fragipan).	ML, CL, SM	A–4	.63–2.0	.10–.15	5.1–5.5	Low	Low	Moderate.
Loam	ML, CL, SM	A–4	.63–2.0	.07–.12	5.1–6.0	Low	Low	Moderate.

TABLE 6.—*Engineering*

[Interpretations were not made for Urban land or Borrow pits. Absence

Soil 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
Alluvial land: Ad, An (Urban land in mapping unit An is variable and is not included in the interpretation of that unit.)	Poor: subject to flooding; seasonal high water table.	High	Fair: subject to flooding.	Not suitable.	Fair: silty material.	Subject to flooding; seasonal high water table.
Arkport: ArB, ArC, ArD	Good: well drained; sandy material.	Low	Poor: sandy material.	Good for sand: well-graded sand. Unsuitable for gravel.	Fair to good: sandy material.	Sandy; well drained.
Bogart: BgA, BgB, BoA, BoB, BoC, Bu (Urban land in mapping unit Bu is variable and is not included in the interpretation of that unit.)	Fair: sandy and gravelly material below a depth of 3 feet; can usually be graded in winter.	Moderate	Good	Good below a depth of 3 feet.	Good in solum: stable material. Good in substratum: stable material; low shrink-swell potential; good workability.	Saturated during wet periods; high stability; good workability.
Brooke: BwC2, BwE2	Poor: difficult to work when wet.	Moderate	Fair: silty clay loam texture.	Not suitable.	Poor: low stability; difficult to work when wet; 20 to 36 inches to limestone.	Limestone below a depth of 2 feet; low stability; clayey; very steep in some places.
Canadice: Ca	Poor: seasonal high water table.	Moderate	Fair: small amount of suitable material; low organic-matter content.	Not suitable.	Poor: clayey material.	High water table; plastic, clayey material; low stability.
Canfield: CdA, CdB, CdC, CdC2, CdD, CdD2, CeB, CeC. (Urban land in mapping units CeB and CeC is variable and is not included in the interpretation of those units.)	Fair: seasonal high water table.	Moderate	Good	Not suitable.	Fair: moderate stability; low shrink-swell potential; easy to compact; erodible on slopes.	Fair stability; susceptibility to frost action.
Canfield (moderately shallow variant): CfB, CfC.	Poor: seasonal high water table.	Moderate	Good	Not suitable.	Poor: shale at depth of 20 to 40 inches.	Shale at depth of 20 to 40 inches.

interpretations of the soils

of entry indicates that the soil or land type is variable and is not rated]

Soil features affecting—					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Reservoir area	Embankments, dikes, and levees				
Subject to flooding; seasonal high water table.	Fair to good compaction and stability; slow seepage.	Seasonal high water table; subject to flooding.	Subject to flooding; seasonal high water table.	Not applicable	Not applicable.
High seepage	Fair stability; rapid permeability; subject to piping; fair to good compaction.	Not needed	Rapid permeability; low available moisture capacity.	Sandy and droughty.	Sandy and droughty.
High seepage; sandy and gravelly material.	Fair to good compaction; poor resistance to piping; excessive seepage.	Moderate permeability in subsoil; rapid permeability in underlying material; moderately well drained.	Medium to high infiltration; low to medium available moisture capacity.	Soil features favorable.	Moderately erodible.
Slow seepage; limestone at a depth of 2 to 3 feet; variable permeability.	Fair compaction; slow seepage; high shrink-swell potential.	Slow permeability; limestone at depth of 2 or 3 feet.	Slow infiltration; low available moisture capacity; slow permeability.	Shallow to fine-textured material; limestone at depth of 20 to 36 inches.	Moderately erodible.
High water table; very slow seepage.	Clayey material: very slow permeability when compacted; poor compaction.	Slow infiltration; low available water capacity; very slow permeability; high water table.	Slow infiltration; very slow permeability; low available moisture capacity.	Not needed	Slightly erodible; high water table.
Slight seepage	Good stability and compaction; moderate seepage; slight piping hazard.	Moderately slow permeability; seasonal high water table.	Moderate infiltration; medium available moisture capacity.	Moderately well drained; moderately steep in some places.	Moderately erodible; other soil features favorable.
Moderate seepage; shale at depth of 20 to 40 inches.	Good stability and compaction; moderate seepage; slight piping hazard; shale at depth of 20 to 40 inches.	Moderately slow permeability; seasonal high water table; shale at depth of 20 to 40 inches.	Moderate infiltration; medium available moisture capacity.	Shale at depth of 20 to 40 inches.	Moderately erodible; other soil features favorable.

TABLE 6.—*Engineering interpretations*

Soil and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Highway location
			Topsoil	Sand and gravel	Road fill	
Carlisle: Ch	Poor: organic material; commonly saturated.	High	Fair to good if mixed with mineral material; poor if used alone.	Not suitable; organic material.	Not suitable: organic material.	Organic material; very low stability; material must be removed from roadbed; high water table.
Chagrin: Ck, Cm	Fair: subject to flooding.	Moderate	Good	Not suitable.	Fair: loamy material.	Subject to flooding; moderate frost action; low stability.
Chili: CnA, CnB, CoC, CoC2, CoD2, CoE2, CpA, CpB, CpC, CpC2, CuB, CuC, CuF, CvF2. (Urban land in mapping units CuB, CuC, and CuF is variable and is not included in the interpretation of those units. For interpretations of Conotton soil in mapping unit CvF2, refer to the Conotton series.)	Good: well drained.	Low	Fair for non-gravelly soils; poor for gravelly soils.	Good below a depth of 3 feet.	Fair to good in solum: loamy and gravelly material. Good in substratum: sandy and gravelly material in most places.	Good stability; well drained; droughty in cuts.
Conotton: CwA, CyB, CyC, CyD2, CyE2	Good: well-drained; gravelly material.	Low	Fair for non-gravelly soils; poor for gravelly soils.	Good below a depth of 2 feet; few cobblestones.	Good: gravelly material.	Sandy and gravelly material; easy to work; high stability; droughty in cuts.
Cut and fill land: Cz			Not suitable.			Cuts and fills are commonly needed.
Dekalb: DkB, DkC, DkE2, DkF2	Poor: sandstone at a depth of 20 to 40 inches.	Low	Fair: few coarse fragments.	Not suitable.	Fair: loamy material; sandstone at depth of 24 to 40 inches.	Sandstone at depth of 24 to 40 inches; good stability.
Edwards: Ed	Poor: organic material; commonly saturated.	High	Fair to good if mixed with mineral soil; poor if used alone.	Not suitable; organic material.	Not suitable: organic material.	Organic material; marl below a depth of 20 inches; very low stability; high water table.

of the soils—Continued

Soil features affecting—					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Reservoir area	Embankments, dikes, and levees				
High water table; high seepage.	Unstable; organic material; high seepage.	Variable permeability; high water table; surface subsidence when drained.	Rapid permeability; high available moisture capacity.	Not needed	Moderately erodible; high water table.
Subject to flooding; moderate seepage; few sandy seams.	Fair compaction; moderate permeability if compacted. Contains strata of sand in some places.	Moderate permeability; good natural drainage.	Moderate to high infiltration; high available moisture capacity.	Nearly level; subject to flooding.	Slightly to moderately erodible; subject to flooding.
High seepage; pervious; sandy and gravelly material.	Good stability; moderate to high seepage; subject to piping; sandy and gravelly material.	Good natural drainage.	High infiltration; medium to low available moisture capacity.	Droughty; sandy and gravelly material.	Moderately erodible; medium to low available moisture capacity.
Sand and gravel below a depth of 2 feet; excessive seepage.	Good compaction; rapid permeability if compacted; subject to piping; sandy and gravelly material.	Good natural drainage.	High infiltration; very low available moisture capacity.	Droughty; sandy and gravelly material.	Moderately erodible; very low available moisture capacity.
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Medium to high seepage; fractured bedrock at depth of 24 to 40 inches.	Fair stability; moderate permeability if compacted; slight piping hazard.	Good natural drainage; sandstone at depth of 24 to 40 inches.	High infiltration; low available moisture capacity.	Bedrock at depth of 20 to 40 inches; other soil features favorable.	Moderately erodible; low available moisture capacity.
High water table; high seepage.	Unstable organic material; high seepage.	High water table; marl below a depth of 20 inches; surface subsidence if drained.	Variable infiltration; high available moisture capacity.	Not needed	High water table; organic material.

TABLE 6.—*Engineering interpretations*

Soil and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			
			Topsoil	Sand and gravel	Road fill	Highway location
Fitchville: FcA, FcB, FcC, Fu (Urban land part of mapping unit Fu is variable and is not included in the interpretation of that unit.)	Poor: seasonal high water table.	High	Good to depth of 12 inches; low organic-matter content.	Not suitable	Poor: high content of silt.	Seasonal high water table; highly susceptible to frost action; low stability; unstable material; may flow when wet.
Geeburg: GbC2, GbE2	Poor: seasonal high water table.	Moderate	Fair: thin to clay.	Not suitable	Poor: clayey material.	Perched water table during wet periods; highly plastic; clayey.
Gilpin: GdB, GdC, GdD	Poor: siltstone and sandstone at depth of 20 to 40 inches.	Moderate	Good	Not suitable	Poor: siltstone and sandstone at a depth of 20 to 36 inches.	Siltstone and sandstone below a depth of 20 inches; stony in some places.
Ginat: Ge	Poor: seasonal high water table.	High	Good	Poor in upper 3 to 4 feet; fair to good below a depth of 3 to 4 feet.	Poor in solum: silty material. Fair in substratum: dirty sand and gravel.	Seasonal high water table; susceptible to frost action; easily excavated.
Glenford: GfA, GfB, GfC, GfC2, GfD2	Poor: seasonal high water table.	High	Good	Not suitable	Poor: silty material; unstable when wet.	Perched water table during wet periods; highly susceptible to frost action; unstable; soil material may flow when wet.
Gravel pits: Gp	Good: well drained; gravelly material.	Low	Not suitable	Good	Variable: sand and gravel in some places.	Well drained; permeable; cuts and fills are commonly needed.
Keene: KeB, KeC, KeC2, KeD, KeD2, KeE	Poor: seasonal high water table.	Moderate	Good	Not suitable	Poor: silty material; soft shale at depth of 20 to 40 inches.	Silty clay loam subsoil; low stability; susceptible to frost action.

of the soils—Continued

Soil features affecting—					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Reservoir area	Embankments, dikes, and levees				
Seasonal high water table; moderate seepage.	Fair compaction; fair stability; slow permeability when compacted; erodibility; fair to poor resistance to piping.	Moderately slow permeability; seasonal high water table.	Moderate infiltration; medium available moisture capacity; somewhat poor natural drainage.	Not needed	Moderately erodible; seasonal wetness.
Very slow seepage	Fair stability; fair to poor compaction; very slow permeability; high resistance to piping; high shrink-swell potential.	Very slow permeability; moderately well drained; saturated during wet periods.	Slow infiltration; low available moisture capacity.	Sloping to steep; shallow to fine-textured material.	Moderately erodible; low available moisture capacity.
Medium to high seepage; fractured bedrock below a depth of 20 inches.	Fair stability; slow permeability when compacted; siltstone and sandstone at depth of 20 to 36 inches.	Moderate permeability; bedrock at depth of 20 to 36 inches.	Moderate infiltration; low available moisture capacity.	Bedrock at depth of 20 to 36 inches.	Moderately erodible; low available moisture capacity.
Seasonal high water table; moderate to high seepage.	Fair stability; good compaction; moderate permeability when compacted; poor resistance to piping.	Moderately slow permeability in subsoil; moderate permeability below subsoil; seasonal high water table.	Moderate infiltration; medium available moisture capacity.	Not needed	Slightly erodible.
Moderate seepage	Poor stability; fair to good compaction; slow permeability when compacted; fair resistance to piping.	Moderately slow permeability; moderately good natural drainage.	Moderate infiltration; high available moisture capacity.	Moderately slow permeability; moderately erodible.	Moderately erodible; seasonal wetness.
Slow seepage; underlain with shale that is commonly impervious.	Fair stability and compaction; slow seepage.	Slow permeability; soft shale at depth of 20 to 40 inches.	Moderate infiltration; low available moisture capacity.	Slow permeability; soft shale at depth of 20 to 40 inches.	Low available moisture capacity.

TABLE 6.—*Engineering interpretations*

Soil and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Highway location
			Topsoil	Sand and gravel	Road fill	
Killbuck: Kk	Poor: seasonal high water table.	High	Good	Not suitable	Poor: silty material.	High water table; low stability; highly susceptible to frost action.
Latham: LaB, LaC, LaC2, LaD, LaD2, LaF	Fair when dry. Poor when wet. Clayey material.	Moderate	Fair: limited amount of suitable material.	Not suitable	Poor: silty and clayey material.	Cuts and fills are needed; clayey material is difficult to work.
Licking: LcA, LcB, LcC, LcC2, LcE2	Poor: seasonal high water table.	High	Good	Not suitable	Poor: silty material.	High content of plastic clay below a depth of 20 inches; few thin layers of gravel at a depth of 20 to 30 inches.
Linwood: Ld	Poor: organic material; commonly saturated.	High	Fair to good if mixed with mineral material. Poor if used alone.	Not suitable; organic material.	Not suitable: organic material.	Organic material to a depth of 20 to 40 inches; very low stability. Mineral material below a depth of 20 to 40 inches; high water table.
Lobdell: Le	Poor: subject to flooding; seasonal high water table.	Moderate	Good	Not suitable	Fair: silty material.	Subject to flooding; susceptible to frost action.
Loudonville: LoB, LoC, LoC2, LoD, LoD2, LoE2, LoF2, LuB, LuC. (Urban land in mapping units LuB and LuC is variable and is not included in the interpretation of those units.)	Poor: sandstone at a depth of 20 to 40 inches.	Moderate	Good	Not suitable	Fair: silty and loamy material; sandstone at depth of 20 to 40 inches.	Sandstone at depth of 20 to 40 inches; steep in some places.
Luray: Ly	Poor: seasonal high water table.	High	Good	Not suitable	Poor: silty material.	Seasonal high water table; soil material is unstable and tends to flow when wet.

of the soils—Continued

Soil features affecting—					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Reservoir area	Embankments, dikes, and levees				
Subject to ponding or flooding; seasonal high water table; moderately slow seepage; few sandy seams in some places.	Fair stability and compaction; slow permeability when compacted; fair resistance to piping; mainly silty or clayey material in lower part of profile.	Moderately slow permeability; seasonal high water table; subject to flooding.	Moderate infiltration; medium available moisture capacity.	Not needed	Seasonal wetness; subject to flooding.
Slow seepage; underlain by shale that is commonly impervious.	Fair to poor stability; clayey material; slow seepage.	Slow or very slow permeability; soft shale at depth of 24 to 40 inches.	Slow infiltration; medium available moisture capacity.	Shallow to fine material.	Moderately erodible; medium available moisture capacity.
Slow seepage; few strata of gravel or sand.	Fair stability; slow permeability when compacted; high resistance to piping; clayey material below depth of 1½ feet.	Very slow permeability in lower part of subsoil and in substratum; saturated during wet periods.	Slow infiltration; medium available moisture capacity.	Shallow to very slowly permeable material.	Moderately erodible.
High water table; high seepage.	Organic material in upper 20 to 40 inches; unstable. Loamy or sandy material below; high seepage.	Moderately rapid permeability; high water table; surface subsidence if drained.	Variable infiltration; high available moisture capacity.	Not needed	High water table.
Subject to flooding; moderate to slow seepage; few sandy seams.	Fair to poor stability and compaction; moderate to slow seepage.	Moderate permeability; seasonal high water table.	Moderate infiltration; high available moisture capacity.	Not needed	Subject to flooding.
Shallow to fractured sandstone; high seepage in some places.	Poor to fair stability; fair compaction; moderate permeability when compacted.	Moderate permeability; bedrock at depth of 20 to 40 inches.	Moderate infiltration; low available moisture capacity.	Bedrock at depth of 20 to 40 inches; other soil features favorable.	Moderately erodible; low available moisture capacity.
Seasonal high water table; slow to moderate seepage.	Fair compaction; slow permeability when compacted; fair to poor resistance to piping.	Moderately slow permeability; seasonal high water table.	Moderately slow infiltration; high available moisture capacity.	Not needed	Moderately erodible; seasonal high water table.

TABLE 6.—*Engineering interpretations*

Soil and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Highway location
			Topsoil	Sand and gravel	Road fill	
Luray, gravelly subsoil variant: Lz	Poor: seasonal high water table.	Moderate	Good	Fair to poor: dirty sand and gravel.	Poor in solum: silty material. Fair in substratum: sandy, gravelly, and silty material.	Seasonal high water table; moderate stability; subject to flooding in some places.
Made land: Ma			Not suitable	Not suitable		Cuts and fills are commonly needed.
Mentor: MeA, MeB, MeC, MeD	Good when dry. Fair when wet.	High	Good	Not suitable	Poor: silty material.	Low to moderate stability; susceptibility to frost action.
Montgomery: Mg	Poor: seasonal high water table.	High	Fair: moderately erodible.	Not suitable	Poor: silty material.	Seasonal high water table; plastic, clayey material; difficult to work; low stability.
Muskingum: MsB, MsC, MsD, MvE, MvE3, MvF, MvG, MwF. (For interpretations of Gilpin soils in mapping units MvE, MvE3, MvF, MvG, and MwF, see Gilpin series. Urban land in mapping unit MwF is variable and is not included in the interpretation of that unit.)	Poor: sandstone and siltstone at a depth of 20 to 40 inches.	Low	Good	Not suitable	Fair: silty and loamy material; sandstone at depth of 20 to 36 inches.	Bedrock at depth of 20 to 36 inches.
Plainfield: PlB, PlC	Good: sandy material; well drained.	Low	Poor: sandy material; low in organic-matter content.	Good for sand. Poor for gravel.	Good: sandy material.	Loose or nearly loose sand that is easily worked; subject to soil blowing and to water erosion.
Quarries: Qu				Not suitable	Poor: bedrock material.	Cuts and fills commonly are needed; surface drainage is a hazard in most places.

of the soils—Continued

Soil features affecting—					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Reservoir area	Embankments, dikes, and levees				
Seasonal high water table; moderate to high seepage.	Fair stability; good compaction; moderate to high seepage; subject to flooding in some places.	Seasonal high water table; moderately slow permeability in subsoil, moderately rapid permeability in substratum.	Slow to medium infiltration; high available moisture capacity.	Not needed	Moderately erodible; seasonal high water table.
Moderate seepage; few seams of sand or gravel.	Fair stability; fair to good compaction; slow permeability when compacted; erodibility.	Moderate permeability in subsoil; well drained.	Moderate infiltration; high available moisture capacity.	Soil features favorable.	Moderately erodible.
Seasonal high water table; very slow seepage.	Very slow permeability; poor compaction; high shrink-swell potential.	Very slow permeability; seasonal high water table.	Slow infiltration; high available moisture capacity.	Not needed	High water table; clayey material.
Moderate to high seepage; fractured bedrock.	Fair stability; moderate permeability when compacted; slight piping hazard; stony below depth of 2 feet.	Moderately rapid permeability; bedrock at depth of 20 to 36 inches.	Moderate to high infiltration; low available moisture capacity.	Bedrock at depth of 20 to 36 inches; other soil features favorable.	Moderately erodible; low available moisture capacity.
Sandy material; highly pervious.	Sandy material; high seepage; subject to piping.	Rapid permeability; good natural drainage.	High infiltration; low available moisture capacity.	Moderately to highly erodible.	Highly erodible; low available moisture capacity.
	Bedrock material				

TABLE 6.—*Engineering interpretations*

Soil and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Highway location
			Topsoil	Sand and gravel	Road fill	
Rainsboro: RaB, RaC	Fair: seasonal high water table.	Moderate	Good	Poor	Fair in solum: loamy material. Poor in substratum: silty and clayey material below a depth of 4 or 5 feet.	Moderately well drained; some seepage in cuts.
Ramsey: RcC, RcD, RcE2, RcF2	Good: well drained; loamy material.	Low	Poor: stony.	Not suitable.	Poor: loamy material; stony; sandstone at depth of less than 20 inches.	Steep in some places; sandstone at a depth of less than 20 inches.
Ravenna: ReA, ReB, Rn (Urban land in mapping unit Rn is variable and is not included in the interpretation of that unit.)	Poor: seasonal high water table.	High	Good	Not suitable.	Fair: loamy material.	Seasonal high water table; highly susceptible to frost action; fairly easy to work.
Remsen: RoA, RoB, Rr (Urban land in mapping unit Rr is variable and is not included in the interpretation of that unit.)	Poor: seasonal high water table.	Moderate	Fair: shallow to clay.	Not suitable.	Poor: clayey material.	Seasonal high water table; low stability; high content of clay; plastic; difficult to work.
Rittman: RsB, RsC, RsC2, RsD2	Poor: seasonal high water table.	Moderate	Good	Not suitable.	Poor in solum: loamy material. Fair in substratum: loamy material.	Fair stability; susceptible to frost action; slow seepage.
Sebring: Sb, Se, Sg (Urban land in mapping unit Sg is variable and is not included in the interpretation of that unit.)	Poor: seasonal high water table.	High	Good: low in organic-matter content. Fair for Se in substratum; loamy material.	Not suitable	Poor in solum: silty material. Poor for Sb and Sg in substratum: silty material.	Seasonal high water table; low stability; silty material; may flow when wet; highly susceptible to frost action.
Shoals: Sh	Poor: subject to flooding; seasonal high water table.	High	Good	Not suitable.	Poor: silty material.	Subject to flooding; seasonal high water table; low stability; susceptible to frost action.

of the soils—Continued

Soil features affecting—					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Reservoir area	Embankments, dikes, and levees				
Seepage in lower part of subsoil.	Good stability and compaction; silty and clayey material below a depth of 4 to 5 feet.	Slow and moderately slow permeability; moderately well drained.	Moderate infiltration; medium to high available moisture capacity.	Slow and moderately slow permeability; gravelly material below a depth of 2½ feet.	Slightly to moderately erodible; seepage.
Moderately rapid permeability; sandstone at a depth of less than 20 inches.	Stony; fair stability and compaction. Moderate permeability when compacted; slight piping hazard.	Rapid permeability; sandstone at a depth of less than 20 inches.	Rapid infiltration; very low available moisture capacity; shallow to bedrock.	Shallow to bedrock.	Erodible; very low available moisture capacity; bedrock at a depth of less than 20 inches.
Seasonal high water table; slow seepage.	Fair to good stability and compaction; slow permeability when compacted; good resistance to piping.	Moderately slow permeability; seasonal high water table.	Moderate infiltration; medium available moisture capacity.	Seasonal wetness; seepage.	Moderately erodible; seasonal wetness.
Seasonal high water table; very slow seepage.	Fair stability; fair to poor compaction; slow permeability when compacted; high resistance to piping.	Very slow permeability; seasonal high water table.	Slow infiltration; medium available moisture capacity.	Shallow to fine-textured material.	Moderately erodible; seasonal wetness.
Slow seepage	Good compaction and stability; slow permeability.	Slow permeability; seasonal high water table.	Slow infiltration; medium available moisture capacity.	Slow seepage	Moderately erodible; slow seepage.
Seasonal high water table; moderate to slow seepage.	Fair stability; moderately slow permeability when compacted; fair resistance to piping.	Moderately slow permeability; seasonal high water table.	Moderate infiltration; medium available moisture capacity.	Not needed	Erodible; medium available moisture capacity; poorly drained.
Subject to flooding; moderate seepage; few sandy seams in some places.	Fair compaction; fair resistance to piping; sandy strata in some places.	Moderate permeability in subsoil; somewhat poorly drained.	Moderate infiltration; high available moisture capacity; somewhat poorly drained.	Not needed	Subject to flooding; seasonal high water table.

TABLE 6.—*Engineering interpretations*

Soil and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			
			Topsoil	Sand and gravel	Road fill	Highway location
Sloan: SI	Poor: subject to flooding; seasonal high water table.	High	Good	Not suitable	Poor: silty material.	Subject to flooding; seasonal high water table; low stability; susceptible to frost action.
Strip mine spoil: SoC, SoE, SoF, SsC, SsE, SsF, StC, StD, StF.		Low to moderate.	Not suitable	Not suitable		Cuts and fills are needed; variable surface drainage.
Tilsit: TIC, TID	Fair: seasonal high water table.	Moderate	Good	Not suitable	Fair: silty and clayey material; sandstone and shale at a depth of about 3 or 4 feet.	Susceptible to some frost action; sandstone and shale at a depth of about 3 or 4 feet; slow seepage in cuts.
Trumbull: Tr	Poor: seasonal high water table.	High	Fair: low in organic-matter content.	Not suitable	Poor: clayey material.	Seasonal high water table; low stability; high in content of plastic clay; difficult to work.
Wadsworth: WaA, WaB, WaC, WaC2	Poor: seasonal high water table.	High	Good	Not suitable	Poor: silty clay loam and clay loam.	Seasonal high water table; highly susceptible to frost action; fairly easy to work.
Wadsworth (moderately shallow variant): WbB.	Poor: seasonal high water table.	High	Good	Not suitable	Poor: silty clay loam; shale at a depth of 20 to 40 inches.	Uppermost material is fairly easy to work; shale at a depth of 20 to 40 inches; seasonal high water table.
Wallkill: Wc	Poor: silty and organic material; commonly saturated.	High	Good	Not suitable	Poor in solum: silty material. Poor in substratum: organic material.	Silty material to a depth of 20 to 40 inches; organic material below; very low stability.

of the soils—Continued

Soil features affecting—					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Reservoir area	Embankments, dikes, and levees				
Subject to flooding; seasonal high water table; slow seepage.	Fair to poor stability; slow seepage; subject to piping.	Moderate permeability; seasonal high water table.	Moderate infiltration; high available moisture capacity; very poor natural drainage.	Not needed	Not applicable.
Slow seepage; bedrock at a depth of about 3 or 4 feet.	Fair stability; slow seepage; sandstone and shale at a depth of about 3 or 4 feet.	Slow permeability; bedrock at a depth of about 3 or 4 feet.	Moderate infiltration; medium available moisture capacity.	Slow permeability; sandstone and shale at a depth of about 3 or 4 feet.	Slow seepage.
Seasonal high water table; slow seepage.	Fair stability; fair to poor compaction; excellent resistance to piping; clayey material.	Slow permeability; seasonal high water table.	Slow infiltration; medium available moisture capacity.	Not needed	Slightly erodible; seasonal high water table; plastic, clayey material.
Slow seepage; seasonal high water table.	Good stability and compaction; slow permeability when compacted.	Slow permeability; seasonal high water table.	Slow infiltration; low to medium available moisture capacity.	Slow permeability	Moderately erodible; seasonal high water table.
Shallow to shale	Good compaction and stability; shale at a depth of 20 to 40 inches.	Slow permeability; seasonal high water table; shale at a depth of 20 to 40 inches.	Slow infiltration; low to medium available moisture capacity; shale at a depth of 20 to 40 inches.	Shallow to silty clay loam.	Moderately erodible; seasonal high water table.
High water table; shallow to organic material; high seepage.	Slow permeability in silty material; not suitable in underlying organic material.	Moderate permeability in silty material; variable permeability in muck; high water table.	Slow infiltration; high available moisture capacity; very poor natural drainage.	Not needed	Nearly level; high water table.

TABLE 6.—*Engineering interpretations*

Soil and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			
			Topsoil	Sand and gravel	Road fill	Highway location
Wayland: Wd	Poor: subject to flooding; seasonal high water table.	High	Good	Not suitable	Fair: silty material.	Subject to flooding; seasonal high water table; low stability; highly susceptible to frost action.
Weikert: WeC, WeD, WeE2, WeF2	Good: well drained; siltstone and shale at a depth of less than 20 inches.	Low	Poor: very channery material.	Not suitable	Fair: very channery material; bedrock at a depth of less than 20 inches.	Very channery material; siltstone and shale at a depth of less than 20 inches.
Weinbach: WhA, WhB, Wk (Urban land in mapping unit Wk is variable and is not included in the interpretation of that unit.)	Poor: seasonal high water table; sandy and gravelly material below a depth of 2 or 3 feet.	High	Good	Good below a depth of 3 feet.	Fair in solum: silt loam and silty clay loam. Good in substratum: sandy and gravelly material.	Somewhat poorly drained; stable material.
Wellston: WlB, WlC	Good: well drained.	Moderate	Good	Not suitable	Fair: silty material; sandstone and shale at depth of about 3 feet.	Sandstone and shale at a depth of about 3 feet; well drained; silty material.
Wheeling: WmA, WmB, WmC2, WrA, WrB, WrC, WrC2, WsD2.	Good: well drained; sandy and gravelly material below a depth of 3 feet.	Low	Good	Good below a depth of 3 feet.	Fair in solum: silty material. Good in substratum: sandy and gravelly material.	Sandy and gravelly material below a depth of 3 feet; easy to work; moderate stability.
Willette: Wt	Poor: organic material; commonly saturated.	High	Fair to good if mixed with mineral material; poor if used alone.	Not suitable	Not suitable in solum: organic material. Poor in substratum: clayey material.	Organic material to a depth of 20 to 40 inches; very low stability; muck must be removed from roadbed.
Wooster: WuB, WuC, WuC2, WuD2, WuE2, WuF2, WvD. (Urban land in mapping unit WvD is variable and is not included in the interpretation of that unit.)	Good: well drained.	Moderate to low.	Good	Not suitable	Fair: loamy material.	Moderate susceptibility to frost action; material is easy to work; well drained.

of the soils—Continued

Soil features affecting—					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Reservoir area	Embankments, dikes, and levees				
Subject to flooding; seasonal high water table; moderate to slow seepage; sand lenses in some places.	Fair compaction, slow permeability when compacted; fair resistance to piping.	Moderate permeability; high water table.	Subject to flooding; poorly drained.	Moderate infiltration; high available moisture capacity; poor natural drainage.	Poorly drained.
High seepage; channery material; siltstone and shale at a depth of less than 20 inches.	Channery material; moderate to rapid permeability if compacted; slight piping hazard.	Moderately rapid permeability; siltstone and shale at a depth of less than 20 inches.	Moderate infiltration; very low available moisture capacity; siltstone and shale at a depth of less than 20 inches.	Siltstone and shale at a depth of less than 20 inches.	Moderately erodible; very low available moisture capacity.
Seasonal high water table; sandy and gravelly material below a depth of 3 feet.	Fair to good stability to a depth of 3 feet; sandy and gravelly material in substratum; pervious material.	Moderately slow permeability in subsoil; moderately rapid permeability in substratum.	Moderate infiltration; medium available moisture capacity.	Short slopes; seasonal wetness.	Moderately erodible; seasonal wetness.
Slow seepage; sandstone and shale at a depth of about 3 feet.	Fair stability and compaction; slow seepage.	Moderate permeability; sandstone and shale at a depth of about 3 feet.	Moderate infiltration; medium available moisture capacity.	Sandstone and shale at a depth of about 3 feet.	Moderately erodible.
Moderate permeability in upper 3 feet; very porous below a depth of 3 feet.	Good stability and compaction; moderate permeability if compacted; sandy and gravelly material below a depth of 3 feet.	Moderate permeability; good natural drainage.	Moderate infiltration; medium available moisture capacity; very rapid permeability below a depth of 3 feet.	Well drained; moderately erodible.	Moderately erodible.
High water table; high seepage in organic material.	Unstable; organic material in upper 20 to 40 inches; clayey material below a depth of 20 to 40 inches.	High water table; moderately slow permeability.	Variable infiltration; high available moisture capacity; very poor natural drainage.	Not needed	High water table; organic material.
Slow seepage	Good stability and compaction; moderate seepage; slight piping hazard.	Moderate permeability; well drained.	Moderate infiltration; high available moisture capacity.	Steep in some places; erosion hazard.	Moderately erodible.

Engineering classification systems

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

Many highway engineers classify soil material according to the system approved by the American Association of State Highway Officials (AASHO) (*2*). In this system soil material is placed in seven principal groups, designated A–1 through A–7. In group A–1 are gravelly soils of high bearing capacity, or the best soils for road subgrade, and in group A–7 are the poorest soils, clays that have low strength when wet. Within each group the relative engineering value of the soil material is indicated by a group index number. Group index numbers range from 0 for the best material to 20 for the poorest. They are shown in parentheses following the group symbol, for example, A–4(7), as is given for the surface layer of Canfield silt loam in table 4.

Some engineers prefer to use the Unified classification system (*15*). In this system soils are grouped on the basis of texture, plasticity, and their performance as material for engineering structures. Soil material is identified as coarse grained (eight classes), fine grained (six classes), or highly organic. The classification of the soils tested according to the Unified system is given in table 4, and the estimated classification for most soils in the county is given in table 5.

The United States Department of Agriculture classifies soils according to texture, which is determined by the proportion of sand, silt, and clay in the soil material (*13*). The terms "sand", "silt," and "clay" are defined in the Glossary at the back of the survey.

Except for some relatively minor modifications, the classification system of the Ohio Department of Highways (see table 4) is identical to the AASHO classification system. In the Ohio system an A–4 group is subdivided into A–4a and A–4b groups, and the A–6 group is subdivided into the A–6a and A–6b groups. Anyone using this system should consult the Ohio Department of Highways for a more detailed explanation of its soil classification system.

Soil test data

To help in evaluating the soils for engineering purposes, samples were taken from the soils of the Canfield, Chili, Fitchville, Geeburg, Luray, Sebring, Weinbach, Wheeling, and Wooster series and were tested by the Ohio Department of Highways, in accordance with standard procedures of the American Association of State Highway Officials (AASHO). The test data obtained are given in table 4. Also shown in table 4 is the classification of each sample according to the AASHO and the Unified systems, and according to the modified AASHO system used by the Ohio Department of Highways Testing Laboratory.

The engineering soil classifications given in table 4 are based on data obtained by mechanical analyses and by tests to determine liquid limit and plastic limit. The mechanical analyses were made by the combined sieve and hydrometer methods. The percentage of clay obtained by the hydrometer method should not be used in naming textural classes of soils.

The tests for determining the liquid limit and plastic limit 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 content 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 changes 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 plastic. Some silty and sandy soils are nonplastic; that is, they do not become plastic at any moisture content.

Table 4 also gives moisture-density data for the tested soils. If a soil material is compacted at a successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material increases 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, soil material is most stable if it is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

Engineering properties of soils

Table 5 gives estimated properties of soils important in engineering and lists estimated AASHO and Unified classifications. The textural terms for the horizons are those used by the U.S. Department of Agriculture. The estimates in table 5 are based on the test data in table 4 and on test data obtained from similar soils in other counties. Additional information useful to engineers is in the sections "Descriptions of the Soils" and "Formation and Classification of Soils."

In table 5 the depth to the seasonal high water table refers to the shallowest depth to which the water table rises in winter and spring. The water table may be a perched one or an ordinary ground water table. In estimating the depth of this water table, soil conditions immediately after heavy precipitation are not considered. In all soils, particularly sloping soils on uplands, the depth to the water table generally is greater late in spring, in winter, and in fall than the depth shown in table 5.

Depth to bedrock varies considerably in this county. Many of the soils are more than 10 feet deep to bedrock, but bedrock is at a depth of less than 2 feet in the Ramsey and Weikert soils.

The column headed "Depth from surface" lists the depths that correspond to significant changes in texture in the technical profile described as typical for the series. Some of the layers given in the technical profile have been combined. Soils having a profile that differs from the typical may have properties that vary from those shown. The depths given in table 5 for

mapping units that include Urban land apply only to undisturbed parts of the profile.

Listed for the layers in table 5 are the estimated percentages of material that pass Nos. 4, 10, and 200 sieves. The amount of material passing a No. 200 sieve determines whether soil material is coarse grained or fine grained. Also listed are the USDA textural classification and the AASHO and Unified engineering classifications.

Permeability refers to the downward movement of water through soil horizons that are saturated but occur above a true water table and can drain freely. The estimates are based on the texture, structure, and porosity of the soil and on infiltration tests and drainage observations. Percolation of water through the surface layer of soils varies considerably and depends on land use, soil management, and the content of moisture. In table 5 permeability is estimated in inches of water percolation per hour.

The available moisture capacity, estimated in inches per inch of soil depth, is the approximate amount of capillary water in a soil that is wet to field capacity. When the soil is air dry, this amount of water wets the soil material to a depth of 1 inch without deeper percolation. Available moisture capacity is the maximum amount of water that a soil can hold available for use by plants. For medium-textured and fine-textured soils, the estimated values listed are based on the difference in percentage of moisture retained at $\frac{1}{3}$ and 15 atmospheres of tension. For sandy soils, the estimated values are based on the difference between $\frac{1}{10}$ and 15 atmospheres of tension. For compact glacial till and fragipans, the estimated values listed in table 5 are lower than normal for a given texture. Because the increased bulk density in compact layers reduces the penetration of roots, all of the stored moisture is not available to plants.

In table 5 reaction is given in pH values that indicate degree of acidity or alkalinity. The values are based on many field tests made during the survey. Reaction is defined in the Glossary at the back of this publication.

Shrink-swell potential indicates the volume change of soil material expected with a change in moisture content. Ratings are low, moderate, and high. If shrink-swell potential is rated high, use for building foundations or some other engineering structure is seriously limited.

In table 5 the ratings for corrosion potential for steel or concrete are low, moderate, or high. These ratings indicate the effects that solvents in a soil have in corroding uncoated steel and untreated concrete pipes. The rating for steel is based on soil texture, drainage, and total acidity. Electrical resistance is not considered. The corrosion potential for concrete is based on soil texture and the pH value. The ratings are for concrete that has not been mixed specifically for corrosion resistance.

Engineering interpretations of soils

In table 6, the soils of Stark County are rated according to their suitability for winter grading, susceptibility to frost action, and suitability as a source of topsoil, sand and gravel, and road fill. In addition, the table lists soil features that affect location of highways and the construction and maintenance of farm ponds, drainage systems, irrigation systems, terraces and diversions, and waterways. The interpretations are based on the estimated soil properties shown in table 5, on the test data shown in table 4, and on field experiences. Following are explanations of the data in the columns of table 6.

Suitability for winter grading.—Because of wetness, plasticity, or susceptibility to frost action, many of the soils in the county are poorly suited to winter grading.

Susceptibility to frost action.—Silt loams, silty clay loams, fine sandy loams, and mucks that are wet most of the winter are the most susceptible to damaging frost action and are rated high in table 6.

Suitability as source of topsoil.—The thickness, texture, and natural fertility of the surface layer determine suitability of a soil for use as a topdressing. Unless noted otherwise, only the surface layer of the soil is considered in this rating.

Sand and gravel.—All areas of a soil rated good for sand and gravel may not be sources that are suitable for commercial development, but a soil rated good is more likely to be suitable for such development than soils rated poor or fair.

Suitability as source of road fill.—Well-graded, coarse materials or a mixture of clay and coarse-grained materials are suitable as a source of road fill. Highly plastic, clayey soils, poorly graded, silty soils, and organic soils are difficult to compact and are not suited as road fill or are poorly suited.

Highway locations.—Soil features that affect the location of highways include the depth to rock, a high water table, steep slopes, slippage of soil material, flooding, plastic soil material, and susceptibility to frost action.

Farm ponds.—The sealing potential of the soil material is the main factor affecting the reservoir area of farm ponds, though depth to bedrock and susceptibility to flooding are also important. Stability, ease or difficulty of compaction, and permeability of soil material affect construction and maintenance of the embankments of farm ponds, low dikes, and levees. Permeability is for soil material compacted at about the optimum moisture content.

Agricultural drainage.—The soil features are described relative to their natural drainage, their in-place permeability, and the presence of a high water table.

Irrigation.—The rate of water intake, permeability, natural drainage, and available moisture capacity are properties that affect irrigation. Slope and susceptibility to erosion are also important.

Terraces and diversions.—Slope and erodibility of the soil are the main features that affect terraces and diversions, though depth to rock and a seasonal high water table are also important. Terraces are not needed on nearly level soils. Steep soils are not well suited to terracing. Special care is needed where diversions are constructed on highly erodible soils.

Waterways.—Erodibility, available moisture capacity, and bedrock near the surface are among the soil features affecting establishment of waterways.

Town and Country Planning

Stark County is in the highly industrialized area that extends from Detroit, Mich., eastward to Buffalo, N. Y., and is also in the rapidly expanding area between Cleveland, Ohio, and Pittsburgh, Pa. The county has congested community centers, sprawling residential developments, fringe areas where town and country land uses are mixed (fig. 8), and good farmland. It also contains land that, because of its location and the characteristics of the soils, has little potential for farming or intensive town use. Because farming cannot compete with community and industrial development, the farmland in the county is slowly decreasing. Canton is the largest city in Stark County, but Alliance to the northeast and Massillon to the west, are rapidly expanding.

Farming can continue on high-quality soils where the extension of public utilities is difficult and community expansion is not feasible. This is particularly true on the organic soils in the northern part of the county where truck crops are grown. Also, dairy farming is expected to continue near the growing communities.

This section of the soil survey provides information on the properties of soils and their effect on selected nonfarm use of land. It will help community planners and industrial users of land, who generally look for areas that are least costly to develop and maintain. Development and maintenance costs are related to soil limitations. These planners will find other useful information on the soil maps and in other parts of the survey, particularly the sections "Engineering Uses of Soils" and "Descriptions of the Soils."

Table 7 gives the estimated degree and kinds of limitations of soils for some selected land uses. By using this information, alternate uses can be developed as a basis for long-range planning and zoning. Because extensive manipulation of the soil alters some of its natural properties, the rating of some uses will no longer apply to areas that have undergone extensive cutting and filling. Also, the estimates given in table 7 do not eliminate the need for an investigation at the site of the specified use.

The estimated degree of limitations of the soils for a specified land use are slight, moderate, and severe. A rating of *slight* indicates that the soil has no important limitation to the specified use. *Moderate* shows that the soil has some limitations to the specified use. These limitations need to be recognized, but they can be overcome or corrected. A rating of *severe* indicates that the soil has serious limitations that are difficult to overcome. A severe rating, however, does not mean that the soil cannot be used for the specific use.

Following are explanations of the uses rated in table 7.

Cultivated crops.—In rating the soils according to their limitations to use for cultivated crops, the degree of limitation is based on the land capability classes, which are explained in the subsection "Capability Grouping." Erosion, flooding, slope, wetness, droughtiness, stoniness, and depth to bedrock were considered in making these ratings. Cultivated crops are rated in table 7 to aid land use planners when they consider whether or not farming is the most suitable use for a particular area. Where it is decided to take cropland for residential or industrial use, the decision generally is irreversible. After the change is made the land is no longer a source of food.

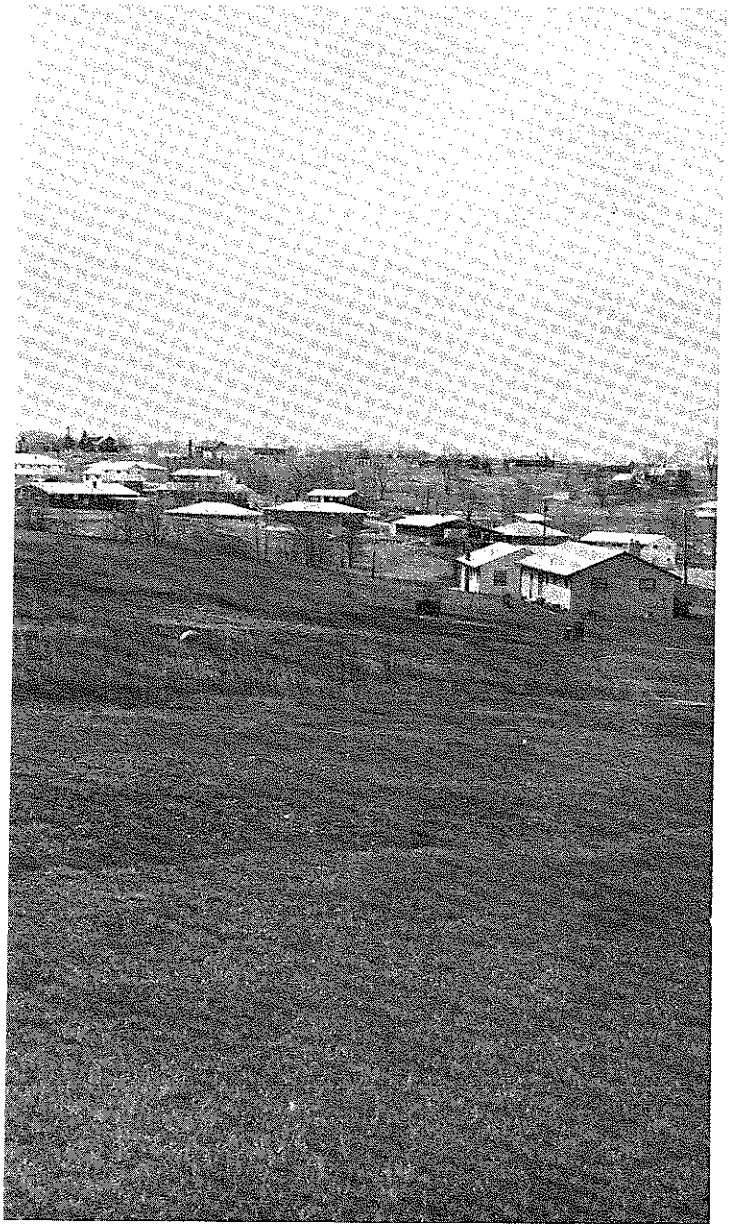

***Figure 8.*—A housing development on a Canfield silt loam. This is a fringe area where town and country land uses are mixed.**

Homesite locations.—The ratings in table 7 are for houses of three stories or less that have a basement, but the ratings also apply to sites for light industrial, commercial, and institutional buildings of three

stories or less that have a basement. The main features that limit the use of soils as homesites are the hazard of flooding, slope, a seasonal high water table, the depth to and kind of bedrock, natural drainage, and stoniness of the soil surface. Not considered is a method for disposing of sewage.

Flooding is a severe hazard when it occurs. Buildings constructed on naturally wet soils probably will have wet basements unless adequate drainage is provided. The soils in many areas of the county are poorly drained or somewhat poorly drained. In many areas tile drains and open ditches have been installed on the naturally wet soils so that they can be used for farming, but excavations for houses or other structures can disrupt these systems. Soils that have poor natural drainage and a high content of silt generally are poor sites for building foundations because the soil material is soft and compressible. Excavating for basements and installing underground utility lines are difficult and expensive on soils that are shallow to bedrock.

Disposal of sewage effluent.—Because the installation of community systems for disposing sewage has not kept pace with the need in Stark County, the number of individual sewage systems is increasing rapidly. The proper functioning of these systems depends on the characteristics of the soils. On some soils the infiltration of effluent is at a rate that is satisfactory for the operation of septic tanks, but the use of some soils for this purpose is severely limited by flooding, by somewhat poor drainage to very poor drainage, or by slow permeability. Among the features that affect the degree of limitation are permeability, depth to the water table, depth to and kind of bedrock, slope, and the hazard of flooding.

If filter fields for septic tanks are located on steep soils, seepage downslope may be a problem. Septic tanks and sewage lines are difficult to install on soils that are shallow to bedrock. A restrictive layer in some soils, such as solid rock or a dense, compact layer, interferes with adequate filtration and the removal of effluent. Some very poorly drained to somewhat poorly drained soils have a high water table for long periods.

Some of the soils in the county are underlain by sandy or gravelly material or by cracked and creviced bedrock through which effluent that is inadequately filtered can contaminate the ground water or nearby springs, lakes, or streams.

Sewage lagoons.—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 available. Among the features that control the degree of limitation are the texture of the soil material, a hazard of flooding, degree of slope, depth to bedrock, permeability, and the water table.

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

Streets and parking lots.—The ratings in table 7 are for soils used for streets and parking lots in residential areas where traffic is not heavy. Considered in estimating the ratings were the hazard of flooding, slope, depth to and kind of bedrock, depth to the water table, and the degree of stoniness. The estimated soil properties and soil features that are important in designing, constructing, and maintaining highways are given in the subsection "Engineering Uses of Soils."

Athletic fields and other intensive play areas.—Properties to consider when selecting sites to be used as athletic fields and other intensive play areas include natural drainage, slope, depth to the water table, depth to and kind of bedrock, permeability, degree of stoniness, the hazard of flooding, and the texture of the surface soil. In table 7 the use of fill material from other areas was not considered in the ratings. Soils on flood plains can be used as ball diamonds, picnic areas, and other intensive play areas that are not subject to costly damage by floodwater and that are not used during normal periods of flooding. The ratings given in table 7 for streets and parking lots are also important when considering the use of soils for tennis courts.

Parks and other extensive play areas.—Parks and other extensive play areas can be located on many kinds of soils that have severe limitations for most other uses. Flood plains, for example, can be safely developed as extensive play areas. Many areas along streams are scenic and, because of their linear shape, can be used by a relatively large number of people. Considered in rating the soils for parks and other extensive play areas were the hazard of flooding, degree of stoniness and rockiness, degree of slope, texture of the surface soil, and depth to the water table.

Campsites.—Sites suitable for tents and trailers should be located in areas suitable as unsurfaced parking lots for cars and camping trailers. Properties to consider when selecting campsites are a hazard of flooding, a seasonal high water table, permeability, the degree of slope, and soil texture. Wetness is the major factor that affects the degree of limitation for campsites. Soils that have slopes of less than 12 percent are the most desirable for use as tent campsites, but trailers require less sloping soils than tents. Soils having a medium-textured surface layer have fewer limitations to use as campsites than the very clayey or very sandy soils.

The ratings given in table 7 for the disposal of sewage effluent are also important when considering the use of soils for campsites.

Sanitary land fills.—Among the properties affecting the use of soils for the trench type of sanitary land

TABLE 7.—*Estimated degree and kinds of*

[Not rated in this table are Borrow pits, Cut and fill land, Gravel pits, Made land,

Soil series and map symbols	Cultivated crops	Sites for homes of 3 stories or less [1]	Disposal of sewage effluent	Sewage lagoons	Lawns, landscaping, and golf fairways
Alluvial land: Ad	Severe: subject to flooding; stoniness.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Arkport: ArB	Slight	Slight	Slight [2]	Severe: rapid permeability.[2]	Severe: low available moisture capacity.
ArC	Moderate: slope; erosion hazard.	Moderate: slope	Moderate: slope	Severe: rapid permeability; slope.[2]	Severe: low available moisture capacity.
ArD	Severe: slope; erosion hazard.	Severe: slope	Severe: slope	Severe: rapid permeability; slope.[2]	Severe: low available moisture capacity.
Bogart: BgA, BoA	Slight	Moderate: seasonal high water table.	Moderate: seasonal high water table.[2]	Severe: rapid permeability in substratum.[2]	Slight
BgB, BoB	Slight	Moderate: seasonal high water table.	Moderate: seasonal high water table.[2]	Severe: rapid permeability in substratum.[2]	Slight
BoC	Moderate: slope; erosion hazard.	Moderate: seasonal high: water table; slope.	Moderate: seasonal high water table; slope.[2]	Severe: rapid permeability in substratum; slope.[2]	Moderate: slope
Brooke: BwC2	Moderate: slope; erosion hazard.	Severe: 20 to 36 inches to limestone.	Severe: slow permeability; 20 to 36 inches to limestone.	Severe: slope; 20 to 36 inches to limestone.	Moderate to severe: medium to low available moisture capacity.
BwE2	Severe: slope; erosion hazard.	Severe: 20 to 36 inches to limestone; slope.	Severe: slow permeability; slope; 20 to 36 inches to limestone.	Severe: slope; 20 to 36 inches to limestone.	Severe: low available moisture capacity; slope.
Canadice: Ca	Severe: wetness	Severe: seasonal high water table.	Severe: very slow permeability; seasonal high water table.	Slight	Severe: seasonal high water table.
Canfield: CdA	Slight	Moderate: seasonal high water table.	Severe: moderately slow permeability.	Slight	Slight
CdB	Slight	Moderate: seasonal high water table.	Severe: moderately slow permeability.	Moderate: slope	Slight
CdC, CdC2	Moderate: slope; erosion hazard.	Moderate: seasonal high water table slope.	Severe: moderately slow permeability.	Severe: slope	Moderate: slope

limitations for town and country planning

Quarries, Strip mine spoil, Urban land, and the 16 complexes that include Urban land]

Streets and parking lots	Athletic fields and other intensive play areas	Parks and other extensive play areas	Campsites		Sanitary land fills	Cemeteries
			Tents	Trailers		
Severe: subject to flooding.	Severe: subject to flooding; coarse fragments.	Severe: subject to flooding; coarse fragments.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.[2]	Severe: subject to flooding.
Moderate: slope.	Moderate: slope.	Slight	Slight	Moderate: slope.	Severe: permeable sandy material.	Slight.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Severe: slope	Severe: permeable sandy material.	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; permeable sandy material.	Severe: slope.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Slight	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Severe: rapid permeability in substratum.	Moderate: seasonal high water table.
Moderate: seasonal high water table; slope.	Moderate: seasonal high water table; slope.	Slight	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Severe: rapid permeability in substratum.	Moderate: seasonal high water table.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: seasonal high water table; slope.	Severe: slope	Severe: rapid permeability in substratum.	Moderate: seasonal high water table; slope.[2]
Severe: 20 to 36 inches to limestone; slope.	Severe: 20 to 36 inches to limestone; slope; slow permeability.	Moderate: 20 to 36 inches to limestone; slope; texture.	Moderate: slope.	Severe: slope	Severe: 20 to 36 inches to limestone.	Severe: 20 to 36 inches to limestone.
Severe: 20 to 36 inches to limestone; slope.	Severe: 20 to 36 inches to limestone; slope; slow permeability.	Severe: slope	Severe: slope	Severe: slope	Severe: 20 to 36 inches to limestone; slope.	Severe: 20 to 36 inches to limestone; slope.
Severe: seasonal high water table.	Severe: very slow permeability; seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; very slow permeability.	Severe: seasonal high water table; very slow permeability.	Severe: seasonal high water table; clayey material.	Severe: seasonal high water table; very slow permeability.
Moderate: seasonal high water table.	Moderate: seasonal high water table; moderately slow permeability.	Slight	Moderate: moderately slow permeability; seasonal high water table.	Moderate: moderately slow permeability; seasonal high water table.	Moderate: seasonal high water table.	Moderate: moderately slow permeability; seasonal high water table.
Moderate: seasonal high water table; slope.	Moderate: seasonal high water table; moderately slow permeability; slope.	Slight	Moderate: moderately slow permeability; seasonal high water table.	Moderate: moderately slow permeability; seasonal high water table.	Moderate: seasonal high water table.	Moderate: moderately slow permeability; seasonal high water table.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: moderately slow permeability; seasonal high water table; slope.	Severe: slope	Moderate: seasonal high water table; slope.	Moderate: moderately slow permeability; seasonal high water table; slope.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Cultivated crops	Sites for homes of 3 stories or less [1]	Disposal of sewage effluent	Sewage lagoons	Lawns, landscaping, and golf fairways
CdD, CdD2	Severe: slope; erosion hazard.	Severe: slope	Severe: moderately slow permeability; slope.	Severe: slope	Severe: slope
CfB	Slight	Severe: 20 to 40 inches to siltstone and shale.	Severe: 20 to 40 inches to siltstone and shale.	Severe: 20 to 40 inches to siltstone and shale.	Moderate: 20 to 40 inches to siltstone and shale; medium available moisture capacity.
CfC	Moderate: slope; erosion hazard.	Severe: 20 to 40 inches to siltstone and shale.	Severe: 20 to 40 inches to siltstone and shale.	Severe: 20 to 40 inches to siltstone and shale; slope.	Moderate: 20 to 40 inches to siltstone and shale; medium available moisture capacity; slope.
Carlisle:					
Ch	Moderate: wetness.	Severe: organic material; high water table; soft material.	Severe: organic material; high water table; soft material.[2]	Severe: organic material; high water table; soft material.[2]	Severe: organic material; high water table; soft material.
Chagrin:					
Ck, Cm	Slight	Severe: subject to flooding.	Severe: subject to flooding.[2]	Severe: subject to flooding.[2]	Severe: subject to flooding.
Chili:					
CnA, CpA	Slight	Slight	Slight[2]	Severe: very rapid permeability in substratum.[2]	Moderate: medium available moisture capacity.
CnB, CpB	Slight	Slight	Slight[2]	Severe: very rapid permeability in substratum.[2]	Moderate: medium available moisture capacity.
CoC, CoC2, CpC, CpC2	Moderate: slope; erosion hazard.	Moderate: slope	Moderate: slope.[2]	Severe: very rapid permeability in substratum; slope.[2]	Moderate: medium available moisture capacity; slope.
CoD2, CoE2	Severe: slope; erosion hazard.	Severe: slope	Severe: slope[2]	Severe: very rapid permeability in substratum; slope.[2]	Severe: slope
CvF2 (Limitations to use of Conotton soil in this mapping unit are the same as for Chili.)	Severe: slope; erosion hazard.	Severe: slope	Severe: slope[2]	Severe: very rapid permeability in substratum; slope.[2]	Severe: low available moisture capacity; slope.
Conotton:					
CwA	Moderate: droughty.	Slight	Slight[2]	Severe:[2] very rapid permeability in substratum.	Severe: very low available moisture capacity.
CyB	Moderate: droughty.	Slight	Slight[2]	Severe:[2] very rapid permeability in substratum.	Severe: very low available moisture capacity.

for town and country planning—Continued

Streets and parking lots	Athletic fields and other intensive play areas	Parks and other extensive play areas	Campsites		Sanitary land fills	Cemeteries
			Tents	Trailers		
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: 20 to 40 inches to siltstone and shale.	Severe: 20 to 40 inches to siltstone and shale.	Moderate: 20 to 40 inches to siltstone and shale.	Moderate: moderately slow permeability; seasonal high water table.	Moderate: moderately slow permeability; seasonal high water table; slope.	Severe: 20 to 40 inches to siltstone and shale.	Severe: 20 to 40 inches to siltstone and shale.
Severe: 20 to 40 inches to siltstone and shale; slope.	Severe: 20 to 40 inches to siltstone and shale; slope.	Moderate: 20 to 40 inches to siltstone and shale; slope.	Moderate: moderately slow permeability; seasonal high water table; slope.	Severe: slope	Severe: 20 to 40 inches to siltstone and shale.	Severe: 20 to 40 inches to siltstone and shale.
Severe: organic material; high water table; soft material.	Severe: organic material; high water table; soft material.	Severe: organic material; high water table; soft material.	Severe: organic material; high water table; soft material.	Severe: organic material; high water table; soft material.	Severe: organic material; high water table; soft material.[2]	Severe: organic material; high water table; soft material.
Severe: subject to flooding.	Moderate:[4] subject to flooding.	Moderate:[4] subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.[2]	Severe: subject to flooding.
Slight	Slight	Slight	Slight	Slight	Severe: very rapid permeability in substratum.[2]	Slight.
Moderate: slope.	Moderate: slope.	Slight	Slight	Moderate: slope.	Severe: very rapid permeability in substratum.[2]	Slight.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Severe: slope	Severe: very rapid permeability in substratum.[2]	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; very rapid permeability in substratum.[2]	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; very rapid permeability in substratum.[2]	Severe: slope.
Slight	Moderate: very low available moisture capacity.	Slight	Slight	Slight	Severe: very rapid permeability in subsoil and substratum.	Slight.
Moderate: slope.	Moderate: texture; slope.	Moderate: gravelly surface.	Moderate: gravelly surface.	Moderate: slope; texture surface layer.	Severe: very rapid permeability in subsoil and substratum.	Slight.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Cultivated crops	Sites for homes of 3 stories or less [1]	Disposal of sewage effluent	Sewage lagoons	Lawns, landscaping, and golf fairways
CyC	Moderate: droughty.	Moderate: slope	Moderate: [2] slope	Severe: [2] very rapid permeability in substratum; slope.	Severe: very low available moisture capacity.
CyD2, CyE2	Severe: slope; erosion hazard.	Severe: slope	Severe: [2] slope	Severe: [2] very rapid permeability in substratum; slope.	Severe: very low available moisture capacity; slope.
Dekalb:					
DkB	Slight	Severe: 24 to 40 inches to sandstone.	Severe: 24 to 40 inches to sandstone.	Severe: 24 to 40 inches to sandstone.	Severe: low available moisture capacity;
DkC	Moderate: slope; erosion hazard.	Severe: 24 to 40 inches to sandstone.	Severe: 24 to 40 inches to sandstone.	Severe: 24 to 40 inches to sandstone; slope.	Severe: 24 to 40 inches to sandstone; slope.
DkE2, DkF2	Severe: slope; erosion hazard.	Severe: 24 to 40 inches to sandstone; slope.	Severe: 24 to 40 inches to sandstone; slope.	Severe: 24 to 40 inches to sandstone; slope.	Severe: low available moisture capacity; slope.
Edwards:					
Ed	Moderate: wetness.	Severe: organic material; high water table; soft material.	Severe: organic material; high water table; soft material.[2]	Severe: organic material; high water table; soft material.[2]	Severe: organic material; high water table.
Fitchville:					
FcA	Slight	Severe: seasonal high water table.	Severe: moderately slow permeability.	Slight	Moderate: seasonal high water table.
FcB	Slight	Severe: seasonal high water table.	Severe: moderately slow permeability.	Moderate: slope	Moderate: seasonal high water table.
FcC	Moderate: slope; erosion hazard.	Severe: seasonal high water table.	Severe: moderately slow permeability.	Severe: slope	Moderate: seasonal high water table; slope.
Geeburg:					
GbC2	Severe: slope; erosion hazard.	Moderate: seasonal high water table; high shrink-swell potential; slope.	Severe: very slow permeability.	Severe: slope	Moderate: slope; high clay content; very slow permeability.
GbE2	Severe: slope; erosion hazard.	Severe: seasonal high water table; slope; high shrink-swell potential.	Severe: very slow permeability; slope.	Severe: slope	Severe: low available moisture capacity; slope.

for town and country planning—Continued

Streets and parking lots	Athletic fields and other intensive play areas	Parks and other extensive play areas	Campsites		Sanitary land fills	Cemeteries
			Tents	Trailers		
Severe: slope	Severe: slope	Moderate: slope; gravelly surface.	Moderate: slope; gravelly surface.	Severe: slope	Severe: very rapid permeability in subsoil and substratum.	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; very rapid permeability in subsoil and substratum.[2]	Severe: slope.
Severe: 24 to 40 inches to sandstone.	Severe: 24 to 40 inches to sandstone.	Moderate: 24 to 40 inches to sandstone.	Slight	Moderate: slope.	Severe: 24 to 40 inches to sandstone.	Severe: 24 to 40 inches to sandstone.
Severe: 24 to 40 inches to sandstone; slope.	Severe: 24 to 40 inches to sandstone; slope.	Moderate: 24 to 40 inches to sandstone; slope.	Moderate: slope.	Severe: slope	Severe: 24 to 40 inches to sandstone.	Severe: 24 to 40 inches to sandstone.
Severe: 24 to 40 inches to sandstone; slope.	Severe: 24 to 40 inches to sandstone; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: 24 to 40 inches to sandstone; slope.	Severe: 24 to 40 inches to sandstone; slope.
Severe: organic material; high water table; soft material.	Severe: organic material; high water table.	Severe: organic material; high water table.	Severe: organic material; high water table.	Severe: organic material; high water table.	Severe: organic material; high water table; soft material.[2]	Severe: organic material; high water table; soft material.
Severe: seasonal high water table; highly susceptible to frost heaving; soft and compressible.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; subject to ponding.	Severe: seasonal high water table.
Severe: seasonal high water table; highly susceptible to frost heaving; soft and compressible.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table.
Severe: slope; highly susceptible to frost heaving; seasonal high water table.	Severe: seasonal high water table; slope.	Moderate: seasonal high water table; slope.	Severe: seasonal high water table.	Severe: seasonal high water table; slope.	Moderate: seasonal high water table; slope.	Severe: seasonal high water table.
Severe: slope	Severe: very slow permeability; slope.	Moderate: slope.	Severe: very slow permeability.	Severe: very slow permeability; slope.	Severe: clayey material.	Severe: seasonal high water table; very slow permeability.
Severe: slope	Severe: very slow permeability; slope.	Severe: slope	Severe: seasonal high water table; very slow permeability; slope.	Severe: seasonal high water table; very slow permeability; slope.	Severe: seasonal high water table; slope.	Severe: seasonal high water table; very slow permeability; slope.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Cultivated crops	Sites for homes of 3 stories or less [1]	Disposal of sewage effluent	Sewage lagoons	Lawns, landscaping, and golf fairways
Gilpin:					
GdB	Slight	Moderate: 20 to 36 inches to siltstone.	Severe: 20 to 36 inches to siltstone.	Severe: 20 to 40 inches to siltstone.	Severe: low available moisture capacity.
GdC	Moderate: slope; erosion hazard.	Moderate: 20 to 36 inches to siltstone.	Severe: 20 to 36 inches to siltstone.	Severe: 20 to 40 inches to siltstone; slope.	Severe: low available moisture capacity;
GdD	Severe: slope; erosion hazard.	Severe: 20 to 36 inches to siltstone; slope.	Severe: 20 to 36 inches to siltstone; slope.	Severe: 20 to 40 inches to siltstone; slope.	Severe: low available moisture capacity; slope.
Ginat:					
Ge	Moderate: wetness.	Severe: seasonal high water table.	Severe: moderately slow permeability; seasonal high water table.[2]	Moderate: moderately slow permeability.[2]	Severe: seasonal high water table.
Glenford:					
GfA, GfB	Slight	Moderate: seasonal high water table; soft material when wet.	Severe: moderately slow permeability.	Slight on GfA; moderate on GfB; slope.	Slight
GfC, GfC2, GfD2	Moderate: slope; erosion hazard.	Moderate: seasonal high water table; slope. Severe on FfD2: slope.	Severe: moderately slow permeability; slope on GfD2.	Severe: slope	Moderate: slope. Severe on GfD2; slope.
Keene:					
KeB	Slight	Moderate: seasonal high water table.	Severe: slow permeability; clay shale substratum.	Moderate: slope	Moderate: clayey; medium available moisture capacity.
KeC, KeC2	Moderate: slope; erosion hazard.	Moderate: seasonal high water table; slope.	Severe: slow permeability; clay shale substratum.	Severe: slope	Moderate: slope; medium available moisture capacity.
KeD, KeD2, KeE	Severe: slope; erosion hazard.	Severe: slope	Severe: slow permeability; clay shale substratum; slope.	Severe: slope	Severe: low available moisture capacity; slope.
Killbuck:					
Kk	Moderate: wetness.	Severe: subject to flooding.	Severe: subject to flooding.[2]	Severe: subject to flooding.[2]	Severe: subject to flooding.
Latham:					
LaB	Moderate: slope; erosion hazard.	Severe: 24 to 40 inches to shale.	Severe: slow permeability.	Moderate: slope	Moderate: 24 to 40 inches to shale.
LaC, LaC2	Severe: slope; erosion hazard.	Severe: 24 to 40 inches to shale.	Severe: slow permeability.	Severe: slope	Moderate: 24 to 40 inches to shale.

for town and country planning—Continued

Streets and parking lots	Athletic fields and other intensive play areas	Parks and other extensive play areas	Campsites		Sanitary land fills	Cemeteries
			Tents	Trailers		
Severe: 20 to 40 inches to siltstone.	Severe: 20 to 40 inches to siltstone.	Moderate: 20 to 40 inches to siltstone.	Moderate: 20 to 40 inches to bedrock.	Moderate: slope.	Severe: 20 to 40 inches to siltstone.	Severe: 20 to 40 inches to siltstone.
Severe: 20 to 40 inches to siltstone.	Severe: 20 to 40 inches to siltstone; slope.	Moderate: 20 to 40 inches to siltstone; slope.	Moderate: slope.	Severe: slope	Severe: 20 to 40 inches to siltstone.	Severe: 20 to 40 inches to siltstone.
Severe: 20 to 40 inches to siltstone; slope.	Severe: 20 to 40 inches to siltstone; slope.	Severe: 20 to 40 inches to siltstone; slope.	Severe: slope	Severe: slope	Severe: 20 to 40 inches to siltstone; slope.	Severe: 20 to 40 inches to siltstone; slope.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; moderately slow permeability.	Severe: seasonal high water table; moderately slow permeability.	Severe: seasonal high water table.	Severe: seasonal high water table; moderately slow permeability.
Moderate: seasonal high water table.	Moderate: seasonal high water table; moderately slow permeability; slope on GfB.	Slight	Moderate: seasonal high water table; moderately slow permeability.	Moderate: seasonal high water table; moderately slow permeability; slope on GfB.	Moderate: seasonal high water table.	Moderate: seasonal high water table; moderately slow permeability.
Severe: slope	Severe: slope	Moderate: slope. Severe on GfD2: slope.	Moderate: seasonal high water table; moderately slow permeability. Severe on GfD2: slope.	Severe: slope	Moderate: seasonal high water table; slope. Severe on GfD2: slope.	Moderate: seasonal high water table; moderately slow permeability; slope. Severe on GfD2: slope.
Moderate: seasonal high water table; slope.	Severe: slow permeability.	Slight	Severe: slow permeability.	Severe: slow permeability.	Severe: clayey; bedrock at depth of less than 5 feet.	Severe: slow permeability.
Severe: slope	Severe: slow permeability; slope.	Moderate: slope.	Severe: slow permeability.	Severe: slow permeability; slope.	Severe: clayey; bedrock at depth of less than 5 feet.	Severe: slow permeability.
Severe: slope	Severe: slow permeability: slope.	Severe: slope	Severe: slow permeability; slope.	Severe: slow permeability; slope.	Severe: slope; clayey.	Severe: slow permeability; slope.
Severe: subject to flooding.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.[2]	Severe: subject to flooding.
Severe: 24 to 40 inches to shale.	Severe: 24 to 40 inches to shale.	Moderate: 24 to 40 inches to shale.	Moderate: 24 to 40 inches to shale.	Moderate: slope.	Severe: 24 to 40 inches to shale.	Severe: 24 to 40 inches to shale.
Severe: 24 to 40 inches to shale; slope.	Severe: 24 to 40 inches to shale; slope.	Moderate: 24 to 40 inches to shale; slope.	Moderate: slope.	Severe: slope	Severe: 24 to 40 inches to shale.	Severe: 24 to 40 inches to shale.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Cultivated crops	Sites for homes of 3 stories or less [1]	Disposal of sewage effluent	Sewage lagoons	Lawns, landscaping, and golf fairways
LaD, LaD2, LaF	Severe: slope; erosion hazard.	Severe: 24 to 40 inches to shale; slope.	Severe: slow permeability; slope.	Severe: slope	Severe: slope
Licking:					
LcA	Moderate: wetness.	Moderate: seasonal high water table.	Severe: very slow permeability.	Slight	Moderate: very slow permeability; clayey.
LcB	Moderate: wetness.	Moderate: seasonal high water table.	Severe: very slow permeability.	Moderate: slope	Moderate: very slow permeability; clayey.
LcC, LcC2	Moderate: slope; erosion hazard.	Moderate: seasonal high water table; slope.	Severe: very slow permeability.	Severe: slope	Moderate: very slow permeability; slope; clayey.
LcE2	Severe: slope; erosion hazard.	Severe: slope	Severe: very slow permeability; slope.	Severe: slope	Severe: slope
Linwood:					
Ld	Moderate: wetness.	Severe: organic material; high water table; soft material.	Severe: organic material; high water table; soft material.[2]	Severe: organic material; high water table; soft material.	Severe: organic material; high water table; soft material.
Lobdell:					
Le	Slight	Severe: subject to flooding.	Severe: subject to flooding.[2]	Severe: subject to flooding.[2]	Severe: subject to flooding.
Loudonville:					
LoB	Slight	Moderate: 20 to 40 inches to siltstone.	Severe: 20 to 40 inches to siltstone.	Severe: 20 to 40 inches to siltstone.	Moderate: slope; 20 to 40 inches to bedrock.
LoC, LoC2	Moderate: slope; erosion hazard.	Moderate: 20 to 40 inches to siltstone.	Severe: 20 to 40 inches to siltstone.	Severe: 20 to 40 inches to siltstone; slope.	Moderate: slope; 20 to 40 inches to bedrock.
LoD, LoD2, LoE2, LoF2	Severe: slope; erosion hazard.	Severe: 20 to 40 inches to siltstone; slope.	Severe: 20 to 40 inches to siltstone; slope.	Severe: 20 to 40 inches to siltstone; slope.	Severe: low available moisture capacity; slope.
Luray:					
Ly	Slight	Severe: seasonal high water table.	Severe: moderately slow permeability; seasonal high water table.	Slight[3]	Severe: seasonal high water table.
Lz	Slight	Severe: seasonal high water table.	Severe: moderately slow permeability; seasonal high water table.	Severe: rapid permeability in substratum.	Severe: seasonal high water table.

for town and country planning—Continued

Streets and parking lots	Athletic fields and other intensive play areas	Parks and other extensive play areas	Campsites		Sanitary land fills	Cemeteries
			Tents	Trailers		
Severe: 24 to 40 inches to shale; slope.	Severe: 24 to 40 inches to shale; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: 24 to 40 inches to shale; slope.	Severe: 24 to 40 inches to shale; slope.
Moderate: seasonal high water table; very slow permeability; clayey; soft and compressible.	Severe: very slow permeability.	Slight	Severe: very slow permeability.	Severe: very slow permeability.	Slight	Severe: very slow permeability.
Moderate: seasonal high water table; slope; soft and compressible.	Severe: very slow permeability.	Slight	Severe: very slow permeability.	Severe: very slow permeability.	Slight	Severe: very slow permeability.
Severe: slope; soft and compressible.	Severe: very slow permeability; slope.	Moderate: slope.	Severe: very slow permeabilitv.	Severe: very slow permeability; slope.	Moderate: slope.	Severe: very slow permeability.
Severe: slope; soft and compressible.	Severe: slope; very slow permeability.	Severe: slope	Severe: very slow permeability; slope.	Severe: very slow permeability; slope.	Severe: slope	Severe: very slow permeability; slope.
Severe: organic material; high water table; soft material.	Severe: organic material; high water table; soft material.	Severe: organic material; high water table; soft material.	Severe: organic material; high water table; soft material.	Severe: organic material; high water table; soft material.	Severe: organic material; high water table; soft material.[2]	Severe: organic material; high water table; soft material.
Severe: subject to flooding.	Moderate:[1] seasonal high water table; subject to flooding.	Moderate:[1] subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.[2]	Severe: subject to flooding.
Severe: 20 to 40 inches to siltstone.	Moderate: 20 to 40 inches to siltstone; slope.	Moderate: 20 to 40 inches to siltstone.	Slight	Moderate: slope.	Severe: 20 to 40 inches to siltstone.	Severe: 20 to 40 inches to siltstone.
Severe: 20 to 40 inches to siltstone; slope.	Severe: 20 to 40 inches to siltstone; slope.	Moderate: 20 to 40 inches to siltstone; slope.	Moderate: slope.	Severe: slope	Severe: 20 to 40 inches to siltstone.	Severe: 20 to 40 inches to siltstone.
Severe: 20 to 40 inches to siltstone; slope.	Severe: 20 to 40 inches to siltstone; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: 20 to 40 inches to siltstone; slope.	Severe: 20 to 40 inches to siltstone; slope.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Cultivated crops	Sites for homes of 3 stories or less [1]	Disposal of sewage effluent	Sewage lagoons	Lawns, landscaping, and golf fairways
Mentor:					
MeA	Slight	Slight	Slight	Moderate: moderate permeability.	Slight
MeB	Slight	Slight	Slight	Moderate: moderate permeability; slope.	Slight
MeC	Moderate: slope; erosion hazard.	Moderate: seasonal high water table; slope.	Moderate: moderate permeability; slope.	Severe: slope	Moderate: slope
MeD	Severe: slope; erosion hazard.	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Montgomery:					
Mg	Moderate: wetness.	Severe: seasonal high water table.	Severe: very slow permeability; seasonal high water table.	Slight	Severe: seasonal high water table.
Muskingum:					
MsB	Slight	Severe: 20 to 36 inches to siltstone.	Severe: 20 to 36 inches to siltstone.	Severe: 20 to 36 inches to siltstone.	Severe: low available moisture capacity.
MsC	Moderate: slope; erosion hazard.	Severe: 20 to 36 inches to siltstone.	Severe: 20 to 36 inches to siltstone.	Severe: 20 to 36 inches to siltstone; slope.	Severe: low available moisture capacity.
MsD	Severe: slope; erosion hazard.	Severe: 20 to 36 inches to siltstone; slope.	Severe: 20 to 36 inches to siltstone; slope.	Severe: 20 to 36 inches to siltstone; slope.	Severe: low available moisture capacity; slope.
MvE, MvE3, MvF, MvG (Limitations to use of Gilpin soils in mapping units MvE, MvE3, MvF, and MvG are the same as for Muskingum.)	Severe: slope; erosion hazard.	Severe: 20 to 36 inches to siltstone; slope.	Severe on MvE: 20 to 36 inches to siltstone. Severe on MvE3, MvF, and MvG: 20 to 40 inches to siltstone; slope.	Severe: 20 to 36 inches to siltstone; slope.	Severe: low available moisture capacity; slope.
Plainfield:					
PlB	Severe: droughty.	Slight	Slight [2]	Severe: rapid permeability.[2]	Severe: low available moisture capacity.
PlC	Severe: droughty.	Slight	Moderate: slope.[2]	Severe: rapid permeability; slope.	Severe: low available moisture capacity.
Rainsboro:					
RaB	Slight	Moderate: seasonal high water table.	Severe: moderately slow permeability.	Moderate: slope	Slight
RaC	Moderate: slope; erosion hazard.	Moderate: seasonal high water table.	Severe: moderately slow permeability.	Severe: slope	Moderate: slope

for town and country planning—Continued

Streets and parking lots	Athletic fields and other intensive play areas	Parks and other extensive play areas	Campsites		Sanitary land fills	Cemeteries
			Tents	Trailers		
Slight	Slight	Slight	Slight	Slight	Slight	Slight.
Moderate: slope.	Moderate: slope.	Slight	Slight	Moderate: slope.	Slight	Slight.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Severe: slope	Moderate: slope.	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: seasonal high water table.	Severe: very slow permeability; seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; very slow permeability; subject to ponding.	Severe: seasonal high water table; very slow permeability.	Severe: seasonal high water table; clayey; very slow permeability; subject to ponding.	Severe: seasonal high water table; very slow permeability.
Severe: 20 to 36 inches to siltstone.	Severe: 20 to 36 inches to siltstone.	Moderate: 20 to 36 inches to siltstone.	Moderate: 20 to 36 inches to bedrock.	Moderate: slope.	Severe: 20 to 36 inches to siltstone.	Severe: 20 to 36 inches to siltstone.
Severe: 20 to 36 inches to siltstone; slope.	Severe: 20 to 36 inches to siltstone; slope.	Moderate: 20 to 36 inches to siltstone; slope.	Moderate: slope.	Severe: slope	Severe: 20 to 36 inches to siltstone.	Severe: 20 to 36 inches to siltstone.
Severe: 20 to 36 inches to siltstone; slope.	Severe: 20 to 36 inches to siltstone; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: 20 to 36 inches to siltstone; slope.	Severe: 20 to 36 inches to siltstone; slope.
Severe: 20 to 30 inches to siltstone; slope.	Severe: 20 to 36 inches to siltstone; slope.	Severe on MvE, MvE3, and MvF: slope. Severe on MvG: 20 to 40 inches to siltstone; slope.	Severe: slope	Severe: slope	Severe: 20 to 36 inches to siltstone; slope.	Severe: 20 to 36 inches to siltstone; slope.
Moderate: slope.	Severe: sandy	Severe: sandy	Severe: sandy	Severe: sandy	Severe: rapid permeability.	Severe: sandy.
Severe: slope	Severe: sandy; slope.	Severe: sandy	Severe: sandy	Severe: sandy; slope.	Severe: rapid permeability.	Severe: sandy.
Moderate: seasonal high water table; slope.	Moderate: moderately slow permeability; seasonal high water table; slope.	Slight	Moderate: seasonal high water table; moderately slow permeability.	Moderate: seasonal high water table; moderately slow permeability; slope.	Moderate: seasonal high water table.	Moderate: seasonal high water table; moderately slow permeability.
Moderate: slope.	Severe: slope	Moderate: slope.	Moderate: seasonal high water table; moderately slow permeability; slope.	Severe: slope	Moderate: seasonal high water table; slope.	Moderate: seasonal high water table; slope.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Cultivated crops	Sites for homes of 3 stories or less [1]	Disposal of sewage effluent	Sewage lagoons	Lawns, landscaping, and golf fairways
Ramsey: RcC, RcD, RcE2, RcF2	Severe: droughty.	Severe: 12 to 20 inches to sandstone.	Severe: 12 to 20 inches to sandstone.	Severe: 12 to 20 inches to sandstone; slope.	Severe on RcC: low available moisture capacity; shallow to sandstone. Severe on RcD, RcE2, and RcF2: low available moisture capacity; slope.
Ravenna: ReA, ReB	Slight	Severe: seasonal high water table.	Severe: moderately slow permeability.	Slight for ReA. Moderate for ReB: slope.	Moderate: seasonal high water table; moderately slow permeability.
Remsen: RoA, RoB	Moderate: wetness.	Severe: seasonal high water table.	Severe: very slow permeability.	Slight for RoA. Moderate for RoB: slope.	Moderate: very slow permeability; seasonal high water table.
Rittman: RsB	Slight	Moderate: seasonal high water table.	Severe: slow permeability.	Moderate: slope	Slight
RsC, RsC2	Moderate: slope; erosion hazard.	Moderate: seasonal high water table; slope.	Severe: slow permeability.	Severe: slope	Moderate: slope
RsD2	Severe: slope; erosion hazard.	Severe: slope	Severe: slow permeability; slope.	Severe: slope	Severe: slow permeability; slope.
Sebring: Sb, Se	Moderate: wetness.	Severe: seasonal high water table.	Severe: moderately slow permeability; seasonal high water table.	Slight	Severe: moderately slow permeability; seasonal high water table.
Shoals: Sh	Slight	Severe: subject to flooding.	Severe: subject to flooding.[2]	Severe: subject to flooding.[2]	Severe: subject to flooding.
Sloan: Sl	Moderate: wetness.	Severe: subject to flooding.	Severe: subject to flooding.[2]	Severe: subject to flooding.[2]	Severe: subject to flooding.
Tilsit: TlC	Moderate: slope; erosion hazard.	Moderate: 36 to 60 inches to siltstone; seasonal high water table.	Severe: slow permeability.	Severe: slope	Severe: slow permeability.

for town and country planning—Continued

Streets and parking lots	Athletic fields and other intensive play areas	Parks and other extensive play areas	Campsites		Sanitary land fills	Cemeteries
			Tents	Trailers		
Severe: 12 to 20 inches to sandstone; slope.	Severe: 12 to 20 inches to sandstone; slope.	Severe on RcC: 12 to 20 inches to sandstone. Severe on RcD, RcE2, and RcF2: slope.	Severe on RcC: 12 to 20 inches to sandstone. Severe on RcD, RcE2, and RcF2: slope.	Severe: slope	Severe on RcC: 12 to 20 inches to sandstone. Severe on RcD, RcE2, and RcF2: 12 to 20 inches to sandstone; slope.	Severe on RcC: 12 to 20 inches to sandstone. Severe on RcD, RcE2, and RcF2: 12 to 20 inches to sandstone; slope.
Moderate for ReA: seasonal high water table. Moderate for ReB: seasonal high water table; slope.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe for ReA; ponding; seasonal high water table. Moderate for ReB; seasonal high water table.	Severe: seasonal high water table.
Moderate: seasonal high water table; high shrink-swell potential.	Severe: very slow permeability; seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table; very slow permeability.	Severe: seasonal high water table; very slow permeability.	Severe: seasonal high water table; clayey material.	Severe: seasonal high water table; very slow permeability.
Moderate: seasonal high water table; slope.	Severe: slow permeability.	Slight	Severe: slow permeability.	Severe: slow permeability.	Moderate: seasonal high water table; clay loam.	Severe: slow permeability.
Severe: slope	Severe: slow permeability; slope.	Moderate: slope	Severe: slow permeability.	Severe: slow permeability; slope.	Moderate: seasonal high water table; slope; clay loam.	Severe: slow permeability.
Severe: slope	Severe: slow permeability; slope.	Severe: slope	Severe: slow permeability.	Severe: slow permeability; slope.	Severe: slope	Severe: slow permeability; slope.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Severe: subject to flooding.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.[2]	Severe: subject to flooding.
Severe: subject to flooding.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.[2]	Severe: subject to flooding.
Severe: slope	Severe: slow permeability; slope.	Moderate: slope.	Severe: slow permeability.	Severe: slow permeability; slope.	Moderate: 36 to 60 inches to siltstone; slope.	Severe: slow permeability.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Cultivated crops	Sites for homes of 3 stories or less [1]	Disposal of sewage effluent	Sewage lagoons	Lawns, landscaping, and golf fairways
TID	Severe: slope; erosion hazard.	Severe: slope	Severe: slow permeability; slope.	Severe: slope	Severe: slow permeability; slope.
Trumbull: Tr	Severe: wetness	Severe: seasonal high water table.	Severe: slow permeability; seasonal high water table.	Slight	Severe: slow permeability; seasonal high water table.
Wadsworth: WaA	Moderate: wetness.	Severe: seasonal high water table.	Severe: slow permeability; seasonal high water table.	Slight	Moderate: slow permeability; seasonal high water table.
WaB	Moderate: wetness.	Severe: seasonal high water table.	Severe: slow permeability; seasonal high water table.	Moderate: slope	Moderate: slow permeability; seasonal high water table.
WaC, WaC2	Moderate: slope; erosion hazard.	Severe: seasonal high water table.	Severe: slow permeability; seasonal high water table.	Severe: slope	Severe: slow permeability; seasonal high water table.
WbB	Moderate: slope; erosion hazard.	Severe: 20 to 40 inches to shale; seasonal high water table.	Severe: slow permeability; 20 to 40 inches to shale.	Severe: 20 to 40 inches to shale.	Moderate: 20 to 40 inches to shale; slow permeability; seasonal high water table.
Wallkill: Wc	Moderate: wetness.	Severe: high water table.	Severe: high water table.	Severe: high water table; high organic content.	Severe: high water table.
Wayland: Wd	Moderate: wetness.	Severe: subject to flooding.	Severe: subject to flooding.[2]	Severe: subject to flooding.[2]	Severe: subject to flooding.
Weikert: WeC, WeD, WeE2, WeF2	Severe: stoniness; 12 to 20 inches to siltstone.	Severe: 12 to 20 inches to siltstone.	Severe: 12 to 20 inches to siltstone.	Severe: 12 to 20 inches to siltstone; slope.	Severe: 12 to 20 inches to siltstone; slope.
Weinbach: WhA, WhB	Slight	Severe: seasonal high water table.	Severe: moderately slow permeability in fragipan.[2]	Severe: moderately rapid permeability in substratum.[2]	Moderate: moderately slow permeability in fragipan; medium available moisture capacity.

for town and country planning—Continued

Streets and parking lots	Athletic fields and other intensive play areas	Parks and other extensive play areas	Campsites		Sanitary land fills	Cemeteries
			Tents	Trailers		
Severe: slope	Severe: slow permeability; slope.	Severe: slope	Severe: slow permeability; slope.	Severe: slow permeability; slope.	Severe: slope	Severe: slow permeability; slope.
Severe: seasonal high water table.	Severe: slow permeability; seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table; clayey material.	Severe: seasonal high water table; slow permeability.
Moderate: seasonal high water table.	Severe: slow permeability; seasonal high water table.	Moderate: seasonal high water table.	Severe: slow permeability; seasonal high water table.	Severe: slow permeability; seasonal high water table.	Severe: seasonal high water table; subject to ponding.	Severe: seasonal high water table; slow permeability.
Moderate: seasonal high water table; slope.	Severe: slow permeability; seasonal high water table.	Moderate: seasonal high water table.	Severe: slow permeability; seasonal high water table.	Severe: slow permeability; seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; slow permeability.
Severe: slope	Severe: slow permeability; seasonal high water table; slope.	Moderate: seasonal high water table; slope.	Severe: slow permeability; seasonal high water table.	Severe: slow permeability; seasonal high water table; slope.	Severe: seasonal high water table.	Severe: seasonal high water table: slow permeability.
Moderate: 20 to 40 inches to shale; seasonal high water table; slope.	Severe: 20 to 40 inches to shale; seasonal high water table; slow permeability.	Moderate: 20 to 40 inches to shale; seasonal high water table.	Severe: slow permeability; seasonal high water table.	Severe: slow permeability; seasonal high water table.	Severe: 20 to 40 inches to shale; seasonal high water table.	Severe: 20 to 40 inches to shale; seasonal high water table; slow permeability.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Severe: subject to flooding.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.[2]	Severe: subject to flooding.
Severe: 12 to 20 inches to siltstone; slope.	Severe: 12 to 20 inches to siltstone; slope.	Severe on WeC: 12 to 20 inches to siltstone. Severe on WeD, WeE2, and WeF2: 12 to 20 inches to siltstone; slope.	Moderate: slope; 12 to 20 inches to siltstone.	Severe: slope; 12 to 20 inches to siltstone.	Severe on WeC: 12 to 20 inches to siltstone. Severe on WeD, WeE2, WeF2: 12 to 20 inches to siltstone; slope.	Severe on WeC: 12 to 20 inches to siltstone. Severe on WeD, WeE2, WeF2: 12 to 20 inches to siltstone; slope.
Moderate on WhA: seasonal high water table. Moderate on WhB: seasonal high water table; slope.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; pervious substratum.[2]	Severe: seasonal high water table.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbols	Cultivated crops	Sites for homes of 3 stories or less [1]	Disposal of sewage effluent	Sewage lagoons	Lawns, landscaping, and golf fairways
Wellston:					
WlB	Slight	Severe: 30 to 48 inches to siltstone and sandstone.	Severe: 30 to 48 inches to siltstone and sandstone.	Severe: 30 to 48 inches to siltstone and sandstone.	Moderate: 30 to 48 inches to siltstone and sandstone; medium available moisture capacity.
WlC	Moderate: slope; erosion hazard.	Severe: 30 to 48 inches to siltstone and sandstone.	Severe: 30 to 48 inches to siltstone and sandstone.	Severe: 30 to 48 inches to siltstone and sandstone; slope.	Moderate: 30 to 48 inches to sandstone and siltstone; medium available moisture capacity; slope.
Wheeling:					
WmA, WrA, WmB, WrB	Slight	Slight	Slight [2]	Severe: rapid permeability in substratum.[2]	Moderate: medium available moisture capacity.
WmC2, WrC, WrC2	Moderate: slope; erosion hazard.	Moderate: slope	Moderate: slope.[2]	Severe: rapid permeability in substratum.	Moderate: medium available moisture capacity; slope.
WsD2	Severe: slope; erosion hazard.	Severe: slope	Severe: slope [2]	Severe: rapid permeability in substratum; slope.[2]	Severe: slope
Willette:					
Wt	Moderate: wetness.	Severe: organic material over clayey material; high water table; soft material.	Severe: organic material over clayey material; high water table; soft material.[2]	Severe: organic material over clayey material; high water table; soft material.[2]	Severe: organic material over clayey material; high water table; soft material.
Wooster:					
WuB	Slight	Slight	Moderate: moderate permeability.	Moderate: moderate permeability.	Slight
WuC, WuC2	Moderate: slope; erosion hazard.	Moderate: slope	Moderate: slope; moderate permeability.	Severe: slope	Moderate: slope
WuD2, WuE2 WuF2	Severe: slope; erosion hazard.	Severe: slope	Severe: slope	Severe: slope	Severe: slope

[1] Ratings also apply to commercial, institutional, and light industrial sites for buildings of 3 stories or less.
[2] There is a hazard of environment pollution if this soil is developed for this use. Some of these soils are porous, particularly in the substratum, and commonly do not provide adequate filtration. The alluvial soils are subject to flooding and can cause surface water pollution.
[3] The uppermost 12 inches should be removed because it is high in organic-matter content.
[4] Rating depends on the frequency and severity of flooding at a specific site.

for town and country planning—Continued

Streets and parking lots	Athletic fields and other intensive play areas	Parks and other extensive play areas	Campsites		Sanitary land fills	Cemeteries
			Tents	Trailers		
Severe: 30 to 48 inches to siltstone and sandstone.	Severe: 30 to 48 inches to siltstone and sandstone.	Moderate: 30 to 48 inches to siltstone and sandstone.	Slight	Moderate: slope.	Severe: 30 to 48 inches to siltstone and sandstone.	Severe: 30 to 48 inches to siltstone and sandstone.
Severe: 30 to 48 inches to siltstone and sandstone; slope.	Severe: 30 to 48 inches to siltstone and sandstone; slope.	Moderate: 30 to 48 inches to siltstone and sandstone; slope.	Moderate: slope.	Severe: slope	Severe: 30 to 48 inches to siltstone and sandstone.	Severe: 30 to 48 inches to siltstone and sandstone.
Slight on WmA and WrA. Moderate on WmB and WrB; slope.	Slight on WmA and WrA. Moderate on WmB and WrB; slope.	Slight	Slight	Slight on WmA and WrA. Moderate on WmB and WrB: slope.	Severe: pervious substratum.	Slight.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Severe: slope	Severe: pervious substratum; slope.	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; pervious substratum.[2]	Severe: slope.
Severe: organic material over clayey material; high water table; soft material.	Severe: organic material over clayey material; high water table; soft material.	Severe: organic material over clayey material; high water table; soft material.	Severe: organic over clayey material; high water table; soft material.	Severe: organic material over clayey material; high water table; soft material.	Severe: organic material over clayey material; high water table; soft material.	Severe: organic material over clayey material; high water table; soft material.
Moderate: slope.	Moderate: slope.	Slight	Slight	Moderate: slope.	Slight	Slight.
Severe: slope	Severe: slope	Moderate: slope.	Moderate: slope.	Severe: slope	Moderate: slope.	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.

fill are depth to rock, stoniness, wetness, permeability, slope, texture of the soil material, and the hazard of flooding. The degree of slope is important when considering the use of soils for this purpose. Where the slope is the only limiting feature, the limitation is slight for slopes of less than 6 percent, moderate for slopes of 6 to 12 percent, and severe for slopes of more than 12 percent. Also important is depth to hard rock. The limitation is slight if rock is at a depth of more than 6 feet; moderate, at a depth of 3 to 6 feet; and severe, at a depth of less than 3 feet.

Sandy soils have fewer limitations as sanitary land fills than other soils in the county, but the ground water may be polluted when sandy soils and other permeable soils are used for sanitary land fills. Limitations are severe on some impermeable soils because of ponding and general wetness.

Cemeteries.—For use as cemeteries, soils have few limitations if they are deep, well drained, and permeable. The depth to rock and natural drainage are especially important. Other features that affect use as cemeteries are the hazard of flooding, slope, permeability, depth to the water table, and texture of the soil material.

Descriptions of the Soils

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

The procedure in this section is first to describe the soil series and then the mapping units in the series. Thus, to get full information on any one mapping unit, it is necessary to read the description of the unit and also the description of the soil series to which it belongs. The description of a soil series mentions features that apply to all the soils in the series. Differences among the soils of one series are pointed out in the descriptions of the individual soils or are indicated in the soil name. As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. For example, Cut and fill land is a miscellaneous land type and does not belong to a soil series; nevertheless, it is listed in alphabetic order along with the 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 the depth beyond which roots of most plants do not penetrate. Each soil series contains a short description of a typical soil profile and a much more detailed description of the same profile that scientists, engineers, and others can use in making highly technical interpretations.

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

Soil	Acres	Percent
Alluvial land	258	0.1
Alluvial land-Urban land complex	979	.3
Arkport fine sandy loam, 0 to 6 percent slopes	258	.1
Arkport fine sandy loam, 6 to 12 percent slopes	173	(1)
Arkport fine sandy loam, 12 to 18 percent slopes	98	(1)
Bogart loam, 0 to 2 percent slopes	104	(1)
Bogart loam, 2 to 6 percent slopes	229	.1
Bogart silt loam, 0 to 2 percent slopes	638	.2
Bogart silt loam, 2 to 6 percent slopes	1,796	.5
Bogart silt loam, 6 to 12 percent slopes	220	.1
Bogart-Urban land complex	296	.1
Borrow pits	63	(1)
Brooke silty clay loam, 4 to 12 percent slopes, moderately eroded	206	.1
Brooke silty clay loam, 12 to 25 percent slopes, moderately eroded	46	(1)
Canadice silt loam	453	.1
Canfield silt loam, 0 to 2 percent slopes	1,192	.3
Canfield silt loam, 2 to 6 percent slopes	40,959	11.2
Canfield silt loam, 6 to 12 percent slopes	10,047	2.7
Canfield silt loam, 6 to 12 percent slopes, moderately eroded	8,112	2.2
Canfield silt loam, 12 to 18 percent slopes	473	.1
Canfield silt loam, 12 to 18 percent slopes, moderately eroded	1,187	.3
Canfield-Urban land complex, undulating	5,669	1.5
Canfield-Urban land complex, rolling	2,105	.6
Canfield silt loam, moderately shallow variant, 2 to 6 percent slopes	105	(1)
Canfield silt loam, moderately shallow variant, 6 to 12 percent slopes	160	(1)
Carlisle muck	5,745	1.6
Chagrin loam, alkaline phase	508	.1
Chagrin silt loam, alkaline phase	1,298	.4
Chili loam, 0 to 2 percent slopes	820	.2
Chili loam, 2 to 6 percent slopes	2,466	.7
Chili gravelly loam, 6 to 12 percent slopes	1,450	.4
Chili gravelly loam, 6 to 12 percent slopes, moderately eroded	1,493	.4
Chili gravelly loam, 12 to 18 percent slopes, moderately eroded	6,670	1.8
Chili gravelly loam, 18 to 25 percent slopes, moderately eroded	1,951	.5
Chili silt loam, 0 to 2 percent slopes	2,922	.8
Chili silt loam, 2 to 6 percent slopes	15,096	4.1
Chili silt loam, 6 to 12 percent slopes	6,267	1.7
Chili silt loam, 6 to 12 percent slopes, moderately eroded	4,960	1.3
Chili-Urban land complex, undulating	13,295	3.6
Chili-Urban land complex, rolling	2,515	.7
Chili-Urban land complex, steep	1,060	.3
Chili and Conotton gravelly loams, 25 to 50 percent slopes, moderately eroded	1,495	.4
Conotton loam, 0 to 2 percent slopes	217	.1
Conotton gravelly loam, 2 to 6 percent slopes	335	.1
Conotton gravelly loam, 6 to 12 percent slopes	486	.1
Conotton gravelly loam, 12 to 18 percent slopes, moderately eroded	1,190	.3
Conotton gravelly loam, 18 to 25 percent slopes, moderately eroded	969	.3
Cut and fill land	3,366	.9
Dekalb sandy loam, 2 to 6 percent slopes	230	.1
Dekalb sandy loam, 6 to 12 percent slopes	1,119	.3
Dekalb sandy loam, 12 to 25 percent slopes, moderately eroded	3,207	.9
Dekalb sandy loam, 25 to 50 percent slopes, moderately eroded	1,805	.5
Edwards muck	52	(1)
Fitchville silt loam, 0 to 2 percent slopes	9,345	2.5
Fitchville silt loam, 2 to 6 percent slopes	3,181	.9
Fitchville silt loam, 6 to 12 percent slopes	244	.1
Fitchville-Urban land complex	412	.1

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

Soil	Acres	Percent
Geeburg silt loam, 6 to 12 percent slopes, moderately eroded	231	.1
Geeburg silt loam, 12 to 25 percent slopes, moderately eroded	172	(1)
Gilpin silt loam, 2 to 6 percent slopes	686	.2
Gilpin silt loam, 6 to 12 percent slopes	2,453	.7
Gilpin silt loam, 12 to 18 percent slopes	2,280	.6
Ginat silt loam	2,169	.6
Glenford silt loam, 0 to 2 percent slopes	765	.2
Glenford silt loam, 2 to 6 percent slopes	2,809	.8
Glenford silt loam, 6 to 12 percent slopes	1,637	.4
Glenford silt loam, 6 to 12 percent slopes, moderately eroded	218	.1
Glenford silt loam, 12 to 18 percent slopes, moderately eroded	367	.1
Gravel pits	1,054	.3
Keene silt loam, 2 to 6 percent slopes	441	.1
Keene silt loam, 6 to 12 percent slopes	2,216	.6
Keene silt loam, 6 to 12 percent slopes, moderately eroded	436	.1
Keene silt loam, 12 to 18 percent slopes	983	.3
Keene silt loam, 12 to 18 percent slopes, moderately eroded	328	.1
Keene silt loam, 18 to 25 percent slopes	143	(1)
Killbuck silt loam	476	.1
Latham silt loam, 2 to 6 percent slopes	341	.1
Latham silt loam, 6 to 12 percent slopes	1,549	.4
Latham silt loam, 6 to 12 percent slopes, moderately eroded	298	.1
Latham silt loam, 12 to 18 percent slopes	1,114	.3
Latham silt loam, 12 to 18 percent slopes, moderately eroded	794	.2
Latham silt loam, 18 to 35 percent slopes	783	.2
Licking silt loam, 0 to 2 percent slopes	73	(1)
Licking silt loam, 2 to 6 percent slopes	460	.1
Licking silt loam, 6 to 12 percent slopes	235	.1
Licking silt loam, 6 to 12 percent slopes, moderately eroded	127	(1)
Licking silt loam, 12 to 25 percent slopes, moderately eroded	268	.1
Linwood muck	634	.2
Lobdell silt loam, alkaline phase	1,586	.4
Loudonville silt loam, 2 to 6 percent slopes	1,204	.3
Loudonville silt loam, 6 to 12 percent slopes	2,346	.6
Loudonville silt loam, 6 to 12 percent slopes, moderately eroded	1,447	.4
Loudonville silt loam, 12 to 18 percent slopes	1,301	.4
Loudonville silt loam, 12 to 18 percent slopes, moderately eroded	1,450	.4
Loudonville silt loam, 18 to 25 percent slopes, moderately eroded	883	.2
Loudonville silt loam, 25 to 35 percent slopes, moderately eroded	384	.1
Loudonville-Urban land complex, undulating	278	.1
Loudonville-Urban land complex, rolling	293	.1
Luray silt loam	4,079	1.1
Luray silt loam, gravelly subsoil variant	1,663	.5
Made land	328	.1
Mentor silt loam, 0 to 2 percent slopes	270	.1
Mentor silt loam, 2 to 6 percent slopes	447	.1
Mentor silt loam, 6 to 12 percent slopes	237	.1
Mentor silt loam, 12 to 18 percent slopes	176	(1)
Montgomery silty clay loam	604	.2
Muskingum silt loam, 2 to 6 percent slopes	320	.1
Muskingum silt loam, 6 to 12 percent slopes	1,738	.5
Muskingum silt loam, 12 to 18 percent slopes	2,321	.6
Muskingum and Gilpin silt loams, 18 to 25 percent slopes	4,765	1.3
Muskingum and Gilpin silt loams, 18 to 25 percent slopes, severely eroded	195	.1
Muskingum and Gilpin silt loams, 25 to 35 percent slopes	2,522	.7
Muskingum and Gilpin silt loams, 35 to 50 percent slopes	648	.2
Muskingum and Gilpin-Urban land complex, steep	290	.1
Plainfield loamy sand, 0 to 6 percent slopes	717	.2
Plainfield loamy sand, 6 to 12 percent slopes	197	.1
Quarries	187	(1)
Rainsboro silt loam, 2 to 6 percent slopes	95	(1)
Rainsboro silt loam, 6 to 12 percent slopes	60	(1)
Ramsey channery sandy loam, 6 to 12 percent slopes	151	(1)
Ramsey channery sandy loam, 12 to 18 percent slopes	55	(1)
Ramsey channery sandy loam, 18 to 25 percent slopes, moderately eroded	148	(1)
Ramsey channery sandy loam, 25 to 50 percent slopes, moderately eroded	959	.3
Ravenna silt loam, 0 to 2 percent slopes	9,721	2.6
Ravenna silt loam, 2 to 6 percent slopes	12,395	3.4
Ravenna-Urban land complex	2,462	.7
Remsen silt loam, 0 to 2 percent slopes	2,225	.6
Remsen silt loam, 2 to 6 percent slopes	2,096	.6
Remsen-Urban land complex	388	.1
Rittman silt loam, 2 to 6 percent slopes	658	.2
Rittman silt loam, 6 to 12 percent slopes	192	.1
Rittman silt loam, 6 to 12 percent slopes, moderately eroded	707	.2
Rittman silt loam, 12 to 18 percent slopes, moderately eroded	281	.1
Sebring silt loam	11,523	3.1
Sebring silt loam, till substratum	1,993	.5
Sebring-Urban land complex	370	.1
Shoals silt loam	8,022	2.2
Sloan silt loam	3,062	.8
Strip mine spoil, sandstone and shale materials, undulating	947	.3
Strip mine spoil, sandstone and shale materials, rolling	2,420	.7
Strip mine spoil, sandstone and shale materials, steep	5,878	1.6
Strip mine spoil, acid clay shale materials, undulating	128	(1)
Strip mine spoil, acid clay shale materials, rolling	283	.1
Strip mine spoil, acid clay shale materials, steep	635	.2
Strip mine spoil, nonacid materials, undulating	834	.2
Strip mine spoil, nonacid materials, rolling	690	.2
Strip mine spoil, nonacid materials, steep	966	.3
Tilsit silt loam, 6 to 12 percent slopes	143	(1)
Tilsit silt loam, 12 to 18 percent slopes	115	(1)
Trumbull silt loam	290	.1
Urban land	3,757	1.0
Wadsworth silt loam, 0 to 2 percent slopes	1,649	.4
Wadsworth silt loam, 2 to 6 percent slopes	3,143	.9
Wadsworth silt loam, 6 to 12 percent slopes	158	(1)
Wadsworth silt loam, 6 to 12 percent slopes, moderately eroded	276	.1
Wadsworth silt loam, moderately shallow variant, 2 to 6 percent slopes	223	.1
Wallkill silt loam, clayey subsoil variant	477	.1
Wayland silt loam	3,377	.9
Weikert channery silt loam, 6 to 12 percent slopes	137	(1)
Weikert channery silt loam, 12 to 18 percent slopes	211	.1
Weikert channery silt loam, 18 to 25 percent slopes, moderately eroded	482	.1
Weikert channery silt loam, 25 to 50 percent slopes, moderately eroded	1,158	.3
Weinbach silt loam, 0 to 2 percent slopes	4,005	1.1
Weinbach silt loam, 2 to 6 percent slopes	1,456	.4
Weinbach-Urban land complex	368	.1

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

Soil	Acres	Percent	Soil	Acres	Percent
Wellston silt loam, 2 to 6 percent slopes	172	(1)	Wooster silt loam, 2 to 6 percent slopes	6,487	1.8
Wellston silt loam, 6 to 12 percent slopes	158	(1)	Wooster silt loam, 6 to 12 percent slopes	3,816	1.0
Wheeling loam, 0 to 2 percent slopes	282	.1	Wooster silt loam, 6 to 12 percent slopes, moderately eroded	10,791	2.9
Wheeling loam, 2 to 6 percent slopes	507	.1	Wooster silt loam, 12 to 18 percent slopes, moderately eroded	6,137	1.7
Wheeling loam, 6 to 12 percent slopes, moderately eroded	140	(1)	Wooster silt loam, 18 to 25 percent slopes, moderately eroded	1,538	.4
Wheeling silt loam, 0 to 2 percent slopes	3,107	.8	Wooster silt loam, 25 to 50 percent slopes, moderately eroded	143	(1)
Wheeling silt loam, 2 to 6 percent slopes	5,144	1.4	Wooster-Urban land complex, steep	305	.1
Wheeling silt loam, 6 to 12 percent slopes	743	.2	Water areas	2,746	.7
Wheeling silt loam, 6 to 12 percent slopes, moderately eroded	269	.1	Total	366,720	100.0
Wheeling soils, 12 to 18 percent slopes, moderately eroded	198	.1			
Willette muck	857	.2			

[1] Less than 0.05 percent.

The color of each soil horizon is described in words, such as grayish brown, but it can also be indicated by symbols for the hue, value, and chroma, such as 10YR 5/2. These symbols, called Munsell color notations, are used by the soil scientists to indicate the color of a soil precisely (*13*). In this survey the terms "light colored" and "dark colored" refer to the color of the surface layer of the soils. Soils that have a surface layer with a color value of 4 or more are light colored; those that have a surface layer with a color value of less than 4 are dark colored. Unless otherwise stated, the color is for a moist soil.

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 and the woodland suitability group in which the mapping unit has been placed. The page on which each capability unit is described can be found by referring to the "Guide to Mapping Units" at the back of this soil survey. The woodland suitability group in which each soil has been placed is given in table 2 in the subsection "Woodland." Many terms used in the soil descriptions and other sections of this survey are defined in the Glossary at the back of this survey and in the "Soil Survey Manual" (*13*).

Alluvial Land

Alluvial land is in two mapping units. In one it is mapped separately and in the other it is mapped in a complex with Urban land.

Alluvial land (Ad).—This mapping unit occupies nearly level areas on bottom lands along the Mahoning River. It is flooded annually by water that backs up from the Berlin Reservoir. In summer this water recedes within the river channel and the soil material is exposed. Willows and other water-tolerant plants grow on this land. Some areas are used for hunting in the fall. The lower lying, very wet, depressional areas are bare. (Capability unit VIIIw–1; woodland suitability group not assigned)

Alluvial land-Urban land complex (An).—This mapping unit occurs on nearly level bottom lands in cities and towns, and it is subject to flooding, particularly in spring. About 25 to 75 percent of this complex consists of land that has been used for building sites, of areas that have had the topsoil removed, and of areas of refuse fill. About 75 percent of the area is somewhat poorly drained and the rest is moderately well drained and well drained.

Limitations to use of this complex for recreational development is moderate in the moderately well drained and well drained areas and is severe in the somewhat poorly drained areas. Use for residential buildings is more severely limited than for recreational areas. (Capability unit not assigned; woodland suitability group not assigned)

Arkport Series

This series consists of well-drained, level to moderately steep soils on stream terraces, glacial outwash plains, and kames.

In a typical profile the plow layer is dark grayish-brown fine sandy loam about 9 inches thick. The subsoil, about 46 inches thick, consists of alternating bands of dark yellowish-brown loamy fine sand and yellowish-red or reddish-brown fine sandy loam in the uppermost 36 inches. Below this is yellowish-brown fine sand. The underlying material is stratified fine sand and silt.

The Arkport soils have a deep root zone. They are mainly strongly acid within the root zone. Water and air move through these soils at a rapid rate. The available moisture capacity is low. These soils dry out rapidly in spring, and they are droughty.

These soils are not extensive in this county, but most of the acreage is used for cultivated crops.

Typical profile of Arkport fine sandy loam, 6 to 12 percent slopes, 2 miles northeast of Canal Fulton, in a meadow in Lawrence Township, section 2, T. 1 N., R. 10 W. (analytical data in table 10):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, crumb structure that breaks to single grain (structureless); loose when dry, friable when moist; abundant roots; few pebbles; medium acid; abrupt, smooth boundary.

B2&B2t—9 to 45 inches, alternating bands of dark yellowish-brown (10YR 4/4) loamy fine sand (B2) and yellowish-red (5YR 5/6) or reddish-brown (5YR 4/4) fine sandy loam (B2t). The bands of fine sandy loam (B2t) are 1 inch to 3 inches thick; they have weak, fine and medium, subangular

blocky structure, are loose when dry, are friable when moist, have clay coatings and bridging between sand grains, and are strongly acid. The B2 strata are thicker than the B2t bands; they have weak to very weak, fine, subangular blocky structure, are loose when dry, and are very friable when moist; few roots below a depth of 18 inches; strongly acid or very strongly acid; abrupt, wavy boundary.

B3—45 to 55 inches, yellowish-brown (10YR 5/4) fine sand; few, medium, faint mottles of light reddish brown (5YR 6/4); single grain (structureless); loose; no roots; strongly acid; abrupt, wavy boundary.

C—55 to 60 inches, stratified fine sand and silt.

In the B2&B2t horizon the matrix of the bands of fine sandy loam (B2t) includes reddish brown (5YR 4/4) and that in the bands of loamy fine sand includes yellowish brown (10YR 5/4) or light yellowish brown (10YR 6/4). Reaction ranges from very strongly acid to medium acid in the B horizon. Coarse fragments make up from 1 to 10 percent of the B horizon and the C horizon.

The Arkport soils are near the Plainfield soils. They are similar to the Plainfield soils, except for having a banded subsoil. The Arkport soils contain more sand and less gravel than the well-drained Chili and Conotton soils. They are more sandy throughout the profile than the Wheeling soils.

Arkport fine sandy loam, 0 to 6 percent slopes (ArB).—This soil occurs on stream terraces and outwash plains. Areas are convex and vary in size. Most areas range from 3 to 10 acres in size and occur mainly north of Canal Fulton in the vicinity of Lake Lucern, but an area about 30 acres in size lies east of the Tuscarawas River near the Summit County line.

Included with this soil in mapping were areas of Wheeling soils and areas of gravelly Chili and Conotton soils.

This Arkport soil is droughty, and the hazard of erosion is moderate in cultivated areas. It generally has good surface tilth although it is commonly low in organic-matter content. (Capability unit IIe–6; woodland suitability group 2s1)

Arkport fine sandy loam, 6 to 12 percent slopes (ArC).—This soil occurs in hummocky areas of glacial outwash and on terraces along the Tuscarawas River and Nimisila Creek. Areas are irregular in size and shape. This soil has the profile described as typical for the series, but in some places depth to glacial till is 40 to 60 inches.

Included with this soil in mapping were a few areas of a moderately eroded Arkport soil that has a lighter colored and thinner surface layer than that described as typical. In this soil the first band of dark-colored material is at a depth of less than 15 inches, and the first few bands of dark-colored material are not so distinct as are those that are below a depth of 20 inches. Also included in the mapping were small areas of Chili soils.

The hazard of erosion is the major limitation to the use of this soil for farming. Use for many nonfarm purposes is limited by the slope, rapid permeability, and droughtiness. (Capability unit IIIe-1; woodland suitability group 2s1)

Arkport fine sandy loam, 12 to 18 percent slopes (ArD).—This soil is on short, irregular slopes of terraces along the Tuscarawas River and hummocky outwash plains. Areas range from 3 to 10 acres in size. This soil is more droughty than the less sloping Arkport fine sandy loams. It contains more gravel than Arkport fine sandy loam, 6 to 12 percent slopes, which has the profile described as typical for the series.

Included with this soil in mapping were areas of a moderately eroded Arkport soil that has more gravel on the surface and is lighter colored than this soil. Other inclusions were small areas of the gravelly Conotton soils.

Droughtiness and the hazard of erosion are the main limitations to the use of this soil for farming. Droughtiness and the slope are limitations to use for many nonfarm purposes. (Capability unit IVe-1; woodland suitability group 2s1)

Bogart Series

The Bogart series consists of moderately well drained, level to sloping soils that occur on terraces and outwash plains throughout the county. These soils formed in sandy and gravelly glacial outwash material.

In a typical profile the plow layer is dark grayish-brown silt loam about 7 inches thick. The subsoil is about 35 inches thick. To a depth of about 22 inches, it is strong-brown silt loam. Below this, and extending to a depth of 28 inches, is yellowish-brown gravelly clay loam that is distinctly mottled with light brownish gray, grayish brown and reddish yellow. The lower part of the subsoil is about 14 inches of yellowish-brown very gravelly sandy loam mottled with gray and reddish yellow. The underlying material is loose gravel and sand.

The Bogart soils have a moderately deep or deep root zone. Permeability is moderate in the subsoil and is rapid in the underlying material. The available moisture capacity is low to medium, depending on the depth to coarse sand and gravel. These soils have a high water table during wet periods. They tend to be less droughty than the nearby Chili soils.

The Bogart soils are not extensive in this county. Most of their acreage is used for cultivated crops.

Typical profile of Bogart silt loam, 2 to 6 percent slopes, in a cultivated field in Lake Township, section 20, T. 12 N., R. 8 W.:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, subangular blocky structure that breaks to moderate, fine and medium, granular structure; friable; abundant roots; 10 percent pebbles; slightly acid; abrupt, smooth boundary.

B1—7 to 16 inches, strong-brown (7.5YR 5/6) silt loam; moderate, fine and medium, subangular blocky structure; slightly friable when moist, slightly plastic when wet; common roots; 10 percent pebbles, by volume, as much as 2 inches in diameter; strongly acid; gradual, wavy boundary.

B21t—16 to 22 inches, strong-brown (7.5YR 5/6) heavy silt loam; few, fine, faint mottles of grayish brown (10YR 5/2); strong, fine and medium, subangular blocky structure; friable; common roots; thin clay films on 20 percent of ped surfaces; 15 percent pebbles, by volume, as much as 2 inches in diameter; strongly acid; gradual, wavy boundary.

IIB22tg—22 to 28 inches, yellowish-brown (10YR 5/4) gravelly clay loam; many, medium, distinct mottles

of light brownish gray (10YR 6/2), grayish brown (10YR 5/2), and reddish yellow (7.5YR 6/6); moderate, medium and coarse, subangular blocky structure; slightly firm; few roots; medium clay films on 40 percent of ped surfaces; few clay enriched masses; few, medium, very dark brown ferromanganiferous stains on ped surfaces; 30 percent pebbles, by volume, as much as 2 inches in diameter; strongly acid; gradual, wavy boundary.

IIB3C1—28 to 42 inches, yellowish-brown (10YR 5/4) very gravelly sandy loam; many, medium, distinct mottles of gray (10YR 6/1) and reddish yellow (7.5YR 6/6); weak, fine and medium, subangular blocky structure; very friable; few roots; discontinuous clay films in old root channels; few black (N 2/0) stains on a few pebbles; 60 percent pebbles in lower part of horizon; strongly acid.

IIC2—42 to 60 inches, loose gravel and sand; medium acid.

The A horizon is silt loam or loam. In some areas there is an A2 horizon in which chromas are 3 or 4 and values are 5 or 6. Depth to the B21t horizon ranges from 14 to 20 inches. The combined B21t and B22tg horizons are 10 to 30 inches thick, and in these horizons the matrix ranges from yellowish brown (10YR 5/4 or 5/5) to brown (7.5YR 5/4) or strong brown (7.5YR 5/6). In the lower part of the B2 horizon, coarse fragments make up from 5 to 30 percent of the soil mass. The C horizon contains only a few stones that are more than 3 inches in diameter.

The Bogart soils are the moderately well drained members of a drainage sequence that includes the well drained Chili soils. Bogart soils are commonly next to the somewhat poorly drained Weinbach soils and the well-drained Chili soils. The underlying material of Bogart soils is sandy and gravelly, whereas that of Glenford soils is silty and contains some clay. The Bogart soils have a more friable subsoil than the Weinbach soils.

Bogart loam, 0 to 2 percent slopes (BgA).—This soil occurs mainly on stream terraces in Marlboro and Sandy Townships. Areas vary in size. This soil has more sand in the surface layer and subsoil than Bogart silt loam, 2 to 6 percent slopes, which has the profile described as typical for the series. The surface layer of this soil is less susceptible to crusting than that of the Bogart silt loams.

Included with this soil in mapping, in Marlboro Township, were areas in which the underlying material is mainly reddish sand and is wet much of the year. Also included in the mapping, in depressions and drainageways, were small areas of the somewhat poorly drained Weinbach soils.

Limitations to use of this soil for cultivated crops are few or none. A seasonal high water table is a limitation to some nonfarm uses. (Capability unit IIs–1; woodland suitability group 1o1)

Bogart loam, 2 to 6 percent slopes (BgB).—This soil occurs on stream terraces. Its surface layer and subsoil contain more sand than do corresponding layers in the profile described as typical for the series. This soil generally has very good surface tilth.

Included with this soil in mapping were areas in which the underlying material is reddish sand 3 to 8 feet or more thick. This material is wet much of the year and is subject to caving. Also included in the mapping were small areas of the well-drained Chili soils.

Use of this Bogart soil for cultivated crops is limited by a moderate hazard of erosion. A seasonal high water table limits use for some nonfarm purposes. (Capability unit IIe–3; woodland suitability group 1o1)

Bogart silt loam, 0 to 2 percent slopes (BoA).—This soil occurs on outwash plains and terraces. It occupies small, irregularly shaped areas on benches above depressional areas. The surface layer of this soil is susceptible to crusting.

This soil commonly is next to the well-drained Chili soils and the somewhat poorly drained Weinbach soils, and small areas of both kinds of soils were included in the mapping. Also included in mapping were small areas of soils that have a dark-colored surface layer 8 to 14 inches thick and areas of soils that have a weak fragipan.

Limitations to use of this soil for cultivated crops are few or none. Seasonal wetness is the major limitation for many nonfarm uses. (Capability unit IIs–1; woodland suitability group 1o1)

Bogart silt loam, 2 to 6 percent slopes (BoB).—This soil generally occupies short slopes on stream terraces and outwash plains. Areas vary in size and shape. This soil has the profile described as typical for the series. Its surface layer is likely to crust.

Included with this soil in mapping, particularly on slopes of 4 to 6 pecent, were small areas of the well-drained Chili soils. Also included, in low drainageways, were areas of the somewhat poorly drained Fitchville and Weinbach soils. Other inclusions were a few areas of soils that have a dark-colored surface layer 8 to 14 inches thick and small areas of soils that have a weak fragipan.

A moderate hazard of erosion limits the use of this soil for cultivated crops. A seasonal high water table is the major limitation for many nonfarm uses. (Capability unit IIe–3; woodland suitability group 1o1)

Bogart silt loam, 6 to 12 percent slopes (BoC).—This soil occurs on short, irregular slopes. It occupies areas between the higher lying, well-drained Chili and Wheeling soils and the lower lying, somewhat poorly drained Weinbach soils. This soil is highly susceptible to surface crusting.

Included with this soil in mapping were small areas of soils that have a weak fragipan in the lower part of the subsoil. Also included in the mapping were a few areas of moderately eroded soils that have a thinner surface layer than is typical of Bogart soils. Other inclusions were spots of soils that have a loam surface layer and small areas of the well-drained Chili soils.

Use of this soil for cultivated crops is limited by a severe hazard of erosion. The slope limits use for many nonfarm purposes. (Capability unit IIIe–1; woodland suitability group 1o1)

Bogart-Urban land complex (Bu).—This complex consists of areas of nearly level and gently sloping Bogart soils and disturbed land. It occurs on the glacial outwash terrace in the southwestern part of the city of Canton.

Because the moderately well drained Bogart soils are dominant, areas of this complex have a high water table in winter and spring. The nearly level areas

receive runoff from adjacent areas and are generally wet later in spring than the gently sloping areas.

Included with this complex in mapping were a few areas of soils that are more poorly drained than Bogart soils.

Seasonal wetness is the major limitation to use of this complex, although water moves readily through the soil material except when the water table is high. (Capability unit not assigned; woodland suitability group 1o1)

Borrow Pits

Borrow pits (Bv) consists of areas from which the soil material has been removed to a depth of at least 4 feet. This material has been used primarily for fill material in other areas. (Capability unit not assigned; woodland suitability group not assigned)

Brooke Series

The Brooke series consists of dark-colored, well-drained, gently sloping to steep soils. These soils occur on uplands in the unglaciated southeastern part of the county. They formed in residuum derived from limestone.

In a typical profile the surface layer is dark-brown silty clay loam about 7 inches thick. The subsoil, about 16 inches thick, is dark-brown channery silty clay in the uppermost 3 inches and is dark yellowish-brown and olive channery clay below. The subsoil is plastic when wet and contains many coarse fragments of limestone. Gray limestone bedrock is at a depth of 23 inches.

The Brooke soils have a moderately deep root zone in most places. Permeability is slow in the subsoil, and available moisture capacity is low.

These soils are not extensive in this county. Most of the acreage is used for cultivated crops or for permanent meadow.

Typical profile of a Brooke silty clay loam about 5.8 miles west of Minerva in Osnaburg Township, section 36, T. 18 N., R. 7 W.:

Ap—0 to 7 inches, dark-brown (10YR 3/3) silty clay loam; weak, fine and very fine, subangular blocky structure that breaks to moderate, fine, granular structure; friable when moist, slightly plastic when wet; abundant roots; few fragments of limestone as much as 3 inches in diameter; neutral; abrupt, smooth boundary.

B21t—7 to 11 inches, dark-brown (7.5YR 4/4) channery silty clay; moderate, fine and medium, subangular blocky structure; plastic when wet; numerous roots; thin, continuous, yellowish-brown (10YR 5/6) clay films on ped faces; 30 percent coarse fragments of limestone; neutral; clear, wavy boundary.

B22t—11 to 17 inches, dark yellowish-brown (10YR 4/4) channery clay; light olive-brown (2.5Y 5/4) ped exteriors; strong, fine and medium, subangular blocky structure; plastic when wet; numerous roots; thick, discontinuous, yellowish-red (5YR 4/5) clay films on peds; 20 percent coarse fragments of limestone; slightly calcareous in lower part of horizon; gradual, wavy boundary.

B3C—17 to 23 inches, olive (5Y 5/3) channery clay; yellowish-brown (10YR 5/4) ped interiors; weak, coarse, prismatic structure that breaks to moderate, medium and coarse, subangular blocky structure; plastic when wet; few roots; thick, discontinuous, dark yellowish-brown (10YR 4/4) clay films on ped surfaces; 35 percent coarse fragments of limestone; calcareous; gradual, irregular boundary.

R—23 to 30 inches, gray, calcareous limestone.

The A horizon includes very dark grayish brown (10YR 3/2) in some places. Fragments more than 3 inches in diameter make up 5 to 15 percent, by volume, of the A horizon. The content of coarse fragments ranges from 20 to 50 percent in the B21t and the B22t horizons and from 30 to 70 percent in the B3C horizon. Reaction ranges from neutral to mildly alkaline in the Ap horizon and from neutral to medium acid in the B21t horizon. Calcareous material occurs at a depth of 12 to 30 inches. Depth to bedrock ranges from 20 to 36 inches. The limestone bedrock is fractured and weathered in the top 6 to 12 inches.

The Brooke soils are commonly adjacent to the well-drained Gilpin and Latham soils. Brooke soils formed on calcareous limestone, whereas the Gilpin soils formed on acid siltstone, shale, and sandstone and the Latham soils formed on acid shale.

Brooke silty clay loam, 4 to 12 percent slopes, moderately eroded (BwC2).—This soil occurs just below ridgetops and on benches. It has a sticky, plastic surface layer and is likely to become cloddy if worked when wet. Fragments of limestone are common on the surface, but they generally do not interfere with tillage.

Included with this soil in mapping, on long slopes, were small areas of the moderately well drained Keene soils.

The hazard of erosion is the major limitation to the use of this soil for farming. The slope, slow permeability, and depth to bedrock are limitations to use for many nonfarm purposes. (Capability unit IIIe–3; woodland suitability group 3c1)

Brooke silty clay loam, 12 to 25 percent slopes, moderately eroded (BwE2).—This soil occupies small, irregular areas on hillsides. It has lost some of its original surface soil through erosion, and its present surface layer includes material from the subsoil. The present surface layer is light colored, and it is sticky and plastic when wet. A few shallow gullies have formed in the steeper areas.

Use of this soil for farming is limited mainly by the continuing hazard of erosion. A few areas on the lower slopes can be used for an occasional cultivated crop, but much of the acreage is too steep for tillage. The slope and slow permeability are limitations to many nonfarm uses. (Capability unit VIe–2; woodland suitability group 3c1 on north- and east-facing slopes, 4c1 on south- and west-facing slopes)

Canadice Series

The Canadice series consists of poorly drained, nearly level soils that occur in small, scattered areas throughout the glaciated part of the county. Most areas were sites of old, shallow glacial lakes. These soils formed in silty clay and clay of Wisconsin age.

In a typical profile the plow layer is dark-gray silt loam about 7 inches thick. The subsoil is about 38 inches thick and is sticky and plastic when wet. To a depth of about 13 inches, it is dark-gray silty clay mottled with strong brown and brownish yel-

low. Below this, and extending to a depth of 34 inches, is gray clay mottled with dark brown, light olive brown, yellowish red, and strong brown. The lower part of the subsoil is dark-gray silty clay mottled with strong brown and light olive brown. The underlying material is gray, poorly sorted and stratified silty clay, silty clay loam, silt loam, gravel, and sand.

The Canadice soils have a deep root zone in most places when the water table is low. The available moisture capacity is low to medium. Permeability is very slow in the subsoil. The water table is at or near the surface late in winter and in spring. Because water seeps in from adjacent higher areas, these soils are seldom droughty.

Most of the acreage of these soils is used for pasture.

Typical profile of Canadice silt loam, in Canton Township, section 13, T. 10 N., R. 8 W.:

Ap—0 to 7 inches, dark-gray (10YR 4/1) heavy silt loam; moderate, fine, granular structure; friable; abundant roots; medium acid; abrupt, wavy boundary.

B21t—7 to 13 inches, dark-gray (5Y 4/0) silty clay; many, medium, prominent mottles of strong brown (7.5YR 5/8) and brownish yellow (10YR 6/6); strong, medium, subangular blocky structure; plastic when wet; numerous roots; thin continuous clay films on ped faces; few white pebbles of quartz; slightly acid; gradual, wavy boundary.

B22tg—13 to 20 inches, gray (N 5/0) clay; many, medium, prominent mottles of dark brown (7.5YR 4/4) and light olive brown (2.5Y 5/4); weak, coarse, prismatic structure that breaks to strong, fine and medium, subangular blocky structure; very plastic when wet; numerous roots; medium continuous clay films on ped faces; slightly acid; gradual, wavy boundary.

B23tg—20 to 34 inches, gray (N 5/0) clay; many, medium, prominent mottles of yellowish red (5YR 4/6), strong brown (7.5YR 4/4), and light olive brown (2.5Y 5/4); weak, coarse, prismatic structure that breaks to strong, fine and medium, subangular blocky structure; very plastic when wet; few roots; very dark gray (N 3/0), thick, continuous clay films on ped faces; slightly acid; gradual, wavy boundary.

B24tg—34 to 45 inches, dark-gray (N 4/0) silty clay; many, medium, prominent mottles of strong brown (7.5YR 5/8) and light olive brown (2.5Y 5/4); moderate, fine and medium, subangular blocky structure; plastic when wet; few roots; medium discontinuous clay films on ped faces; neutral; gradual, wavy boundary.

IIC—45 to 60 inches, gray (N 5/0) poorly sorted and stratified silty clay, silty clay loam, silt loam, gravel, and sand; many, coarse, distinct mottles of yellowish brown (10YR 5/4), light olive brown (2.5Y 5/4), and brown (7.5YR 4/4); massive (structureless); no roots; many rounded pebbles of quartz and granite; neutral to mildly alkaline in lower part of horizon.

In uncultivated areas there is a very dark brown (10YR 2/2) or very dark gray (10YR 3/1) A1 horizon that is 2 to 4 inches thick and a gray (10YR 5/1) or dark-gray (10YR 4/1) A2 horizon 3 to 6 inches thick. In the B2 horizon, the clay content ranges from 45 to 55 percent, and the matrix ranges from light gray (N 6/0), gray (N 5/0), and dark gray (5YR 4/1 and N 4/0) to olive gray (5Y 5/2). Reaction ranges from slightly acid to medium acid in the upper part of the B horizon and from neutral to slightly acid in the lower part. Coarse fragments in the solum make up less than 5 percent of the soil mass. From 5 to 15 percent of the IIC horizon consists of coarse fragments.

The Canadice soils are the poorly drained members of a drainage sequence that includes the very poorly drained Montgomery soils. Canadice soils are next to the Sebring soils in many places, but they are more clayey in their subsoil and are less acid throughout their profile than these soils. The Canadice soils are similar to the Trumbull soils, but unlike them are underlain by stratified material deposited by water.

Canadice silt loam (0 to 2 percent slopes) (Ca).—This soil occurs in swales and in somewhat depressional areas that are commonly dissected by small streams. It is subject to flooding in some places. Ponding is likely in undrained areas.

Included with this soil in mapping were a few areas of soils that have a dark-colored surface layer that is very high in organic-matter content and small areas of soils that have a silty clay loam surface layer that is sticky when wet. Also included in the mapping were small areas of the Wallkill soils that are underlain by muck and small areas of the somewhat poorly drained Fitchville soils.

Wetness is the major limitation to use of this soil for most purposes. This soil is difficult to drain. (Capability unit IVw–1; woodland suitability group 1w1)

Canfield Series

The Canfield series consists of moderately well drained, level to moderately steep soils that occur on uplands throughout the glaciated part of the county. These soils formed in loam or silt loam glacial till of Wisconsin age.

In a typical profile the surface layer is silt loam about 10 inches thick. It is dark grayish brown in the upper 8 inches and yellowish brown below. The subsoil is about 45 inches thick. To a depth of about 25 inches, it is yellowish-brown, friable silt loam mottled with dark grayish brown, yellowish brown, brown, and strong brown. Below this, and extending to a depth of 55 inches, is a dark yellowish-brown and yellowish-brown loam fragipan that is mottled with yellowish brown, gray, and dark gray. The underlying material is yellowish-brown loam that is mottled with grayish brown and contains fragments of sandstone and shale.

The Canfield soils have a moderately deep root zone. Permeability is moderate in the upper part of the subsoil, and it is moderately slow in the lower part of the subsoil and in the underlying material. The available moisture capacity is medium. These soils have a perched water table during long wet periods.

The Canfield soils are the most extensive soils in this county. Most of the acreage is used for cultivated crops.

Typical profile of Canfield silt loam, 2 to 6 percent slopes, in a meadow in Tuscarawas Township, section 9, T. 12 N., R. 10 W.:

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

A2—8 to 10 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, platy structure that breaks to weak, very fine, subangular blocky structure; fria-

ble; abundant roots; strongly acid; clear, wavy boundary.

B21t—10 to 20 inches, yellowish-brown (10YR 5/4) silt loam; few, fine, faint mottles of dark grayish brown (10YR 4/2), yellowish brown (10YR 5/8), and brown (7.5YR 5/4); moderate, medium, subangular blocky structure; friable; many roots; thin patchy clay films; very strongly acid; diffuse, wavy boundary.

B22t—20 to 25 inches, yellowish-brown (10YR 5/4) silt loam; many, medium, distinct mottles of strong brown (7.5YR 5/8) and grayish brown (10YR 5/2); weak, medium, subangular blocky structure; friable; many roots; thin discontinuous clay films on ped faces; strongly acid; clear, wavy boundary.

IIBx1—25 to 36 inches, dark yellowish-brown (10YR 4/4) loam; common, medium, faint mottles of yellowish brown (10YR 5/6) and gray (10YR 5/1); weak, coarse, prismatic structure that breaks to weak, thick, platy structure; very firm, brittle; few roots; black and dark-brown stains on platy surfaces; few stones as much as 3 inches in diameter; strongly acid; gradual, wavy boundary.

IIBx2—36 to 46 inches, yellowish-brown (10YR 5/4) loam; weak, coarse, prismatic structure that breaks to weak, thick, platy structure; very firm, brittle; few roots; thin dark-gray (10YR 4/1) clay films on ped faces; dark-brown stains on platy surfaces; strongly acid; gradual, wavy boundary.

IIBx3—46 to 55 inches, dark yellowish-brown (10YR 4/4) loam; few, medium, faint mottles of dark gray (10YR 4/1); very weak, coarse, subangular blocky structure; very firm, brittle; few roots; black and brown stains on ped faces; strongly acid; clear, smooth boundary.

IIC—55 to 62 inches, yellowish-brown (10YR 5/4) loam; few, medium, faint mottles of grayish brown (10YR 5/2); massive (structureless); firm; no roots; common fragments of sandstone and shale; medium acid.

The B21, Bx1, and Bx2 horizons are loam, silt loam, or light clay loam and are 25 to 40 inches thick; their clay content is typically 23 percent, but it ranges from 20 to 27 percent. Depth to the Bx1 horizon (fragipan) generally is 25 inches, but it ranges from 15 to 30 inches. The Bx horizon is 20 to 36 inches thick, and it contains primary prisms 6 to 14 inches across and black coats that cover 20 to 50 percent of the horizontal surfaces. Reaction ranges from slightly acid to very strongly acid in the solum. The texture of the Bx and C horizons is silt loam, loam, or fine sandy loam. Depth to calcareous till ranges from 60 to 100 inches, and the calcium-carbonate equivalent of this material is 2 to 4 percent.

The Canfield soils are the moderately well drained members of a drainage sequence that includes the somewhat poorly drained Ravenna soils and the well drained Wooster soils. Along the boundary between soil associations 3 and 7, Canfield soils are commonly adjacent to Rittman soils. Canfield soils have less clay in their subsoil and underlying glacial till than Rittman soils, and they are deeper to limy material.

Canfield silt loam, 0 to 2 percent slopes (CdA).—This soil occurs on hilltops, mainly in areas that range from 5 to 10 acres in size. Slopes are most commonly 1 or 2 percent. This soil tends to dry out more slowly in spring than the other Canfield soils.

Included with this soil in mapping, in drainageways and small concave areas, were small areas of the poorly drained Sebring soil that has a till substratum. Other inclusions were small areas of Canfield soils that have slopes of more than 2 percent.

Seasonal wetness limits the use of this Canfield soil for cultivated crops. For many nonfarm uses, moderately slow permeability and seasonal wetness are limitations. (Capability unit IIw–4; woodland suitability group 1o1)

Canfield silt loam, 2 to 6 percent slopes (CdB).—This soil occupies convex areas on uplands. Most areas are large and irregularly shaped. This soil has the profile described as typical for the series.

Included with this soil in mapping were small areas of a moderately eroded Canfield soil that has more gravel on the surface and has a lighter colored and thinner surface layer than that described as typical. Also included in mapping were small areas of the poorly drained Sebring soil that has a till substratum. Other inclusions, on the crests of small knolls, were spots of the well-drained Wooster soils.

A moderate hazard of erosion is the major limitation to the use of this soil for farming. Wet areas caused by seepage are common on the lower third of long slopes. Moderately slow permeability is the main limitation to many nonfarm uses. (Capability unit IIe–2; woodland suitability group 1o1)

Canfield silt loam, 6 to 12 percent slopes (CdC).—This soil occupies irregularly shaped areas that vary in size.

Included with this soil in mapping were small areas of a moderately eroded Canfield soil that has more gravel on the surface and has a thinner and lighter colored surface layer than this soil. Also included in the mapping, in narrow drainageways, were small areas of the poorly drained Sebring soil that has a till substratum.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. For many nonfarm uses, it is limited by the slope and moderately slow permeability. (Capability unit IIIe–2; woodland suitability group 1o1)

Canfield silt loam, 6 to 12 percent slopes, moderately eroded (CdC2).—This soil occurs along drainageways and on the lower part of long slopes. Areas are irregular in size and shape. This soil has more gravel on the surface than the soil described as typical for the series, and its surface layer is thinner and lighter colored. Past erosion has thinned the root zone and lowered the available moisture capacity of this soil. Because of the loss of organic matter, good tilth is difficult to maintain on this soil. The surface layer is susceptible to crusting, and runoff is rapid.

Included with this soil in mapping were a few small areas of a severely eroded soil; shallow gullies have formed in these areas. Also included in the mapping, at the base of slopes, were small areas of the somewhat poorly drained Ravenna soils.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. Moderately slow permeability and the slope are limitations to many nonfarm uses. (Capability unit IIIe–2; woodland suitability group 1o1)

Canfield silt loam, 12 to 18 percent slopes (CdD).—This soil generally occupies long, narrow areas along drainageways. In the profile of this soil the fragipan is at a depth of 18 to 20 inches, which is nearer the surface than in the profile described as typical for the series. Because runoff is very rapid, the hazard of erosion is very severe.

Included with this soil in mapping were small areas of moderately eroded Canfield soils that have more pebbles on the surface and are lighter colored than this soil. Other inclusions were small areas of the well-drained Wooster soils.

A very severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope is a severe limitation for many nonfarm uses. (Capability unit IVe–2; woodland suitability group 1o1)

Canfield silt loam, 12 to 18 percent slopes, moderately eroded (CdD2).—This soil generally occurs in long, narrow areas along drainageways and streams. It has lost most of its original surface layer through erosion, and the fragipan is only 15 to 20 inches below the surface. There is more gravel on the surface of this soil than is on the surface of the surrounding uneroded Canfield soils. This soil is droughty. A few shallow gullies have formed in some places.

Included with this soil in mapping were small areas of the well-drained Wooster soils.

The major limitation to the use of this soil for cultivated crops is a very severe hazard of erosion. The slope is a severe limitation for many nonfarm uses. (Capability unit IVe-2; woodland suitability group 1o1)

Canfield-Urban land complex, undulating (CeB).—This complex occupies broad areas in the glaciated part of the county. It consists of areas of unaltered, or only slightly altered, Canfield soils and of areas where the soil material has been severely altered or disturbed by cutting and filling during construction.

Included in the mapping of this complex were a few areas of the well-drained Wooster soils.

In areas outside the cities about 50 to 60 percent of the area has been altered by construction, but the percentage is much larger within the cities. In some places, where grading has been extensive, the compact glacial till underlying these areas has been exposed. In the relatively undisturbed areas, the dense fragipan in the Canfield soils is at a depth of 24 to 50 inches, and permeability is moderately slow.

Because the dominant Canfield soils are moderately well drained and the fragipan slows the movement of water, areas of this complex have a high water table in winter and in spring; in disturbed areas, runoff generally is rapid, and the hazard of erosion is moderate. (Capability unit not assigned; woodland suitability group 1o1)

Canfield-Urban land complex, rolling (CeC).—This mapping unit consists of moderately well drained Canfield soils and disturbed land that have been used for community development.

Included in the mapping of this complex were a few areas of the well-drained Wooster soils.

The dominant Canfield soils have a fragipan that slows the movement of water through the soil, and seepage downslope is common. Runoff is rapid, and erosion is a severe hazard in the disturbed areas. Unprotected ditchbanks along roads tend to erode rapidly, and in places material from the dense, compact fragipan is exposed. (Capability unit not assigned; woodland suitability group 1o1)

Canfield Series, Moderately Shallow Variant

In some soil series, a variant is included. A variant has many of the characteristics of the series in which it is placed, but it differs in at least one important characteristic, which is indicated by its name. The acreage of a variant is not large enough to justify establishing a new series. The moderately shallow variant of the Canfield series is similar to normal Canfield soils but is thinner to bedrock.

The profile of the moderately shallow variant of the Canfield series has a dark grayish-brown and yellowish-brown silt loam surface layer about 7 inches thick. The subsoil is about 29 inches thick. To a depth of about 20 inches, it is brown and dark-brown, friable silt loam. Below this is a dark yellowish-brown loam fragipan 4 inches thick that is mottled with grayish brown and yellowish brown. The lower part of the subsoil is 12 inches of yellowish-brown silty clay loam mottled with grayish brown.

Typical profile of a Canfield silt loam, moderately shallow variant, in Bethlehem Township, section 3, T. 9 N., R. 9 W.:

A1—0 to 4 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, crumb structure; friable; abundant roots; very strongly acid; clear, wavy boundary.

A2—4 to 7 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, subangular blocky structure; friable; common roots; very strongly acid; gradual, wavy boundary.

B1—7 to 14 inches, brown (7.5YR 4/4) silt loam; few, fine faint mottles of grayish brown (10YR 5/2); moderate, medium, subangular blocky structure; friable; common roots; very strongly acid; gradual, wavy boundary.

B2t—14 to 20 inches, dark-brown (7.5YR 4/4) silt loam; moderate, medium, subangular blocky structure; friable; common roots; thin, patchy, gray (5Y 5/1) clay films in pores and in root channels; many fragments of granite, siltstone, and shale; very strongly acid; gradual, wavy boundary.

Bx—20 to 24 inches, dark yellowish-brown (10YR 4/4) loam; common, medium, distinct mottles of grayish brown (10YR 5/2) and yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; firm, somewhat brittle; few roots; very dark brown (10YR 2/2) ferromanganiferous stains on pebbles and stone fragments; 15 percent coarse fragments; very strongly acid; abrupt, wavy boundary.

IIB3—24 to 36 inches, yellowish-brown (10YR 5/4) silty clay loam; many, medium, distinct mottles of grayish brown (2.5Y 5/2); weak, medium, subangular blocky structure; friable when moist, slightly plastic when wet; few roots; 15 percent fragments of weathered shale; very strongly acid; clear, wavy boundary.

Depth to shale bedrock ranges from 20 to 40 inches.

Canfield silt loam, moderately shallow variant, 2 to 6 percent slopes (CfB).—This soil occurs mainly in small areas on or near crests of hills. Slopes are slightly convex. This Canfield soil is well drained and moderately well drained, but it is moderately well drained in most areas.

This soil is commonly next to normal Canfield soils, and small areas of those soils were included in mapping.

A moderate hazard of erosion is the major limi-

tation to the use of this soil for farming. Moderate permeability and shallowness to shale limit use for many nonfarm purposes. (Capability unit IIe–4; woodland suitability group 1o1)

Canfield silt loam, moderately shallow variant, 6 to 12 percent slopes (CfC).—This soil occurs mainly in small areas in the southern part of the county. It is generally moderately well drained, but it is well drained in some places. Thin layers of glacial till are underlain by shale bedrock. In most places, this soil contains more fragments of shale or sandstone than the other Canfield soils. This soil has the profile described as typical for the series.

Included with this soil in mapping, in the northeastern part of the county, were a few small areas of somewhat poorly drained soils.

A severe hazard of erosion is the major limitation to the use of this soil for farming. The slope and the limited depth to bedrock are limitations for many nonfarm uses. (Capability unit IIIe–3; woodland suitability group 1o1)

Carlisle Series

In the Carlisle series are very poorly drained, black organic soils that occur in level and depressed areas in the glaciated part of the county. The organic material formed from partly decomposed plant material from fibrous grasses, sedges, and trees.

A typical cultivated Carlisle soil is black muck to a depth of about 9 inches. Below this, and extending to a depth of 22 inches, is dark reddish-brown muck and partly decomposed peat. Below a depth of 22 inches is dark yellowish-brown, partly decomposed peat.

The Carlisle soils have a deep root zone when the water table is low. They have rapid permeability in the layers of muck, but the underlying material is nearly impervious. The available moisture capacity is very high. These soils are wet for long periods unless they are artificially drained.

These soils are moderately extensive in this county. Some areas have been drained and are used for vegetables and special crops. Undrained areas are swampy much of the time.

Typical profile of Carlisle muck in a cultivated field in Marlboro Township, section 5, T. 20 N., R. 7 W. (analytical data in table 10):

1—0 to 9 inches, black (N 2/0) muck; moderate, fine and very fine, granular structure; very friable; abundant roots; strongly acid; clear, smooth boundary.

2—9 to 22 inches, dark reddish-brown (5YR 2/2) muck and partly decomposed peat; fibrous; platy structure; abundant roots; many roots of old plants; few pieces of wood as much as 2 inches in diameter; very strongly acid; gradual, wavy boundary.

3—22 to 60 inches, dark yellowish-brown (10YR 4/4), partly decomposed peat; fibrous; thick platy structure; abundant, coarse and fine, woody roots; strong odor of hydrogen-sulfide; water table is at a depth of 50 inches; strongly acid.

The surface layer ranges from 8 to 14 inches in thickness. Depth to the underlying mineral material is 5 to 30 feet or more. The horizon below the surface layer includes black (N 2/2), and the layer of peat includes dark reddish brown (5YR 2/2). Reaction ranges from very strongly acid to slightly acid but is most commonly strongly acid.

The Carlisle soils are next to the very poorly drained, organic Linwood and Willette soils. They are deeper to mineral material than either the Linwood soil or the Willette soil.

Carlisle muck (0 to 2 percent slopes) (Ch).—This soil occupies level to depressional areas that vary in size. A large area is in the Hartville Swamp (fig. 9). This soil is very soft and spongy, and it quakes when a person jumps up and down on it. Drainage outlets are not available in many places, especially in areas of kames. When this soil is saturated in winter and spring, it is extremely dangerous to traverse with machinery in unfarmed areas because of the danger of sinking.

Included with this soil in mapping were small areas of the shallow Willette and Linwood soils. Also included in mapping were a few knolls of the poorly drained Ginat soils.

Wetness is a major limitation to the use of this soil. During dry periods, however, this soil is subject to soil blowing in cultivated areas and to damage by fire. In drained areas the muck tends to subside be-

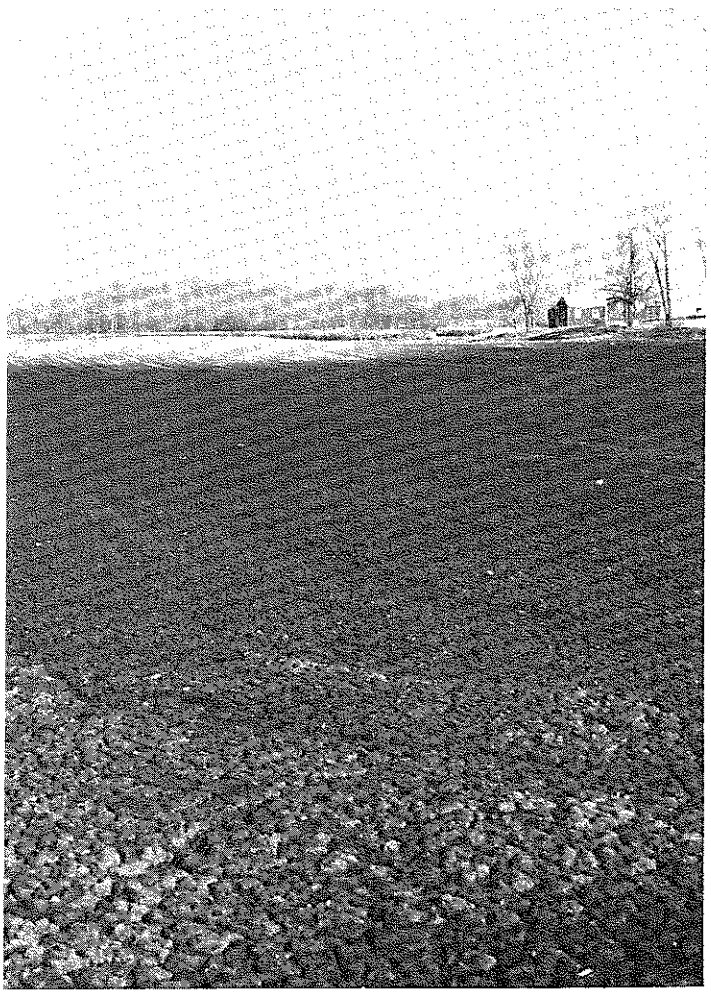

Figure 9.—An area of Carlisle muck is in the foreground. A light-colored Chili soil is in the background.

cause the organic material oxidizes. (Capability unit IIIw–5; woodland suitability group not assigned)

Chagrin Series

In the Chagrin series are well-drained, nearly level soils on flood plains. These soils formed in recent alluvium washed from uplands.

In a typical profile the surface layer is dark-brown silt loam about 21 inches thick. The subsoil, about 27 inches thick, is dark-brown, friable silt loam in the uppermost 11 inches and is strong-brown, friable loam below. The underlying material is stratified, loose gravelly loam and sandy loam.

The Chagrin soils have a deep root zone and high available moisture capacity. Their water table fluctuates, but generally it is more than 3 feet below the surface. Flooding is a hazard.

These soils are inextensive in this county. Areas along the larger streams are used for corn and hay. Most of the acreage on narrow flood plains along the smaller streams is used for pasture or trees.

Typical profile of Chagrin silt loam, alkaline phase, in a meadow in Pike Township, section 29, T. 9 N., R. 8 W.:

A1—0 to 21 inches, dark-brown (10YR 4/3) silt loam; weak, fine, crumb structure and weak, fine, subangular blocky structure; friable; abundant roots; mildly alkaline; clear, wavy boundary.

B21—21 to 32 inches, dark-brown (7.5YR 4/4) silt loam; weak, fine, subangular blocky structure; friable; few roots; mildly alkaline; diffuse, wavy boundary.

B22—32 to 48 inches, strong-brown (7.5YR 5/6) loam; weak, fine, subangular blocky structure, friable; few roots; medium acid; gradual, wavy boundary.

C—48 to 60 inches, stratified, loose, gravelly and sandy loam.

The A horizon is silt loam or loam. It is dark grayish brown (10YR 4/2) or dark brown (10YR 4/3) and is 12 to 24 inches thick. The C horizon contains stratified material of gravelly loam or sandy loam texture. Reaction ranges from medium acid to moderately alkaline. In this county the Chagrin soils are more alkaline throughout than is typical.

The Chagrin soils are the well drained members of a drainage sequence that includes the moderately well drained Lobdell soils, the somewhat poorly drained Shoals soils, the poorly drained Wayland soils, and the very poorly drained Sloan soils. They are generally above the topographic level of the other soils in this drainage sequence. Chagrin soils are commonly adjacent to the Lobdell soils next to the stream channels. They are similar to Wheeling soils but occupy lower positions than those soils.

Chagrin loam, alkaline phase (Ck).—This soil occurs primarily along Sandy Creek and its tributaries. It contains more sand and is in better tilth than Chagrin silt loam, alkaline phase, which has the profile described as typical for the Chagrin series. Gravel is commonly on the surface of this soil.

Included with this soil in mapping were a few areas of soils that have a sandy loam surface layer.

A hazard of flooding is the major limitation to the use of this soil for farming and for nonfarm purposes. (Capability unit IIw–5; woodland suitability group 1o1)

Chagrin silt loam, alkaline phase (Cm).—This soil occupies long bands along streams and higher areas on the flood plains of the Tuscarawas River and Sandy Creek. It has the profile described as typical for the Chagrin series.

Included with this soil in mapping were small areas of the somewhat poorly drained Shoals soils. Also included in mapping were small areas of Chagrin soils that have a loam surface layer and areas, along breaks of abandoned stream channels, where slopes are 2 to 6 percent.

Use of this soil for farming and for nonfarm purposes is limited mainly by a hazard of flooding. (Capability unit IIw–5; woodland suitability group 1o1)

Chili Series

The Chili series consists of well-drained, level to steep soils that occur on broad stream terraces, outwash plains, and kames. These soils formed in glacial outwash of Wisconsin age (fig. 10).

In a typical profile the surface layer is dark-brown

Figure 10.—Profile of a Chili silt loam.

silt loam about 9 inches thick. The subsoil, about 27 inches thick, is dark-brown and reddish-brown, friable silt loam in the uppermost 10 inches and is dark-brown, reddish-brown, and dark reddish-brown, firm gravelly sandy loam below. The underlying material is reddish-brown and brownish-yellow gravelly loamy sand.

The Chili soils have a moderately deep root zone in most places. Permeability is moderately rapid to rapid in the subsoil and is very rapid in the underlying material. Available moisture capacity ranges from medium to very low. These soils are generally droughty.

The Chili soils are extensive in this county. Most of the acreage is used for cultivated crops, but many acres are in community development.

Typical profile of Chili silt loam, 2 to 6 percent slopes, in a cultivated field in Perry Township, section 20, T. 10 N., R. 9 W. (analytical data in table 10):

Ap—0 to 9 inches, dark-brown (10YR 4/3) crushed silt loam; moderate, fine, granular structure; friable; abundant roots; strongly acid; abrupt, smooth boundary.

B1—9 to 12 inches, dark-brown (7.5YR 4/4) silt loam; moderate, thin and medium, platy structure; friable; plentiful roots; very strongly acid; clear, wavy boundary.

B2t—12 to 19 inches, dark-brown (7.5YR 4/4) and reddish-brown (5YR 4/3) silt loam; moderate, medium, subangular blocky structure; thin, patchy clay films on ped faces; friable; plentiful roots; 5 to 10 percent, by volume, is gravel below a depth of 15 inches; very strongly acid; clear, wavy boundary.

IIB3t—19 to 36 inches, dark-brown (7.5YR 4/4), reddish-brown (5YR 4/4), and dark reddish-brown (5YR 3/4) gravelly sandy loam; massive (structureless); firm; clay films on gravel faces; clay bridging between sand grains; 35 percent, by volume, is gravel; common, distinct, dark stains at a depth of 19 to 25 inches; plentiful roots; very strongly acid; clear, wavy boundary.

IIIC—36 to 60 inches, reddish-brown (5YR 4/4) and brownish-yellow (10YR 6/6) gravelly loamy sand; loose; plentiful roots; strongly acid.

The A horizon is silt loam, loam, or gravelly loam. It is dark grayish brown (10YR 4/2), dark brown (10YR 4/3), or dark yellowish brown (10YR 4/4). Where the A horizon is silt loam, the silty layer ranges from 15 to 30 inches in thickness. The B1 horizon ranges from silt loam to clay loam, and the B2t horizon from silt loam to sandy clay loam. The clay content of the B2 horizon ranges from 18 to 25 percent. Typically, hue in the B horizon is 7.5YR, but it ranges from 10YR to 5YR. Reaction ranges from very strongly acid to medium acid in the B horizon. Depth to calcareous material ranges from 45 inches to more than 100 inches, but tongues of calcareous material are within 36 inches of the surface in some places.

The Chili soils are the well drained members of a drainage sequence that includes the moderately well drained Bogart soils. Chili soils commonly are adjacent to the Wheeling, Bogart, and Weinbach soils and, in a few places, adjoin Ginat and Conotton soils. The upper part of the subsoil of Chili soils does not contain so much gravel as that of the Conotton soils. Chili soils have a thinner mantle of silt than Wheeling soils, and they lack the fragipan that is typical for Weinbach soils.

Chili loam, 0 to 2 percent slopes (CnA).—This soil occurs along the larger streams and on the stream terraces, mainly along Little Sandy Creek. Its surface layer contains more sand and is in better tilth than the Chili silt loams. The available moisture capacity is low.

Included with this soil in mapping were spots and larger areas that have a sandy loam surface layer.

The low available moisture capacity is the major limitation to use of this soil for cultivated crops. Limitations for many nonfarm uses are few. (Capability unit IIs–1; woodland suitability group 1o1)

Chili loam, 2 to 6 percent slopes (CnB).—This soil occupies outwash plains and stream terraces. Areas are slightly convex and vary in size and shape.

Included with this soil in mapping, generally on the stronger slopes, were small moderately eroded areas that have gravel on the surface.

Although this soil absorbs rainwater well, surface runoff is moderate. The hazard of erosion is moderate in cultivated areas. Limitations for most nonfarm uses are few. (Capability unit IIe–3; woodland suitability group 1o1)

Chili gravelly loam, 6 to 12 percent slopes (CoC).—This soil is on crests of knolls and terrace breaks along drainageways. It has more sand and gravel in the surface layer and subsoil and tends to be more droughty than Chili silt loam, 2 to 6 percent slopes, which has the profile described as typical for the series.

This soil commonly is next to Conotton soils, and small areas of those soils were included in the mapping. Also included were small areas of eroded Chili soils that have a very gravelly surface layer. Where kames occur in the north-central part of the county, there are inclusions in which the subsoil and underlying material contain granitic boulders 1 or 2 feet in diameter.

Use of this soil for farming is limited mainly by a severe hazard of erosion. The slope is a limitation to some nonfarm uses. (Capability unit IIIe–1; woodland suitability group 1o1)

Chili gravelly loam, 6 to 12 percent slopes, moderately eroded (CoC2).—This soil occurs on crests of knolls and on breaks. Areas vary in size and shape. In the profile of this soil the surface layer and subsoil contain more sand and gravel than do corresponding layers in the profile described as typical for the series, and the gravelly loamy sand part of the underlying material is not more than 20 inches from the surface. This soil commonly is lighter colored than the uneroded Chili gravelly loam. Because runoff is rapid, the hazard of erosion is severe. The available moisture capacity is very low.

Included with this soil in mapping were small areas of Conotton soils. Other areas of Conotton soils are near areas of this Chili soil.

The severe erosion hazard and droughtiness are the major limitations to the use of this soil for farming. Slope is a limitation for some nonfarm uses. (Capability unit IIIe–1; woodland suitability group 1o1)

Chili gravelly loam, 12 to 18 percent slopes, moderatley eroded (CoD2).—This soil occurs along drainageways and on banks of stream terraces. Its surface layer and subsoil contain more gravel than do corresponding layers in the profile described as typical for the series, and the gravelly and sandy underlying material is less than 20 inches from the soil surface.

Included with this soil in mapping were areas of gravelly Conotton soils.

The major limitations to the use of this soil for

farming are a very severe hazard of erosion and droughtiness. The slope is a limitation to many nonfarm uses. (Capability unit IVe–1; woodland suitability group 1o1)

Chili gravelly loam, 18 to 25 percent slopes, moderately eroded (CoE2).—This soil occurs along streams, in areas of kames, and on terrace breaks. In the profile of this soil, the subsoil contains more gravel and the gravelly and sandy underlying material is nearer the surface than in the profile described as typical for the series.

Included with this soil in mapping were areas of gravelly Conotton soils.

This Chili soil is better suited to pasture than to crops, but the hazard of erosion is severe in pastured areas. The steep slopes severely limit use of this soil for nonfarm purposes. (Capability unit VIe–1; woodland suitability group 2r1)

Chili silt loam, 0 to 2 percent slopes (CpA).—This soil occupies long areas on stream terraces and areas of various shapes and sizes on outwash plains. Depth to sandy and gravelly material is 15 to 40 inches. Available moisture capacity is no more than medium.

Included with this soil in mapping were areas of gently sloping Chili soils that were too small to map separately. Also included, in drainageways and depressions, were small areas of the somewhat poorly drained Weinbach soils and the moderately well drained Bogart soils.

Although the available moisture capacity of this Chili soil is more favorable for the growth of plants than that of the other Chili soils, moderate droughtiness is the main limitation to use for cultivated crops. Limitations for many nonfarm uses are few or none. (Capability unit IIs–1; woodland suitability group 1o1)

Chili silt loam, 2 to 6 percent slopes (CpB).—This soil occupies areas that vary in size and shape, and it is one of the most extensive soils in the county. It has the profile described as typical for the Chili series.

Included with this soil in mapping were areas of soils that contain erratic globs of glacial till that are less permeable than this soil. These included areas were in the north-central part of the county where kames occur. Also included, on tops of convex slopes, were a few small areas of moderately eroded soils.

This soil is well suited to cultivated crops, but erosion is a moderate hazard. Limitations for many nonfarm uses are few or none. (Capability unit IIe–3; woodland suitability group 1o1)

Chili silt loam, 6 to 12 percent slopes (CpC).—This soil occurs along drainageways and on low knolls and hills. In most places it is susceptible to surface crusting. This soil is more droughty than the less sloping Chili silt loams.

Included with this soil in mapping were spots of moderately eroded soils that have gravel on the surface and are lighter colored than this soil. Also included, in the mapping in the north-central part of the county, were areas of soils that have a mass or layer of glacial till in the subsoil or the underlying material. The soils having glacial till in the subsoil are more slowly permeable than the surrounding Chili soil.

Use of this soil for farming is limited mainly by a severe hazard of erosion. Runoff is rapid in some places. The slope limits use for some nonfarm purposes. (Capability unit IIIe–1; woodland suitability group 1o1)

Chili silt loam, 6 to 12 percent slopes, moderately eroded (CpC2).—This soil occurs along drainageways and on low knolls and hills. It has some gravel on the surface, and its surface layer is lighter colored and more susceptible to crusting than that of the uneroded Chili silt loams. The underlying material ranges from loam or sandy loam that contains very little gravel to gravelly loamy sand.

Included with this soil in mapping were small areas of more slowly permeable soils that contain a layer of glacial till in their subsoil or underlying material.

Droughtiness and a severe hazard of erosion are major limitations to use of this soil for farming. The slope is the main limitation for nonfarm uses. (Capability unit IIIe–1; woodland suitability group 1o1)

Chili-Urban land complex, undulating (CuB).—This complex occupies large areas in the cities of Massillon and Canton and in the villages of Waynesburg, Magnolia, Minerva, and Beach City. It consists of areas of relatively undisturbed Chili soils and of areas where the soil material has been severely altered or disturbed by cutting and filling. Slopes range from 0 to 6 percent. Depth to the underlying gravelly material varies considerably within short distances. Locally, large cobblestones and a few boulders are excavated. Chili soils have moderately rapid permeability and tend to dry out quickly after a rain. Where septic tanks are installed, pollution of ground water is a danger. (Capability unit not assigned; woodland suitability group 1o1)

Chili-Urban land complex, rolling(CuC).—This complex occurs in residential areas and on breaks between stream terraces and bottom lands. In many areas cut and fill operations have so altered the Chili soils that the soil profile cannot be recognized. In areas outside of cities and towns, about 25 percent of the area can be recognized as Chili soils. Areas of this complex are well drained. They dry out rapidly after rains, and much of the complex is droughty. Pollution of ground water is a danger where septic tanks have been installed. (Capability unit not assigned; woodland suitability group 1o1)

Chili-Urban land complex, steep (CuF).—This mapping unit consists of Chili soils and disturbed land that have been used for residential or other community development. Slopes range from 12 to 25 percent. Runoff is rapid, and erosion and siltation are serious concerns during and following construction. The gravelly Chili soils are droughty. Effluent is likely to seep out of hillsides in areas where septic tanks are installed. (Capability unit not assigned; woodland suitability group 3f1)

Chili and Conotton gravelly loams, 25 to 50 percent slopes, moderately eroded (CvF2).—These soils occur on banks of terraces and on kames. Any area may consist of either the Chili soil or the Conotton soil, or of both soils in any proportion. These gravelly soils are very droughty and highly susceptible to erosion.

In some local areas of kames, boulders 1 to 3 feet in diameter occur in the subsoil. (Capability unit VIIe–1; woodland suitability group 3f1)

Conotton Series

This series consists of well-drained, level to steep soils that occur in outwash areas throughout the county. These soils contain a large amount of gravel throughout.

In a typical profile the plow layer is dark-brown gravelly loam about 9 inches thick. The subsoil is about 33 inches thick. To a depth of about 15 inches, it is dark-brown very gravelly sandy clay loam. Below this, and extending to a depth of 34 inches, is dark-brown, dark yellowish-brown, and dark grayish-brown very gravelly sandy loam. The lower part of the subsoil is 8 inches of dark reddish-brown and dark grayish-brown very gravelly sandy clay loam. The underlying material is brown very gravelly sandy loam.

The Conotton soils have a shallow to moderately deep root zone and very low available moisture capacity. Permeability is rapid or very rapid, and the water table is below 5 feet throughout the year. The soils dry out rapidly in spring, and they are droughty.

The Conotton soils are inextensive in this county. Most of the acreage is used for crops and pasture.

Typical profile of a Conotton gravelly loam on slopes of 18 to 25 percent, in Bethlehem Township, section 27, T. 9 N., R. 9 W.:

Ap—0 to 9 inches, dark-brown (10YR 4/3) gravelly loam; moderate, medium, crumb structure; friable; abundant roots; 25 percent, skeletal material, by volume; medium acid.

B21t—9 to 15 inches, dark-brown (7.5YR 4/4) very gravelly sandy clay loam; weak, medium, subangular blocky structure; friable when moist, sticky when wet; common roots; thick continuous clay films on skeletal material and bridging between sand grains; 60 percent skeletal material, by volume; stones as much as 4 inches in diameter; medium acid; gradual, wavy boundary.

B22t—15 to 24 inches, dark-brown (7.5YR 4/4) very gravelly sandy loam; massive (structureless), breaks to weak, medium, subangular blocky structure; friable when moist, sticky when wet; occasional roots; medium continuous clay films on skeletal material and bridging between sand grains; patchy, black (N 2/0) ferromanganiferous stains on a few stones; 75 percent skeletal material, by volume; strongly acid; gradual, smooth boundary.

B23t—24 to 34 inches, dark yellowish-brown (10YR 4/4) and dark grayish-brown (10YR 4/2) very gravelly sandy loam; massive (structureless); friable when moist, sticky when wet; occasional roots; thick continuous clay coatings on pebbles and bridging between sand grains; few black (N 2/0) concretions 2 or 3 millimeters in diameter that are easily crushed; 80 percent skeletal material, by volume; pebbles dominantly less than 1 inch in diameter; more coarse sand and less gravel more than 1 inch in diameter than in B22t horizon; strongly acid; gradual, wavy boundary.

B3t—34 to 42 inches, dark reddish-brown (5YR 3/4) and dark grayish-brown (10YR 4/2) very gravelly sandy clay loam; massive (structureless); friable when moist, slightly sticky when wet; no roots; medium continuous clay coatings on skeletal material and bridging between sand grains; 80 percent skeletal material, by volume; medium acid; gradual, smooth boundary.

C—42 to 60 inches, brown (10YR 4/3) very gravelly sandy loam; single grain (structureless); loose; sandstone and shale gravel is dominant; no roots; 80 percent skeletal material, by volume; medium acid.

The A horizon is loam or gravelly loam. The B horizon is 18 to 40 inches thick. The clay films in the B horizon are thin and discontinuous in some places. Depth to calcareous material is more than 60 inches. The content of coarse fragments makes up 25 to 70 percent of the upper part of the solum and ranges to more than 80 percent in the lower part of the B horizon and the C horizon.

The Conotton soils are commonly adjacent to the well-drained Chili soils. They contain considerably more gravel in their subsoil than Chili soils.

Conotton loam, 0 to 2 percent slopes (CwA).—This soil occurs mainly on low terraces along the Tuscarawas River. It commonly is next to the Chili soils. It is relatively free of gravel to a depth of 15 inches.

Included with this soil in mapping, in slightly depressed areas, were small areas of the moderately well drained Bogart soils.

Severe droughtiness limits the use of this soil for farming and for most nonfarm purposes. (Capability unit IIIs–1; woodland suitability group 3f1)

Conotton gravelly loam, 2 to 6 percent slopes (CyB).—This soil occupies small, slightly convex areas, and it has a considerable amount of gravel on the surface.

Included with this soil in mapping were small areas that are not gravelly on the surface. Also included, in drainageways and in small depressions, were areas of the moderately well drained Bogart soils.

Droughtiness late in summer is the major limitation to the use of this soil for farming, but the hazard of erosion is also a concern. Except for droughtiness, limitations for nonfarm uses are few or none. (Capability unit IIIs–1; woodland suitability group 3f1)

Conotton gravelly loam, 6 to 12 percent slopes (CyC).—This soil occupies areas that vary in size and shape, and it is scattered throughout the county.

Included with this soil in mapping at the base of slopes, were small areas of the moderately well drained Bogart soils.

A hazard of erosion and droughtiness late in summer are the major limitations to the use of this soil for farming. Droughtiness and the slope are limitations for nonfarm uses. (Capability unit IIIs–1; woodland suitability group 3f1)

Conotton gravelly loam, 12 to 18 percent slopes, moderately eroded (CyD2).—This soil occurs on terrace breaks and along dissected drainageways of terraces. It has a thinner, lighter colored surface layer than that of the soil described as typical for the series, and it has more gravel and cobblestones on the surface than that soil. The soil is very low in organic-matter content.

This soil is better suited to pasture than to cultivated crops. A severe hazard of erosion and droughtiness are the major limitations to use for farming. The slope and droughtiness limit use for many nonfarm purposes. (Capability unit VIe–1; woodland suitability group 3f1)

Conotton gravelly loam, 18 to 25 percent slopes, moderately eroded (CyE2).—This soil occupies areas that

are scattered throughout the county, but it is primarily on terrace breaks along Sandy Creek, the Tuscarawas River, and in areas of kames in the north-central part of the county. This soil contains more gravel and has a shallower root zone than the uneroded Conotton soils.

This soil is better suited to permanent pasture than to hay or to rotation pasture. A very severe hazard of erosion and droughtiness are major limitations to use for farming. The slope is the main limitation for nonfarm uses. (Capability unit VIIe–1; woodland suitability group 3f1)

Cut and Fill Land

Cut and fill land (Cz) consists of areas where grading has removed or disturbed the soil material or where the original soil has been covered with 3 feet or more of fill material. (Capability unit VIIIs–1; woodland suitability group not assigned)

Dekalb Series

The Dekalb series consists of well-drained, gently sloping to steep soils that occur on hillsides in the unglaciated southern part of the county. These soils formed in material weathered from sandstone and thin beds of siltstone.

In a typical profile the plow layer is dark grayish brown sandy loam about 7 inches thick. The subsoil, to a depth of about 25 inches, is brown and pale-brown channery sandy loam. At a depth of 25 inches is a layer of light yellowish-brown very channery loam in which coarse fragments make up about 60 percent of the soil mass. Thin beds of light-gray, weathered, fractured sandstone are at a depth of 34 inches.

The Dekalb soils have a moderately deep root zone in most places. Permeability is moderately rapid, and available moisture capacity is low.

These soils are extensive in the county. Most of the acreage is woodland or is pastured.

Typical profile of Dekalb sandy loam, 6 to 12 percent slopes, in an abandoned meadow in Sandy Township, section 17, T. 17 N., R. 7 W. (analytical data in table 10):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) sandy loam; weak, fine and medium, subangular blocky structure; friable; abundant roots; 5 percent coarse fragments, by volume; strongly acid; abrupt, smooth boundary.

B1—7 to 15 inches, brown (10YR 4/3) channery sandy loam; weak, medium and coarse, subangular blocky structure; friable; common roots; thin coats of dark-brown (10YR 3/3) clay loam on weathered upper surfaces of stone fragments; few, thin, patchy, light yellowish-brown (10YR 6/6) clay films on some ped faces; 35 percent coarse fragments, by volume; very strongly acid; clear, wavy boundary.

B2—15 to 25 inches, pale-brown (10YR 6/3) channery sandy loam; weak, medium, subangular blocky structure; friable; few roots; coats of dark-brown (10YR 4/3) clay loam on weathered upper surfaces of stone fragments; few, thin, patchy, pale-brown (10YR 6/3) clay films on some ped faces; 35 percent coarse fragments, by volume; strongly acid gradual, wavy boundary.

B&C—25 to 34 inches, light yellowish-brown (10YR 6/4) very channery sandy loam; weak, medium, subangular blocky structure; friable; few roots; coats of dark-brown (10YR 3/3) clay loam on upper surfaces of stone fragments; few, thin, patchy, very pale brown (10YR 7/3) clay films on ped surfaces; 60 percent coarse fragments; strongly acid; gradual, wavy boundary.

R—34 to 50 inches, thin beds of light-gray (N 7/0), medium-grained, fractured sandstone; weathered surface of sandstone is yellowish brown (10YR 5/6) and dark brown (10YR 4/3); some soil material is in fractures and bedding planes.

In wooded areas there is a 3- to 5-inch A1 horizon that is very dark gray (10YR 3/1) or very dark grayish brown (10YR 3/2). The B horizon ranges from loam or sandy loam to coarse loamy sand. The matrix of the B2 horizon includes light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/4 to 5/6). Reaction ranges from strongly acid to extremely acid throughout the profile. Depth to bedrock is 24 to 40 inches. The sandstone, and in some places the siltstone, bedrock is fractured in the uppermost 2 feet, and the crevices contain mineral soil material.

The Dekalb soils are adjacent to, or are near, the well-drained, silty Muskingum and Gilpin soils, and in some places, the shallow Weikert and Ramsey soils. The Dekalb soils are less clayey than the nearby Latham and Keene soils, which are underlain by shale bedrock.

Dekalb sandy loam, 2 to 6 percent slopes (DkB).—This soil occupies small, irregularly shaped areas on rounded ridgetops and on high benches. This soil is less droughty than the other Dekalb sandy loams. A few fragments of sandstone are on the surface.

Included with this soil in mapping, on knobs and near ridgetops, were small areas of the well-drained, shallow Weikert and Ramsey soils.

Use of this soil for cultivated crops is limited by a moderate hazard of erosion. For many nonfarm uses, this soil is limited by shallowness to bedrock. (Capability unit IIe–4; woodland suitability group 3o1)

Dekalb sandy loam, 6 to 12 percent slopes (DkC).—This soil occupies elongated, irregularly shaped areas on hillsides and convex ridgetops. It has the profile described as typical for the Dekalb series.

Included with this soil in mapping were moderately eroded areas that have more fragments of stone on the surface than this soil. Also included in the mapping, on hilltops and ridgetops, were small areas of the shallow Ramsey soils and on lower slopes, small strips of the shallow Weikert soils. Other inclusions, on a north-south ridge near Battlesburg, were areas of soils that are neutral to weakly calcareous.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope and shallowness to bedrock are limitations for many nonfarm uses. (Capability unit IIIe–3; woodland suitability group 3o1)

Dekalb sandy loam, 12 to 25 percent slopes, moderately eroded (DkE2).—This soil occurs on hillsides in moderately long bands that follow the contour of the hill. It has a lighter colored surface layer and more stones on the surface than the uneroded Dekalb sandy loams.

Included with this soil in mapping were small

areas of the shallow Ramsey and Weikert soils. Also included in mapping, near Battlesburg and south of Waco, were areas of soils that are neutral to weakly calcareous.

A severe hazard of erosion and droughtiness are limitations to the use of this soil for cultivated crops. For most nonfarm uses, the slope and shallowness to bedrock are limitations. (Capability unit IVe–3; woodland suitability group 2r1 on north- and east-facing slopes, 3r1 on south- and west-facing slopes)

Dekalb sandy loam, 25 to 50 percent slopes, moderately eroded (DkF2).—This soil occurs on hillsides in strips that follow the contour of the hill. It is more droughty than the other Dekalb soils in the county. Bedrock generally is at a depth of 20 to 30 inches.

Included with this soil in mapping were severely eroded areas that have a few shallow gullies. Also included in mapping were small areas of the shallow Ramsey soils and, on the hillsides or at the base of the slopes, small areas of Latham and Keene soils. Other inclusions, near Battlesburg and south of Waco, were areas of soils that are neutral to weakly calcareous.

A very severe hazard of erosion and the slope are the major limitations to use of this soil. (Capabilitiy unit VIe–3; woodland suitability group 2r1 on north- and east-facing slopes, 3r1 on south- and west-facing slopes)

Edwards Series

In the Edwards series are very poorly drained, dark-colored organic soils that occur in depressional, swampy areas in the vicinity of Hartville. These soils formed from mixed plant material underlain by marl.

A typical Edwards soil is black muck in the uppermost 5 inches and is very dark grayish-brown and dark brown mucky peat to a depth of 28 inches. The underlying material is pale-yellow, strongly calcareous marl.

The Edwards soils have a moderately deep root zone when the water table is low. They have a high water table most of the year unless they are drained. The available moisture capacity is high.

These soils occur only in a small acreage in this county. Drained areas are used for truck crops. Undrained areas are swampy and have a cover of water-tolerant plants.

Typical profile of Edwards muck in a wooded area in Lake Township, section 15, T. 12 N., R. 8 W. (analytical data in table 10):

1—0 to 5 inches, black (N 2/0) muck; moderate, very fine, granular structure; friable; abundant roots; medium acid; clear, smooth boundary.

2—5 to 13 inches, very dark grayish-brown (10YR 3/2) mucky peat; massive (structureless); firm, tough, fibrous plant material; abundant roots; slightly acid; clear, wavy boundary.

3—13 to 24 inches, dark-brown (7.5YR 3/2) mucky peat; massive (structureless); firm, tough, fibrous plant material; abundant roots; earthworm activity, neutral; clear, wavy boundary.

4—24 to 28 inches, dark-brown (7.5YR 3/2) mucky peat; massive (structureless); firm, tough, fibrous plant material; common fine roots; few shells; few lenses of single-grained sand; mildly alkaline; abrupt, smooth boundary.

IICca—28 to 50 inches +, pale-yellow (5Y 7/3) marl; massive (structureless); friable; few fine roots; old root channels with prominent brownish-yellow (10YR 6/6) rinds; intersecting fissures, or old cracks, in marl with top 5 to 6 inches filled with black mucky peat; fissure faces are yellowish red (5YR 4/6) and reddish yellow (7.5YR 6/8); many shells 3 millimeters in diameter, and a few shells 5 to 7 millimeters in diameter; marl material extends to a depth of 84 inches with no change in color or effervescence; strongly calcareous.

The combined thickness of the mucky horizons over the marl ranges from 20 to 40 inches. The horizon of black muck ranges from 4 to 12 inches in thickness. The amount of woody material in the mucky horizons ranges from none to common. Reaction ranges from medium acid to neutral between depths of 13 and 24 inches.

The Edwards soils are commonly adjacent to, or are near, the Carlisle, Linwood, and Willette soils. Edwards soils are underlain by marl instead of mineral material, as are the Carlisle, Linwood, and Willette soils.

Edwards muck (0 to 2 percent slopes) (Ed).—This soil occurs as bands near the edges of swampy areas southwest of the village of Hartville. In a few cultivated areas the muck is shallow and the underlying marl is visible on the surface.

This soil is commonly next to Carlisle soils, and small areas of those soils were included in mapping. Also included in the mapping were areas of Linwood and Willette soils.

Wetness is the major limitation to the use of this soil for farming, but soil blowing is a concern in drained areas. Suitable drainage outlets are difficult to establish on this soil. (Capability unit IIIw–5; woodland suitability group not assigned)

Fitchville Series

The Fitchville series consists of somewhat poorly drained, nearly level to sloping soils on low stream terraces and along basins and drainageways on uplands. These soils formed mainly in silty sediments deposited by water.

In a typical profile the surface layer is silt loam about 12 inches thick. This layer is dark grayish brown in the upper part and is light brownish gray, mottled with yellowish brown, in the lower part. The subsoil is about 28 inches thick and is mottled with dark yellowish brown, grayish brown, strong brown, and dark brown. It is yellowish-brown silty clay loam in the uppermost 20 inches and is strong-brown silt loam below. At a depth of 40 inches is a layer of yellowish-brown silty clay loam mottled with grayish brown.

The Fitchville soils have a moderately deep to deep root zone and medium to high available moisture capacity. Permeability is moderately slow in the subsoil. These soils have a seasonal high water table. They are subject to ponding and to occasional flooding.

The Fitchville soils are extensive in this county. Most of the acreage is used for cultivated crops, and many acres have been artificially drained.

Typical profile of Fitchville silt loam, 0 to 2 per-

cent slopes, in a meadow in Nimishillen Township, section 35, T. 19 N., R. 7 W. (analytical data in table 10):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine and medium, granular structure; friable; abundant roots; medium acid; abrupt, smooth boundary.

A2—9 to 12 inches, light brownish-gray (10YR 6/2) silt loam; common, medium, faint mottles of yellowish brown (10YR 5/5); weak, thick, platy structure that breaks to weak, fine, subangular blocky structure; friable; common roots; very strongly acid; gradual, wavy boundary.

B21tg—12 to 20 inches, yellowish-brown (10YR 5/4 to 5/6) silty clay loam; many, medium, distinct mottles of dark yellowish brown (10YR 4/4) and grayish brown (2.5Y 5/2); moderate, coarse, angular blocky structure; friable; common roots; light brownish-gray (10YR 6/2), medium, discontinuous clay films on ped surfaces; few, medium, black (N 2/0) ferromanganiferous concretions; very strongly acid; gradual, wavy boundary.

B22tg—20 to 32 inches, yellowish-brown (10YR 5/4 to 5/6) silty clay loam; many, medium, distinct mottles of grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/5); moderate, fine and medium, subangular blocky structure; firm; roots common; thick, discontinuous, olive-gray (5Y 5/2) clay films on horizontal ped faces, thick continuous clay films on vertical ped faces; strongly acid; clear, wavy boundary.

B23—32 to 40 inches, strong-brown (7.5YR 5/6) silt loam; many, medium, distinct mottles of grayish brown (2.5Y 5/2) and dark brown (7.5YR 4/4); weak, coarse, prismatic structure; firm; occasional roots; thick, discontinuous, gray clay films on ped surfaces; medium acid; clear, wavy boundary.

B&C—40 to 52 inches, yellowish-brown (10YR 5/6) silty clay loam; many, medium, distinct mottles of grayish brown (2.5Y 5/2); weak, coarse, prismatic structure that breaks to weak, thick, platy structure; prisms are 8 to 14 inches in diameter; firm; few roots; thick, continuous, dark-gray (N 4/0), vertical clay flows between prisms; few fine ferromanganiferous concretions; slightly acid.

In some places the B2tg horizon is heavy silt loam or clay loam, the matrix includes pale brown (10YR 6/3) and brown (10YR 5/3), and the mottles are gray (N 6/0). The lower part of the B2tg horizon commonly contains dark yellowish-brown, cemented nodules 1 to 3 inches in diameter. The clay content of the B2tg horizon ranges from 22 to 35 percent, and the clay films on the ped faces have chromas of 2 or less. Depth to calcareous material ranges from 60 to 100 inches. Coarse fragments in the B&C horizon make up from 0 to 10 percent of the soil mass. Reaction ranges from strongly acid to very strongly acid in the A2 horizon and from neutral to slightly acid in the B&C horizon.

The Fitchville soils are the somewhat poorly drained members of a drainage sequence that includes the very poorly drained Luray soils, the poorly drained Sebring soils, the moderately well drained Glenford soils, and the well drained Mentor soils. Fitchville soils are commonly adjacent to the Sebring and Glenford soils. They lack the fragipan that is typical for Ravenna soils and are not so compact and dense in their subsoil as those soils. The Fitchville soils have a less clayey subsoil than the Remsen soils.

Fitchville silt loam, 0 to 2 percent slopes (FcA).—This soil is in broad areas in valleys and in partly blocked drainageways on uplands in the glaciated part of the county. It has the profile described as typical for the series. This soil is very susceptible to surface crusting.

Included with this soil in mapping, in depressions and swales, were small areas of the poorly drained Sebring soils.

Ponding and seasonal wetness are the major limitations to use of the soil for most purposes. The underlying silt and clay material tends to be unstable. (Capability unit IIw–1; woodland suitability group 1w1)

Fitchville silt loam, 2 to 6 percent slopes (FcB).—This soil occurs on slack-water terraces and in drainageways. It occurs as elevated rises on broad, nearly level terraces.

This soil commonly is next to the moderately well drained Glenford soils, and small areas of those soils were included in mapping. Also included in mapping, in the lowest part of the drainageways, were small areas of the poorly drained Sebring soils.

Seasonal wetness is the major limitation to use of this soil, but sheet erosion is a hazard in some areas. Ponding is not likely, except in the included nearly level areas. This soil is unstable under heavy loads. (Capability unit IIw–1; woodland suitability group 1w1)

Fitchville silt loam, 6 to 12 percent slopes (FcC).—This soil occurs as narrow, convex strips on walls of basins and on sides of drainageways. It generally has a thinner surface layer than that in the profile described as typical for the Fitchville series.

This soil commonly is next to the moderately well drained Glenford soils, and areas of those soils were included in mapping. Also included in the mapping were spots of moderately eroded soils that are lighter colored than this soil.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The soil material is also unstable and is subject to slippage. (Capability unit IIIe–5; woodland suitability group 1w1)

Fitchville-Urban land complex (Fu).—This complex occurs along drainageways. It consists of areas of nearly level and gently sloping Fitchville soils and areas where the soil material has been altered by cutting and filling.

Wetness and instability of the soil material are the main limitations to use of this complex. Flooding and surface ponding are hazards in some low areas. Water moves through the Fitchville soils at a moderately slow rate, and runoff from adjacent areas is also a concern. (Capability unit not assigned; woodland suitability group 1w1)

Geeburg Series

The Geeburg series consists of moderately well drained, sloping to steep soils that occur in the northeastern corner of the county. These soils formed in silty clay glacial till of Wisconsin age.

In a typical profile the plow layer is dark grayish-brown silt loam about 7 inches thick. The subsoil, about 20 inches thick, is yellowish-brown silty clay in the uppermost 3 inches and is yellowish-brown and grayish-brown clay below. It is mottled with grayish brown and yellowish brown in the lower 13 inches. The underlying material is dark grayish-brown and light brownish-gray clay.

The Geeburg soils have a moderately deep root zone and low available moisture capactiy. Permeability is very slow in the subsoil and the underlying material. Runoff is rapid.

These soils are not extensive in this county. Most of the acreage is woodland or is used for pasture.

Typical profile of Geeburg silt loam, 6 to 12 percent slopes, moderately eroded, in a meadow in Lexington Township, section 21, T. 19 N., R. 6 W.:

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

B1—7 to 10 inches, yellowish-brown (10YR 5/5) silty clay; moderate, fine and medium, angular blocky structure; friable; common roots; few thin clay films; very strongly acid; gradual, wavy boundary.

B21t—10 to 14 inches, yellowish-brown (10YR 5/4) clay; moderate, fine and medium, angular blocky structure; friable when moist, sticky when wet; common roots; thin continuous clay films on ped faces; very strongly acid; gradual, wavy boundary.

B22t—14 to 18 inches, yellowish-brown (10YR 5/4) clay; few, fine, distinct mottles of grayish brown (2.5Y 5/2); strong, medium and coarse, angular blocky structure; sticky when wet; common roots; light gray (10YR 6/1), thin, continuous clay films on ped faces; very strongly acid; gradual, wavy boundary.

B3t—18 to 27 inches, grayish-brown (2.5Y 5/2) clay; few, fine, distinct mottles of yellowish brown (10YR 5/4); strong, medium and coarse, angular blocky structure; sticky when wet; few roots; thin continuous clay films on ped faces; neutral; gradual, wavy boundary.

C—27 to 60 inches, dark grayish-brown (2.5Y 4/2) and light brownish-gray (2.5Y 6/2) clay; strong, fine and medium, angular blocky structure; sticky when wet; no roots; calcareous.

In the B21t and B22t horizons, the clay content ranges from 50 to 60 percent and the matrix ranges from dark brown (7.5YR 4/4) to dark yellowish brown (10YR 4/4) or yellowish brown (10YR 5/6). Mottles of grayish brown (2.5Y 5/2) or pale brown (10YR 6/3) occur at a depth of 12 to 16 inches. Texture of the C horizon includes silty clay loam and silty clay in some places. Depth to calcareous material ranges from 24 to 36 inches. Reaction ranges from strongly acid to extremely acid in the B1 and B2t horizons. Throughout the profile, only from 1 to 5 percent of the soil mass is coarse fragments.

The Geeburg soils are the moderately well drained members of a drainage sequence that includes the poorly drained Trumbull soils and the somewhat poorly drained Remsen soils. Unlike the Canfield and Rittman soils, Geeburg soils do not have a fragipan. The Geeburg soils have a more clayey subsoil and underlying material than the Rittman soils. They are more clayey in the upper part of the subsoil than the Licking soils and are more shallow to limy material.

Geeburg silt loam, 6 to 12 percent slopes, moderately eroded (GbC2).—This soil occurs along small drainageways and at the head of large drainageways. It has the profile described as typical for the Geeburg series.

This soil is commonly next to the somewhat poorly drained Remsen soils, and small areas of those soils were included in the mapping. Also included in the mapping, north of Alliance near Klingler Road, was an area of a Geeburg soil in which shale bedrock is at a depth of 4 feet. Other inclusions, on the upper part of slopes, were areas of slightly eroded Geeburg soils that make up as much as 50 percent of the area mapped, have fewer pebbles on the surface, and are darker colored than this soil.

A very severe hazard of erosion is the main limitation to the use of this soil for cultivated crops. Very slow permeability and the slope are limitations to some nonfarm uses. (Capability unit IVe–4; woodland suitability group 2c1)

Geeburg silt loam, 12 to 25 percent slopes, moderately eroded (GbE2).—This soil occupies areas along streams and drainageways. The slopes are short vertically, and they follow the direction of the streams and drainageways for relatively long distances. This soil has a thinner, lighter colored surface layer than Geeburg silt loam, 6 to 12 percent slopes, moderately eroded, which has the profile described as typical for the series.

Included with this soil in mapping were a few spots of severely eroded Geeburg soils that have more pebbles on the surface than this soil and in which the clayey subsoil is exposed and shallow gullies have formed.

This soil is better suited to hay or pasture than to cultivated crops. A severe hazard of erosion is the major limitation to use for farming. The slope and very slow permeability are limitations for many nonfarm uses. (Capability unit VIe–2; woodland suitability group 2c1)

Gilpin Series

The Gilpin series consists of well-drained, gently sloping to very steep soils that occur in the unglaciated southern part of the county. These soils formed on thin beds of acid siltstone, shale, and fine-grained sandstone (fig. 11).

In a typical profile the plow layer is brown silt loam about 9 inches thick. The subsoil, about 21 inches thick, is strong-brown, brownish-yellow and light yellowish-brown silt loam and heavy silt loam. Light yellowish-brown siltstone and sandstone are at a depth of about 30 inches.

The Gilpin soils have a moderately deep root zone and low available moisture capacity. Permeability is moderate in the subsoil. These soils generally are droughty.

The Gilpin soils are only moderately extensive in this county. They are used mainly for crops and pasture, but the steeper areas are wooded.

Typical profile of a Gilpin silt loam, 0.5 mile south of Waynesburg in Sandy Township, section 27, T. 17 N., R. 7 W.:

Ap—0 to 9 inches, brown (10YR 5/3) silt loam; moderate, fine, crumb structure; friable; abundant roots; few fragments of siltstone and sandstone as much as 2 inches across and ½ inch thick; strongly acid; abrupt, smooth boundary.

B21t—9 to 13 inches, strong-brown (7.5YR 5/6) silt loam; moderate, very fine, subangular blocky structure; friable; abundant roots; thin patchy clay films on ped surfaces; few fragments of siltstone and sandstone as much as 2 inches across and ½ inch thick; strongly acid; clear, smooth boundary.

B22t—13 to 18 inches, strong-brown (7.5YR 5/6) heavy silt loam; moderate, fine and medium, subangular

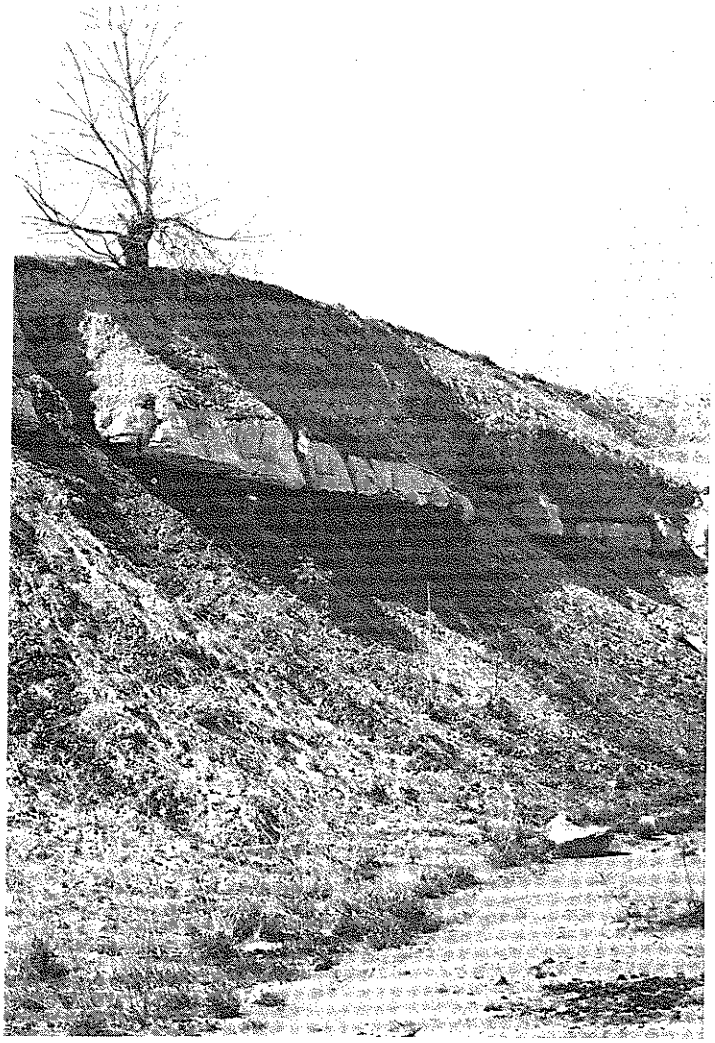

Figure 11.—An area of Gilpin soils that developed over sandstone.

blocky structure; friable; plentiful roots; thin discontinuous clay films on 50 percent of ped surfaces; strongly acid; clear, wavy boundary.

B23t—18 to 30 inches, heavy silt loam; brownish-yellow (10YR 6/6) ped interiors; light yellowish-brown (10YR 6/4) ped exteriors with black (N 2/0) ferromanganiferous stains on ped faces; moderate, fine and medium, subangular blocky structure; friable; plentiful roots; thin, continuous, light yellowish-brown (10YR 6/4) clay films on ped surfaces; few, thick, dark yellowish-brown (10YR 4/4) clay films; 5 percent, by volume, coarse skeletal material; strongly acid; abrupt, smooth boundary.

R—30 inches +, light yellowish-brown (10YR 6/4) siltstone and sandstone.

The B2t horizon ranges from silt loam to light silty clay loam or silty clay loam. It ranges from 9 to 22 inches in thickness but averages about 14 inches. In some places the B2t horizon is yellowish brown (10YR 5/6 to 5/8) or dark yellowish brown (10YR 4/4). Coarse fragments make up 5 to 30 percent of the B23t horizon. Reaction is very strongly acid or strongly acid throughout the profile. Depth to bedrock ranges from 20 to 36 inches.

The Gilpin soils are the well drained members of a drainage sequence that includes the moderately well drained Keene soils and the well drained Muskingum and Dekalb soils. The Gilpin soils contain more clay in their subsoil than the Muskingum soils. Unlike the Keene soils, Gilpin soils are not mottled, and they have a less clayey subsoil than those soils. The Gilpin soils have a less sandy surface layer and subsoil than the Dekalb soils.

Gilpin silt loam, 2 to 6 percent slopes (GdB).—This soil is on ridgetops, mainly in narrow strips that follow the crests of the ridges. In some places it occupies lower benchlike positions. The profile of this soil is generally deeper to bedrock but is otherwise similar to the one described as typical for the series.

Included with this soil in mapping were small areas of the moderately well drained Keene soils and small areas of the shallow, well drained Weikert soils.

A moderate hazard of erosion limits the use of this soil for cultivated crops. Shallowness to bedrock is a limitation for some nonfarm uses. (Capability unit IIe–4; woodland suitability group 3o1)

Gilpin silt loam, 6 to 12 percent slopes (GdC).—This soil occupies convex areas on ridgetops and areas on the upper part of hillsides.

Included with this soil in mapping were areas of the moderately eroded Gilpin soils that have a lighter colored surface layer than the uneroded soils. Also included in mapping were a few, small, severely eroded areas in which a few shallow gullies have formed. Other inclusions were small areas of the shallow Weikert soils.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. Shallowness to bedrock and the slope are limitations to use for some nonfarm purposes. (Capability unit IIIe–3; woodland suitability group 3o1)

Gilpin silt loam, 12 to 18 percent slopes (GdD).—This soil occurs as strips around the middle area of hillsides. Most of the cultivated areas are moderately eroded, and a few shallow gullies have formed in these areas.

Included with this soil in mapping were small areas of the shallow Weikert soils that have numerous channery fragments on the surface. Also included in mapping were small areas of the Latham soils.

Use of this soil for farming is limited mainly by a very severe hazard of erosion. The slope is a limitation to use for most nonfarm purposes. (Capability unit IVe–3; woodland suitability group 3o1)

Ginat Series

The Ginat series consists of poorly drained, level and nearly level soils that occur on terraces and outwash plains. These soils formed in gravelly sandy loam of Wisconsin age.

In a typical profile the plow layer is grayish-brown silt loam about 8 inches thick. The subsoil is about 28 inches thick. To a depth of about 26 inches, it is light olive-gray and light brownish-gray silt loam mottled with yellowish brown. Below this, and extending to a depth of 36 inches, is a light brownish-gray loam fragipan mottled with light olive brown, dark yellowish brown, and strong brown. The underlying material is light brownish-gray gravelly sandy loam mottled with light olive and strong brown.

The Ginat soils have a moderately deep root zone

and medium available moisture capacity. Permeability is moderately slow in the subsoil and moderate in the underlying material. These soils have a seasonal high water table.

The Ginat soils are not extensive in this county. Most of the acreage is wooded or is used for pasture, but some areas have been drained and generally are used for cultivated crops.

Typical profile of the Ginat silt loam on slopes of 0 to 2 percent in a meadow in Lake Township, section 20, T. 12 N., R. 8 W.:

Ap—0 to 8 inches, grayish-brown (2.5Y 5/2) silt loam; moderate, fine, granular structure; friable; abundant roots; medium acid; abrupt, smooth boundary.

Blg—8 to 17 inches, light olive-gray (5Y 6/2) silt loam; few, fine, distinct mottles of yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; friable; common roots; common very dark brown (10YR 2/2) ferromanganiferous concretions 3 to 5 millimeters thick; strongly acid; clear, wavy boundary.

B2tg—17 to 26 inches, light brownish-gray (2.5Y 6/2) silt loam; many, medium, distinct mottles of yellowish brown (10YR 5/6); weak, coarse, angular blocky structure; friable; common roots; thin discontinuous clay films on ped surfaces; few dark-brown (7.5YR 4/4) ferromanganiferous concretions; medium acid; gradual, wavy boundary.

Bxg—26 to 36 inches, light brownish-gray (2.5Y 6/2) loam; many, medium, distinct mottles of light olive brown (2.5Y 5/4), dark yellowish brown (10YR 4/4), and strong brown (7.5YR 5/6); massive (structureless); weak fragipan; slightly brittle; few roots; thin clay films in pores and bridging between sand grains; few black (N 2/0) ferromanganiferous concretions 1 or 2 millimeters thick; pebbles less than 5 percent, by volume; medium acid; gradual, wavy boundary.

Cg—36 to 60 inches, ilght brownish-gray (2.5Y 6/2) gravelly sandy loam; common, medium, distinct mottles of light olive brown (2.5Y 5/4) and strong brown (7.5YR 5/8); massive; friable; no roots; dark-gray (N 4/0) vertical clay seams 1 or 2 millimeters thick; 15 to 20 percent coarse fragments, by volume; strongly acid.

The Ap horizon ranges from dark gray (10YR 4/1) to dark grayish brown (10YR 4/2) or grayish brown (2.5Y 5/2). In the B2 horizon the matrix is grayish brown (10YR 5/2) or light brownish gray (2.5Y 6/2), the clay content ranges from 20 to 30 percent, and the content of material coarser than very fine sand ranges from 18 to 45 percent. The Bxg horizon is 8 to 16 inches thick. Reaction is typically medium acid in the B2 horizon, but it ranges from strongly acid to slightly acid. Coarse fragments in the Cg horizon make up 10 to 50 percent of the horizon.

The Ginat soils are the poorly drained members of the drainage sequence that includes the somewhat poorly drained Weinbach soils and the well-drained Wheeling soils. Ginat soils are commonly next to the Weinbach soils and the well-drained Chili soils. The Ginat soils have a fragipan and are less clayey than the poorly drained Sebring soils. Unlike the Sebring soils, the Ginat soils are underlain by sandy and gravelly material.

Ginat silt loam (0 to 2 percent slopes) (Ge).—This soil occupies areas that vary in size and are scattered throughout the glaciated part of the county. These areas are below the Weinbach and Chili soils and are just above the very poorly drained Luray silt loam, gravelly subsoil variant. This soil is susceptible to surface crusting.

Included with this soil in mapping were small areas of soils that have a loam or silty clay loam surface layer. Also included in mapping, on low hummocks, were small areas of the somewhat poorly drained Weinbach soils and the moderately well drained Bogart soils.

Wetness is the major limitation to the use of this soil. Ponding and flooding are hazards in spring. (Capability unit IIIw–4; woodland suitability group 1w1)

Glenford Series

The Glenford series consists of moderately well drained, level to steep soils on slack water terraces and on uplands. These soils formed on silt and clay deposited by slack water.

In a typical profile the plow layer is dark grayish-brown silt loam about 8 inches thick. The subsoil, about 32 inches thick, is yellowish-brown silt loam in the uppermost 3 inches. Below this, and extending to a depth of 24 inches, is yellowish-brown silty clay loam that is mottled with grayish brown and brownish yellow in the lower 4 inches. The lower part of the subsoil is 16 inches of light olive-brown silt loam mottled with brownish yellow and grayish brown. The underlying material is mottled grayish-brown, brownish-yellow, light olive-brown, and dark-brown silt loam.

The Glenford soils have a deep root zone and high available moisture capacity. Permeability is moderately slow.

These soils are not extensive in this county. They are used primarily for cultivated crops.

Typical profile of Glenford silt loam, 2 to 6 percent slopes, in a meadow in Lake Township, section 33, T. 12 N., R. 8 W.:

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

B1—8 to 11 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium, subangular blocky structure; friable; common roots; thin discontinuous clay films on ped faces; medium acid; clear, wavy boundary.

B21t—11 to 20 inches, yellowish-brown (10YR 5/5) silty clay loam; strong, medium and coarse, subangular blocky structure that breaks to weak, medium, subangular blocky structure; friable; common roots; medium, continuous, dark grayish-brown (10YR 4/2) clay films on ped surfaces; few, fine, very dark gray (10YR 3/1) ferromanganiferous stains; strongly acid; gradual, wavy boundary.

B22t–20 to 24 inches, yellowish-brown (10YR 5/5) silty clay loam; many, fine, distinct mottles of grayish brown (10YR 5/2) and brownish yellow (10YR 6/6); moderate, medium and coarse, subangular blocky structure; slightly firm; common roots; thin discontinuous clay films; few, fine and medium, very dark brown (10YR 2/2) stains, primarily on horizontal planes; strongly acid; gradual, wavy boundary.

B3t—24 to 40 inches, light olive-brown (2.5Y 5/4) silt loam; many, medium, distinct mottles of brownish yellow (10YR 6/6) and grayish brown (10YR 5/2); weak, coarse, subangular structure that breaks to weak, fine and medium, subangular blocky structure; friable; few roots; medium clay films on pores; medium, dark grayish-brown (10YR 4/2) clay flows; few, fine, very dark brown (10YR 2/2) ferro-

manganiferous stains; strongly acid; gradual, diffuse boundary.

C—40 to 50 inches, mottled grayish-brown (10YR 5/2), brownish-yellow (10YR 6/6), light olive-brown (2.5Y 5/4), and dark-brown (10YR 3/3) silt loam; massive (structureless); slightly firm; few roots; strongly acid.

In some places the B1 horizon is brown (10YR 5/3) and the B21t and B22t horizons are heavy silt loam and dark yellowish brown (10YR 4/4) or yellowish brown (10YR 5/4 or 5/5). The clay content of the B21t and B22t horizons ranges from 25 to 35 percent. Mottles that have a chroma or 2 or less occur at depths ranging from 14 to 24 inches. Depth to calcareous material ranges from 50 to 80 inches. In some places reaction is strongly acid in the B1 horizon and is medium acid in the C horizon.

The Glenford soils are the moderately well drained members of the drainage sequence that includes the very poorly drained Luray soils, the poorly drained Sebring soils, the somewhat poorly drained Fitchville soils, and the well-drained Mentor soils. Glenford soils are commonly adjacent to the Mentor soils, the well drained, gravelly Chili soils, and the moderately well drained Canfield soils. Glenford soils are more silty and less clayey in their subsoil and underlying material than the Licking soils.

Glenford silt loam, 0 to 2 percent slopes (GfA).—This soil occurs in irregularly shaped areas on stream terraces and in areas of old glacial lakes. Runoff from this soil is slow. Surface crusting is likely. In some places thin seams of gravelly material 2 to 6 inches thick are below a depth of 30 inches.

Included with this soil in mapping, in spoon-shaped depressions and in small drainageways, were a few areas of the somewhat poorly drained Fitchville soils.

Limitations to use of this Glenford soil for cultivated crops are few or none. Moderately slow permeability is a limitation for some nonfarm uses. (Capability unit I–1; woodland suitability group 1o1)

Glenford silt loam, 2 to 6 percent slopes (GfB).—This soil occupies elongated areas below the well-drained Mentor soils and above the somewhat poorly drained Fitchville soils. It has the profile described as typical for the series. This soil is susceptible to surface crusting.

Included with this soil in mapping, in areas adjacent to Canfield soils, were a few areas of soils that are underlain by compact glacial till. Also included in the mapping, in narrow drainageways, were small areas of the somewhat poorly drained Fitchville soils.

A moderate hazard of erosion is a limitation to use of this soil for cultivated crops. The hazard of erosion and moderately slow permeability are limitations to use for some nonfarm purposes. (Capability unit IIe–1; woodland suitability group 1o1)

Glenford silt loam, 6 to 12 percent slopes (GfC).—This soil occupies rounded areas below the well-drained Mentor soils and above the somewhat poorly drained Fitchville soils. Because runoff is rapid, the hazard of erosion is severe. The surface layer of this soil is thinner and lighter colored than that in the profile described as typical for the series.

Included with this soil in mapping were small areas of moderately eroded Glenford silt loams. Also included in the mapping were small areas of Mentor soils.

A severe hazard of erosion limits use of this soil for cultivated crops. The slope and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIIe–5; woodland suitability group 1o1)

Glenford silt loam, 6 to 12 percent slopes, moderately eroded (GfC2).—This soil occurs in short, irregularly shaped areas at the head of drainageways, on stream terraces, and in old lake areas. On uplands, in areas next to the Canfield soils, this soil is underlain by glacial till. This soil has more gravel on the surface, and its surface layer is lighter colored than that of the uneroded Glenford soils. On this soil, past erosion has reduced the organic-matter content, and surface crusting and puddling are likely.

Included with this soil in mapping, on the upper part of slopes, were small areas of the well-drained Mentor soils.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope, the hazard of erosion, and moderately slow permeability are limitations for many nonfarm uses. (Capability unit IIIe–5; woodland suitability group 1o1)

Glenford silt loam, 12 to 18 percent slopes, moderately eroded (GfD2).—This soil occupies short slopes along valley sides of stream terraces and in areas of old glacial lakes. Its surface layer is about 4 inches thick, and it is lighter colored than that in the profile described as typical for the series. Depth to the underlying sand, silt, and clay is 30 inches. Because of past erosion, this soil is low in organic-matter content. Surface runoff is very rapid.

Included with this soil in mapping, on the upper part of slopes, were small areas of the well-drained Mentor soils.

A very severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope and moderately slow permeability are limitations for most nonfarm uses. (Capability unit IVe–1; woodland suitability group 1o1)

Gravel Pits

Gravel pits (Gp) are open excavations from which sand and gravel have been removed. The gravel is generally in layers that vary in thickness and change in composition within short distances. Between the gravelly layers are sandy ones that contain variable amounts of silty and clayey material. (Capability unit not assigned; woodland suitability group not assigned)

Keene Series

The Keene series consists of moderately well drained, gently sloping to steep soils that occur in the unglaciated southern part of the county. These soils formed in residuum weathered from shale and thin beds of siltstone.

In a typical profile the surface layer is dark-brown silt loam about 8 inches thick. The subsoil is about 26 inches thick and is mottled throughout. It is strong-brown and yellowish-brown silty clay loam in the uppermost 11 inches and is yellowish-brown and strong-brown silty clay below. The underlying mate-

rial is mottled gray and brownish-yellow, weathered clay shale.

The Keene soils have a moderately deep or deep root zone and medium available moisture capacity. Permeability is moderately slow in the upper part of the subsoil and slow in the lower part.

These soils are relatively extensive in the southern part of the county. They are used for pasture, cultivated crops, and trees.

Typical profile of a Keene silt loam, 1.25 miles west of Magnolia, 100 feet north of Farber street, in Pike Township, section 25, T. 9 N., R. 8 W. (analytical data in table 10):

Ap—0 to 8 inches, dark-brown (10YR 4/4) silt loam; moderate, medium, granular structure; friable; abundant roots; very strongly acid; abrupt, smooth boundary.

B1—8 to 13 inches, strong-brown (7.5YR 5/6) silty clay loam; few, fine, distinct mottles of light olive brown (2.5Y 5/4) and yellowish red (5YR 4/6); moderate, fine, subangular blocky structure; slightly plastic when wet; plentiful roots; very strongly acid; gradual, wavy boundary.

B21t—13 to 19 inches, yellowish-brown (10YR 5/4) silty clay loam; many, fine, distinct mottles of light brownish gray (2.5Y 5/2) and yellowish brown (10YR 5/6); moderate, medium, subangular blocky structure; slightly plastic when wet; plentiful roots; few, thin, patchy clay films on ped surfaces; very strongly acid; gradual, wavy boundary.

IIB22t—19 to 25 inches, yellowish-brown (10YR 5/6) silty clay; common, medium, distinct mottles of gray (N 6/0) and strong brown (7.5YR 5/8); moderate, medium, subangular blocky structure; slightly plastic when wet; few roots; thin patchy clay films on vertical and horizontal ped faces; very strongly acid; gradual, wavy boundary.

IIB3—25 to 34 inches, strong-brown (7.5YR 5/6) silty clay; many, fine, distinct mottles of dark reddish brown (5YR 3/4), dark brown (7.5YR 4/4), grayish brown (10YR 5/2), and gray (N 6/0); moderate, medium and coarse, subangular blocky structure; slightly plastic when wet; no roots evident; flecks of coal and pieces of easily crushed weathered shale in lower part; very strongly acid; clear, smooth boundary.

IIIC—34 to 40 inches +, mottled gray (N 6/0) and brownish-yellow (10YR 6/8) weathered clay shale; massive; plastic when wet; no roots evident; thin soft coal blossoms at a depth of 35 inches; few dark-red (10R 3/6) mottles below a depth of 40 inches; very strongly acid.

Mottles of low chroma occur at depths between 12 and 24 inches. The matrix of the IIB22t horizon ranges from yellowish brown (10YR 5/4 to 5/6) or dark yellowish brown (10YR 4/4) to strong brown (7.5YR 5/6) but is dominantly yellowish brown (10YR 5/4). In the lower part of the B horizon, the clay content is 30 to 40 percent. The content of coarse fragments in the solum ranges from 5 to 15 percent. Reaction ranges from strongly acid to extremely acid throughout the solum. Depth to bedrock is 34 to 60 inches.

The Keene soils are in a toposequence with the well-drained Latham soils and are adjacent to those soils in many places. They are commonly adjacent to the well-drained Gilpin soils. Unlike the Gilpin soils, the Keene soils are mottled, and they are more clayey in the lower part of their subsoil. The Keene soils are less clayey than the Latham soils, and they have a thicker silt capping and are deeper to the clayey subsoil than those soils.

Keene silt loam, 2 to 6 percent slopes (KeB).—This soil occupies the uppermost part of ridgetops. The available moisture capacity is medium.

Included with this soil in mapping were small areas of wetter, somewhat poorly drained soils. Also included in the mapping were small areas of the well-drained Latham and Gilpin soils.

A moderate hazard of erosion is the major limitation to the use of this soil for cultivated crops. Moderately slow or slow permeability is a limitation for many nonfarm uses. (Capability unit IIe–5; woodland suitability group 3w1)

Keene silt loam, 6 to 12 percent slopes (KeC).—This soil occupies sloping hillsides and rounded hilltops. It is highly susceptible to surface crusting. Runoff is very rapid from this soil.

Included with this soil in mapping were a few small areas of somewhat poorly drained soils. Also included in mapping were a few small areas of moderately eroded soils that are lighter colored than is typical of Keene soils. Other inclusions, on the lower part of slopes, were a few areas of the well-drained Gilpin soils.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope and moderately slow or slow permeability are limitations for some nonfarm uses. (Capability unit IIIe–6; woodland suitability group 3w2)

Keene silt loam, 6 to 12 percent slopes, moderately eroded (KeC2).—This soil is on the lower half of hillsides and on the convex crest of ridges. Its surface layer is thinner and lighter colored than that in the profile described as typical for the series. A few very shallow gullies have formed in places. Because this soil is lower in organic-matter content than the uneroded Keene soils, its surface tilth generally is not so good. Runoff is very rapid.

Included with this soil in mapping, on the lower part of slopes, were a few small areas of the well-drained Gilpin soils. Also included in mapping were small strips of the well-drained Latham soils.

A severe hazard of erosion is the main limitation to the use of this soil for cultivated crops. The slope and moderately slow or slow permeability are the major limitations to nonfarm uses. (Capability unit IIIe–6; woodland suitability group 3w2)

Keene silt loam, 12 to 18 percent slopes (KeD).—This soil occurs on hillsides below the breaks of ridgecrests, mainly in eroded and abandoned fields. Its surface layer is thinner than that in the profile described as typical for the series.

Included with this soil in mapping were a few spots of moderately eroded soils that are medium in size; they make up about 20 percent of each area. Also included in mapping were small areas of the Latham soils.

Because surface runoff from this soil is very rapid, a very severe hazard of erosion is the major limitation to use for cultivated crops. Moderately steep slopes and moderately slow or slow permeability are limitations for most nonfarm uses. (Capability unit IVe–4; woodland suitability group 3w2)

Keene silt loam, 12 to 18 percent slopes, moderately eroded (KeD2).—This soil occupies narrow strips around the contour of hillsides. Erosion has removed much of the original surface layer, and the profile of

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this soil is thinner to shale bedrock than that described as typical for the series. Shallow gullies are common. This soil is very low in organic-matter content, and good surface tilth is difficult to maintain. Runoff is very rapid.

Included with this soil in mapping were small areas of the well-drained Muskingum soils.

A very severe hazard of erosion is the main limitation to use of this soil for cultivated crops. The slope and slow permeability are major limitations for most nonfarm uses. (Capability unit IVe–4; woodland suitability group 3w2)

Keene silt loam, 18 to 25 percent slopes (KeE).—This soil is on hillsides, in long narrow strips that follow the contour of the hill. Most areas are wooded. This soil has a thinner surface layer than the one in the profile described as typical for the Keene series. There are a few stones on the surface in some places.

Included with this soil in mapping were eroded spots of moderate size and in some areas shallow and deep gullies have formed. Shale bedrock is visible at the bottom of a few of the deep gullies. Also included in the mapping were small areas of the well-drained Latham and Gilpin soils.

This soil is better suited to hay or pasture than to cultivated crops because of its slope. A severe hazard of erosion is the major limitation to its use, even for hay or pasture. The slope is a limitation to use for most nonfarm purposes. (Capability unit VIe–2; woodland suitability group 3w2)

Killbuck Series

The Killbuck series consists of alluvium recently deposited over dark-colored, very poorly drained, older soil material. These soils occur on level and nearly level flood plains and along drainageways.

In a typical profile the surface layer is dark grayish-brown silt loam about 4 inches thick. This layer is underlain by dark-gray, friable silt loam that extends to a depth of about 22 inches and is mottled with yellowish brown and dark brown. Below this is very dark gray light silty clay loam mottled with dark brown. It is about 14 inches thick and is underlain by about 5 inches of light brownish-gray loam glacial till mottled with light olive brown.

The Killbuck soils have a deep root zone when the water table is low. The water table is high in winter and spring. Permeability is moderately slow, and available moisture capacity is high. These soils are subject to ponding and to occasional flooding.

The Killbuck soils are not extensive in the county. Most of the acreage is pastured.

Typical profile of Killbuck silt loam on slopes of 0 to 2 percent, in a pasture in Plain Township, section 20, T. 11 N., R. 8 W.:

A1—0 to 4 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; abundant roots; medium acid; gradual, wavy boundary.

B2—4 to 22 inches, dark-gray (10YR 4/1) silt loam; common, medium, distinct mottles of yellowish brown (10YR 5/4) and dark brown (10YR 3/4); weak, fine, angular blocky structure; friable; common roots; few, fine, black (N 2/0) ferromanganiferous concretions; slightly acid; abrupt, wavy boundary.

A1b—22 to 36 inches, very dark gray (10YR 3/1) light silty clay loam; few, fine, faint mottles of dark brown (7.5YR 4/4); massive (structureless) that breaks to weak, medium, angular blocky structure; friable; few roots; thin clay films in pores and root channels; slightly acid; clear, wavy boundary.

B2b—36 to 50 inches, light brownish-gray (2.5Y 6/2) loam; many, medium, distinct mottles of light olive brown (2.5Y 5/4); massive (structureless); friable; few roots; thin discontinuous clay films in root channels and pores; less than 5 percent skeletal material, by volume; slightly acid.

In some places the A1 horizon is very dark gray (10YR 3/1) or dark gray (10YR 4/1). Depth to the A1b horizon ranges from 20 to 36 inches. The A1b horizon is dark grayish brown (10YR 4/2) or grayish brown (10YR 5/2) in some places. Its texture includes silt loam. Coarse fragments make up 1 to 10 percent of the B2b horizon.

The Killbuck soils are adjacent to the very poorly drained Luray soils, but they are less clayey than those soils. Unlike the Luray soils, Killbuck soils contain a dark-colored buried soil. Killbuck soils formed in recent alluvium deposited over loam glacial till, whereas, the poorly drained Sloan and Wayland soils formed entirely in recent alluvium.

Killbuck silt loam (0 to 2 percent slopes) (Kk).—This soil occurs in drainageways on the glacial till plain and on bottom lands along small streams. It occupies small, irregular areas that are scattered throughout the northern half of the county.

Included with this soil in mapping were small areas of the somewhat poorly drained Fitchville soils.

Seasonal wetness is the major limitation to the use of this soil for farming and for nonfarm purposes. Ponding and flooding are severe limitations for most nonfarm uses. (Capability unit IIIw–3; woodland suitability group 2w1)

Latham Series

The Latham series consists of well-drained, gently sloping to very steep soils in the unglaciated southern part of the county. These soils formed on acid shale bedrock.

In a typical profile the plow layer is brown silt loam about 7 inches thick. The subsoil, about 27 inches thick, is yellowish-brown silty clay loam in the uppermost 6 inches. Below this, and extending to a depth of 20 inches, is yellowish-brown silty clay mottled with light brownish gray at a depth of 18 inches. The lower part of the subsoil is 14 inches of yellowish-brown and strong-brown clay mottled with light brownish gray, yellowish red, and grayish brown. The underlying material is light brownish-gray and brownish-yellow, shaly silty clay. Gray shale bedrock is at a depth of 38 inches.

The Latham soils have a moderately deep root zone in most places. Permeability is slow in the subsoil. The available moisture capacity is medium to low.

These soils are moderately extensive in this county. The gently sloping and sloping Latham soils are commonly used for cultivated crops, and the steeper areas are pastured or wooded.

Typical profile of Latham silt loam, 6 to 12 percent slopes, in an old meadow in Pike Township, section 5, T. 9 N., R. 8 W.:

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; moderate, medium, crumb structure; friable; abundant roots; few coarse fragments of sandstone; strongly acid; abrupt, smooth boundary.

B1t—7 to 13 inches, yellowish-brown (10YR 5/6) silty clay loam; weak and moderate, medium, subangular blocky structure; friable or firm when moist, slightly plastic when wet; common roots; thin discontinuous clay films on vertical ped faces; very strongly acid; gradual, wavy boundary.

IIB21t—13 to 20 inches, yellowish-brown (10YR 5/6) silty clay; few, fine, faint mottles of light brownish gray (10YR 6/2) at a depth of 18 inches; weak, medium, subangular blocky structure; plastic when wet; common roots; thin continuous clay films on ped faces; very strongly acid; gradual, wavy boundary.

IIB22t—20 to 31 inches, yellowish-brown (10YR 5/6) clay; common, fine, distinct mottles of light brownish gray (10YR 6/2) and yellowish red (5YR 5/6); weak, medium and coarse, subangular blocky structure; plastic when wet; few roots; thin, continuous light-gray (N 7/0) clay films on ped faces; very strongly acid; clear, wavy boundary.

IIB3—31 to 34 inches, strong-brown (7.5YR 5/6) clay; common, medium, distinct mottles of grayish brown (2.5Y 5/2) and yellowish red (5YR 5/6); weak, coarse, angular blocky structure; plastic when wet; few roots; thin, continuous, light-gray (N 7/0) clay films, primarily on vertical surfaces; extremely acid; clear, wavy boundary.

IIC—34 to 38 inches, light brownish-gray (10YR 6/2) and brownish-yellow (10YR 6/6) shaly silty clay; weak, coarse, blocky structure or weak platy structure; friable when moist, plastic when wet; no roots; vertical, light-gray (N 7/0) clay seams; highly weathered shale; extremely acid; clear, smooth boundary.

R—38 to 45 inches, gray, acid shale bedrock.

In some places the B1 horizon is silt loam and the B21t, B22t, and B3 horizons include silty clay loam. The matrix of the B21t and B22t horizons ranges from strong brown (7.5YR 5/6 to 5/8) or yellowish brown (10YR 5/6) to brownish yellow (10YR 6/6). The content of coarse fragments in the B horizon is less than 20 percent. Reaction in the solum ranges from strongly acid to extremely acid, but the pH value generally is below 5.0. Depth to shale bedrock ranges from 24 to 40 inches.

The Latham soils are in a toposequence with the moderately well drained Keene soils and in some places are adjacent to those soils. Latham soils are more clayey in the upper part of the subsoil than Keene soils.

Latham silt loam, 2 to 6 percent slopes (LaB).—This soil occurs on broad ridgetops and benchlike areas just below the ridgetops. Its surface layer is thicker than that in the profile described as typical for the series. Runoff is rapid.

Included with this soil in mapping were a few small areas of somewhat poorly drained soils that have slopes of 2 to 4 percent and are grayer in the upper part of the subsoil than are Latham soils. Also included in the mapping were small areas of the moderately well drained Keene soils.

Use of this soil for cultivated crops is limited mainly by a severe hazard of erosion. Slow permeability is a limitation for many nonfarm uses. (Capability unit IIIe–4; woodland suitability group 3c1)

Latham silt loam, 6 to 12 percent slopes (LaC).—This soil occupies slightly concave areas on hillsides. It has the profile described as typical for the series, but in some places the underlying bedrock has thin strata of siltstone or fine-grained sandstone and shale. Runoff is rapid.

Included with this soil in mapping were small areas of the moderately well drained Keene soils and small areas of the well drained Gilpin soils.

A very severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope and the slowly permeable, clayey subsoil are limitations for many nonfarm uses. (Capability unit IVe–4; woodland suitability group 3c1)

Latham silt loam, 6 to 12 percent slopes, moderately eroded (LaC2).—This soil occurs in uniform areas on hillsides. It is one of the least extensive soils in the Latham series. This soil has lost part of its original surface layer through erosion, and its plow layer is partly clayey material from the subsoil. The present surface layer is lighter colored and thinner than that of the uneroded soil described as typical for the series, and it is more sticky and cloddy. Runoff is very rapid from this soil.

Included with this soil in mapping were small areas of the well-drained Gilpin soils.

A very severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope, the hazard of erosion, and the clayey, slowly permeable subsoil are limitations for many nonfarm uses. (Capability unit IVe–4; woodland suitability group 3c1)

Latham silt loam, 12 to 18 percent slopes (LaD).—This soil occupies the upper part of slopes that, in length, are short downhill but are several hundred feet on the contour of the hillside.

Included with this soil in mapping were small areas of the Gilpin soils.

This soil is generally too steep to be cultivated safely. It is subject to severe erosion, even when used for hay or pasture. Slope and slow permeability are the major limitations for most nonfarm uses. (Capability unit VIe–2; woodland suitability group 3c1)

Latham silt loam, 12 to 18 percent slopes, moderately eroded (LaD2).—This soil is on the lower part of narrow slopes that generally are 100 to 200 feet long on the contour of hillsides. It has a lighter colored, more sticky surface layer than that in the profile described as typical for the series. Runoff is very rapid.

Included with this soil in mapping were a few spots of severely eroded soils in which shallow gullies have formed. Also included in mapping were small areas of the Muskingum and Gilpin soils.

This soil is very poorly suited to cultivated crops. A severe hazard of erosion limits the use of this soil even for hay or pasture. The slope is the dominant limitation for most nonfarm uses. (Capability unit VIe–2; woodland suitability group 3c1)

Latham silt loam, 18 to 35 percent slopes (LaF).—This soil occurs as short, narrow strips along hillsides. Locally, it has lost much of its topsoil, and clayey spots occur in areas where the subsoil is exposed. Fragments of weathered shale are common on the surface, and depth to shale bedrock is 30 to 36 inches.

Included with this soil in mapping were small areas of the well-drained Muskingum and Gilpin soils. Also

included in mapping were severely eroded spots where a few shallow gullies have formed.

Steep slopes and a hazard of erosion are the major limitations to use of this soil for most purposes. (Capability unit VIe–2; woodland suitability group 3c1 on north- and east-facing slopes and 4c1 on south- and west-facing slopes)

Licking Series

The Licking series consists of moderately well drained, level to steep soils in the unglaciated south-central part of the county. These soils occur on old terraces along streams that flow southward but are above the present flood plains. They formed in silty clay or clay sediments.

In a typical profile the plow layer is dark-brown silt loam about 7 inches thick. The subsoil, about 37 inches thick, is yellowish-brown silt loam in the uppermost 13 inches. Below this is about 6 inches of yellowish-brown silty clay mottled with light brownish gray and yellowish brown. Between depths of 26 and 44 inches, the subsoil is olive-brown clay that is plastic when wet. Below 44 inches is a layer of light olive-brown, stratified clay, silty clay, and silt loam mottled with grayish brown and light olive brown.

The Licking soils have a deep root zone and high available moisture capacity. The movement of water is very slow below a depth of 20 inches, and during long wet periods the soil material is saturated in the top 20 inches.

These soils are used primarily for pasture and trees, but some of the acreage is used for crops.

Typical profile of Licking silt loam, 2 to 6 percent slopes, in an old meadow in Pike Township, section 17, T. 9 N., R. 8 W. (analytical data in table 10):

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

B1—7 to 15 inches, yellowish-brown (10YR 5/6) silt loam; moderate, fine and medium, subangular blocky structure; friable; common roots; thin patchy clay films on ped surfaces in lower part of horizon; strongly acid; clear, wavy boundary.

B21t—15 to 20 inches, yellowish-brown (10YR 5/8) heavy silt loam; few, medium, faint mottles of strong brown (7.5YR 5/6); strong, medium, subangular blocky structure; friable; common roots; thin discontinuous clay films on nearly all peds; strongly acid; gradual, wavy boundary.

IIB22t—20 to 26 inches, yellowish-brown (10YR 5/4) silty clay; many, medium, distinct mottles of light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/8) on rinds next to clay flows; moderate, coarse, angular blocky structure; plastic when wet, firm when moist; occasional roots; light yellowish-brown (2.5Y 6/4) clay flow coatings on primary peds; moderate continuous clay films on secondary peds; medium acid; clear, wavy boundary.

IIB31t—26 to 33 inches, olive-brown (2.5Y 4/5) clay; massive (structureless) but breaks to moderate, coarse, angular blocky structure; plastic when wet, firm when moist; occasional roots; light-gray (N 7/0) clay vertical flows; moderate, continuous, olive-gray (5Y 5/2) clay films on ped surfaces; few, fine, black (N 2/0) concretions 2 millimeters in diameter; medium acid; gradual, diffuse boundary.

IIB32t—33 to 44 inches, olive-brown (2.5Y 4/4) clay; massive (structureless) that breaks to moderate, coarse, angular blocky structure; plastic when wet, firm when moist; occasional roots; moderate, continuous, grayish-brown (2.5Y 5/2) and pale-olive (5Y 6/3) clay films on ped surfaces; few, fine, medium, black (N 2/0) concretions; slightly acid; clear, wavy boundary.

IIB&C—44 to 60 inches, light olive-brown (2.5Y 5/6) stratified clay, silty clay, and silt loam; massive (structureless) that breaks to weak, medium, platy structure; few, fine, faint mottles of grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/4); no roots; few black (N 2/0) concretions; neutral.

The combined thickness of the Ap, B1, and B21t horizons ranges from 15 to 30 inches. Depth to gray mottling ranges from 15 to 24 inches. In some places the IIB31t and IIB32t horizons are silty clay and are yellowish brown (10YR 5/4) or light olive brown (2.5Y 5/6). Depth to calcareous material ranges from 30 to 80 inches. The B1 horizon is strongly acid or very strongly acid, but acidity decreases with depth.

The Licking soils commonly are adjacent to the lower lying, somewhat poorly drained Fitchville soils and poorly drained Sebring soils. They are also next to the moderately well drained Glenford soils in some places. The Licking soils are more clayey than the Glenford soils, and they have a less acid subsoil.

Licking silt loam, 0 to 2 percent slopes (LcA).—This soil occupies small areas on low-lying terraces. In the profile of this soil, the gray mottles and the clayey material generally are nearer the surface than in the profile described as typical for the series. This soil dries out more slowly in spring than the other Licking soils in the county.

Included with this soil in mapping, in drainageways, were areas of the poorly drained Sebring soils.

Seasonal wetness is the major limitation to use of this soil for cultivated crops. Very slow permeability and seasonal wetness are limitations for many nonfarm uses. Capability unit IIIw–1; woodland suitability group 2c1)

Licking silt loam, 2 to 6 percent slopes (LcB).—This soil occupies terraces in areas of old lakes. It has the profile described as typical for the series, but in some areas the subsoil contains lenses of gravelly material, 2 to 6 inches thick, between the layers of silt loam and the clayey layers. Surface runoff from this soil is rapid, and seep spots are common.

Included with this soil in mapping were small, slightly higher areas of the moderately well drained Glenford soils. Also included in the mapping, in narrow drainageways, were small strips of the poorly drained Sebring soils.

Use of this soil for cultivated crops is limited mainly by a severe hazard of erosion. Very slow permeability is the main limitation for nonfarm purposes. (Capability unit IIIe–5; woodland suitability group 2c1)

Licking silt loam, 6 to 12 percent slopes (LcC).—This soil occurs as bands along small drainageways and in areas next to steep hillsides.

Included with this soil in mapping, in the higher areas, were small areas of the moderately well drained Glenford soils. Also included in the mapping were spots of the moderately well drained Rainsboro soils.

A very severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. Very slow permeability and the slope are the main limita-

tions for nonfarm uses. (Capability unit IVe–4; woodland suitability group 2c1)

Licking silt loam, 6 to 12 percent slopes, moderately eroded (LcC2).—This soil occupies small irregularly shaped areas adjacent to the larger drainage channels. Its surface layer is lighter colored than that in the profile described as typical for the series. This soil has lost some of its original surface soil through erosion, and its present surface layer is a mixture of the original surface soil and material from the subsoil. A few shallow gullies have formed, but generally they are overgrown with grass. The surface layer is very low in organic-matter content.

A very severe hazard of erosion is the primary limitation to the use of this soil for cultivated crops. The slope and very slow permeability are limitations for many nonfarm uses. (Capability unit IVe–4; woodland suitability group 2c1)

Licking silt loam, 12 to 25 percent slopes, moderately eroded (LcE2).—This soil occurs as long, narrow bands on terrace walls. Its surface layer is dark brown and is about 4 inches thick. Depth to the neutral silty clay or clay is about 30 inches. Gullies, 1 to 2 feet deep, are common in some places.

Included with this soil in mapping were a few small areas of the Rainsboro soils.

This soil is too steep to be used for cultivated crops. A severe hazard of erosion is a limitation to use for hay or pasture. Slope is the dominant limitation for most nonfarm uses. (Capability unit VIe–2; woodland suitability group 2c1)

Linwood Series

The Linwood series consists of very poorly drained, dark-colored, organic soils that occur in small, level and depressional areas in the glaciated part of the county. The native vegetation consists of tamarack, willow, reed, sedges, and other water-tolerant plants.

In a typical profile the uppermost 23 inches is black and dark reddish-brown muck. Below this is a layer of dark-gray silty clay loam about 2 inches thick. Below a depth of 25 inches is grayish-brown, mildly alkaline sandy loam mottled with yellowish brown.

The Linwood soils have a moderately deep root zone in most places when the water table is low. In undrained areas the water table is high most of the year. Permeability is variable, and the available moisture capacity is high.

These soils are not extensive in this county. Drained areas are used for vegetables and other special crops. Undrained areas are wooded or pastured.

Typical profile of Linwood muck on slopes of 0 to 2 percent in a cultivated field in Marlboro Township, section 6, T. 20 N., R. 7 W.:

I—0 to 10 inches, black (10YR 2/1) muck; moderate, fine and medium, granular structure; very friable; common roots; slightly acid; clear, wavy boundary.

2—10 to 23 inches, dark reddish-brown (5YR 2/2) muck; massive (structureless) in place, breaks to weak, thick, platy structure; friable; disintegrated peat; small amount of woody material; medium acid; clear, smooth boundary.

IIC1—23 to 25 inches, dark-gray (10YR 4/1) silty clay loam; massive (structureless); plastic when wet; neutral; clear, smooth boundary.

IIC2—25 to 50 inches, grayish-brown (2.5Y 5/2) sandy loam; common, medium, prominent mottles of yellowish brown (10YR 5/6); massive (structureless); some stratification of silt; few pebbles as much as ¼ inch in diameter; mildly alkaline.

The combined thickness of the muck, or organic layers, over the mineral material ranges from 20 to 40 inches. The lower 13 inches of the muck is black (10YR 2/1) or dark brown (7.5YR 3/2) in some places, and the reaction ranges from medium acid to neutral in this layer. In some places there is no IIC1 horizon, and the layers of muck occur immediately above the moderately coarse textured mineral material. From 10 to 50 percent of the IIC2 horizon consists of coarse fragments.

The Linwood soils are adjacent to the very poorly drained Carlisle and Willette soils. They are similar to the Willette soils but are underlain mainly by coarser textured material. The Linwood soils are shallower to the mineral material than the Carlisle soils.

Linwood muck (0 to 2 percent slopes) (Ld).—This soil occupies level and depressional areas that vary in size and shape. It occurs along small streams and on the outer edge of areas of Carlisle soils. This soil is difficult to drain, and in some areas natural drainage outlets are not available. In some areas the surface layer of this soil contains some mineral material that accumulated at the base of slopes.

Included with this soil in mapping were areas where the muck is less than 18 inches thick and a few areas where it is 40 inches thick.

Wetness limits the use of this soil for farming. The muck tends to subside in drained areas, and it is susceptible to destruction by fire during dry periods. Soil blowing is a hazard in cultivated areas. Wetness and unstable soil material are hazards to use for most nonfarm purposes. (Capability unit IIIw–5; woodland suitability group not assigned)

Lobdell Series

The Lobdell series consists of moderately well drained, nearly level soils on flood plains. These soils formed in recent alluvium that washed from the surrounding uplands.

In a typical profile the surface layer is dark grayish-brown silt loam about 11 inches thick. The subsoil, about 37 inches thick, is brown and very pale brown, friable silt loam mottled with brownish yellow in the lower 26 inches. The underlying material is stratified silt loam and loam.

The Lobdell soils have a deep root zone and high available moisture capacity. Permeability is moderate. These soils have a seasonal high water table for short periods, and they are subject to flooding.

These soils occupy a small total acreage in this county. They are used mostly for crops or pasture.

Typical profile of Lobdell silt loam, alkaline phase, on slopes of 0 to 2 percent in a meadow in Pike Township, section 29, T. 9 N., R. 8 W.:

A1—0 to 11 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine and very fine, crumb structure; friable; abundant roots; mildly alkaline; clear, wavy boundary.

B21—11 to 16 inches, brown (10YR 5/3) silt loam; weak, fine and very fine crumb structure; friable; com-

mon roots; mildly alkaline; diffuse, wavy boundary.

B22—16 to 22 inches, brown (10YR 5/3) silt loam; few, fine, faint mottles of light gray (10YR 7/2); weak, fine and very fine, crumb structure and subangular blocky structure; friable; common roots; neutral; diffuse, wavy boundary.

B3—22 to 48 inches, very pale brown (10YR 7/3) silt loam; common, fine, distinct mottles of brownish yellow (10YR 6/6); weak, very fine, subangular blocky structure; friable; common roots; few black (N 2/0) concretions; neutral.

C—48 to 60 inches, grayish-brown (2.5Y 5/2) stratified silt loam and loam; massive (structureless); friable; neutral.

The A horizon is dark brown (10YR 4/3) in some places. The C horizon contains stratified loam, silt loam, sandy loam, and light silty clay loam. Through the entire profile, the range in reaction is from medium acid to moderately alkaline.

The Lobdell soils in this county are more alkaline than is typical for the series.

The Lobdell soils are the moderately well drained members of the drainage sequence that includes the well drained Chagrin soils, the somewhat poorly drained Shoals soils, the poorly drained Wayland soils, and the very poorly drained Sloan soils. The Lobdell soils are generally next to the Shoals soils and the Chagrin soils. They contain less clay throughout the profile than do the Glenford soils.

Lobdell silt loam, alkaline phase (Le).—This soil occurs as narrow bands, primarily along the Tuscarawas River and Little Sandy Creek.

Included with this soil in mapping were slightly higher areas of sandy soils. Also included in the mapping, in the lower areas, were areas of the somewhat poorly drained Shoals soils and, in the higher areas, were areas of the well-drained Chagrin soils.

Flooding is the major limitation to the use of this soil for farming and for nonfarm purposes. (Capability Unit IIw–5; woodland suitability group 1o1)

Loudonville Series

The Loudonville series consists of moderately well drained and well drained, nearly level to very steep soils that occur mainly in the south-central part of the county. These soils formed in silt loam or loam glacial till underlain by sandstone and siltstone.

In a typical profile the surface layer is dark-brown and yellowish-brown silt loam about 6 inches thick. The subsoil is about 22 inches thick. To a depth of about 14 inches, it is yellowish-brown and dark yellowish-brown silt loam. Below this, and extending to a depth of 23 inches, is dark yellowish-brown and dark-brown loam. The lower part of the subsoil is about 5 inches of dark yellowish-brown gravelly sandy loam. At a depth of about 28 inches is sandstone bedrock that is fractured and creviced in the uppermost 8 to 12 inches; brown loamy sand and dark yellowish-brown sandy loam fill the crevices, and roots penetrate the crevices.

The Loudonville soils have a moderately deep root zone and low to medium available moisture capacity. Permeability is moderate in the subsoil. Water penetrates the fractured sandstone. These soils dry out rapidly in spring, and they are droughty in midsummer.

The Loudonville soils are moderately extensive in this county. The gently sloping and sloping soils are used for cultivated crops, but the steeper soils are pastured or wooded.

Typical profile of Loudonville silt loam, 6 to 12 percent slopes, in an old meadow in Sugar Creek Township, section 29, T. 11 N., R. 10 W.:

A1—0 to 2 inches, dark-brown (10YR 4/3) silt loam with streaks and zones of very dark grayish brown (10YR 3/2) along roots; weak, fine, crumb structure; friable; common small fragments of sandstone; abundant roots; strongly acid; clear, wavy boundary.

A2—2 to 6 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, subangular blocky structure; friable; abundant roots; common small fragments of sandstone; very strongly acid; abrupt, smooth boundary.

B1—6 to 10 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, subangular blocky structure; friable; common roots; discontinuous grayish coats of silt on ped surfaces that indicate the removal of the clay; many small stones; very strongly acid; clear, wavy boundary.

B21t—10 to 14 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, medium, subangular blocky structure; moderately firm; common roots; thin discontinuous clay coats at and in structure breaks; many small stones; very strongly acid; gradual, wavy boundary.

B22t—14 to 19 inches, dark yellowish-brown (10YR 4/4) loam; moderate, medium and coarse, subangular blocky structure; moderately firm; few roots; thin discontinuous clay films; common pebbles and small stones; very strongly acid; gradual, wavy boundary.

B23t—19 to 23 inches, dark-brown (10YR 4/3) loam; weak, medium, subangular blocky structure; friable; few roots; thin patchy clay films; common pebbles and small stones; very strongly acid; abrupt, smooth boundary.

IIB3—23 to 28 inches, dark yellowish-brown (10YR 4/4) gravelly sandy loam; massive (structureless); friable; disintegrated sandstone material surrounding many rock fragments that show horizontal bedding; very strongly acid; clear, smooth boundary.

IIR—28 to 56 inches, fractured, stratified sandstone in beds 2 to 5 inches thick. Variable disintegration of sandstone to brown (10YR 5/3) loamy sand and a few planes or strata of dark yellowish-brown (10YR 4/4) sandy loam; roots penetrate the fractured rock to bottom of cut.

The A horizon ranges from 2 to 20 inches in thickness. The B horizon is yellowish brown (10YR 5/6) or dark brown (7.5YR 4/4) in some places. Texture of the B1 and B2t horizons includes light silty clay loam. The B2t horizon ranges from 10 to 20 inches in thickness, but it averages about 15 inches. Reaction is strongly acid or very strongly acid in the B horizon. From 20 to 70 percent of the lower B horizon and the R horizon consists of coarse fragments. Depth to bedrock ranges from 20 to 40 inches.

The Loudonville soils are commonly next to the well drained Gilpin, Muskingum, and Wooster soils and the moderately well drained Canfield soils. The Loudonville soils are shallower to sandstone bedrock than the Wooster soils, and unlike those soils, they do not have a fragipan. Loudonville soils formed in glacial till over bedrock, but the Gilpin and Muskingum soils formed in residuum from sandstone and siltstone bedrock.

Loudonville silt loam, 2 to 6 percent slopes (LoB).—This soil occurs on high ridges and hilltops, in areas that vary in size and shape. It is well drained.

Included with this soil in mapping were a few areas of moderately well drained nearly level Loudonville soils that are too small to map separately; these soils are grayer in the subsoil, and generally are deeper to bedrock than this soil. Also included in the mapping were small areas of the well-drained Muskingum and Gilpin soils.

A moderate hazard of erosion is the major limitation to the use of this soil for cultivated crops. Shallowness to bedrock is a limitation for some nonfarm uses. (Capability unit IIe–4; woodland suitability group 2o1)

Loudonville silt loam, 6 to 12 percent slopes (LoC).—This soil occurs mainly on the upper slopes of hillsides, but in some places it is in elongated areas on ridgetops. Most areas are 10 to 40 acres in size, and the slopes generally are no more than 500 feet long. This soil has the profile described as typical for the Loudonville series. Runoff is rapid from this soil.

Included with this soil in mapping were areas of the well-drained Muskingum and Gilpin soils that are generally shallower to bedrock than the Loudonville soils.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope and shallowness to bedrock are limitations for nonfarm uses. (Capability unit IIIe–1; woodland suitability group 2o1)

Loudonville silt loam, 6 to 12 percent slopes, moderately eroded (LoC2).—This soil occupies convex areas on ridgetops and on the lower parts of long slopes. It has a lighter colored, thinner surface layer than that described as typical for the series. There are many pebbles and fragments of sandstone on the surface. Because of past erosion, this soil is very low in organic-matter content and has low available moisture capacity.

Included with this soil in mapping were spots of severely eroded soils in which shallow gullies have formed. Also included in mapping were areas of moderately well drained Loudonville soils that are not so brown as this soil and that contain gray mottles in the subsoil. Other inclusions were small areas of the well-drained Muskingum and Gilpin soils.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope and shallowness to bedrock are limitations to use for many nonfarm purposes. (Capability unit IIIe–1; woodland suitability group 2o1)

Loudonville silt loam, 12 to 18 percent slopes (LoD).—This soil occupies elongated strips around hillsides and along small drainageways. Most areas are 10 to 20 acres in size. Because runoff is very rapid, the hazard of erosion is very severe.

Included with this soil in mapping were small areas of the well-drained Muskingum and Gilpin soils.

A very severe hazard of erosion limits the use of this soil for cultivated crops. The slope and depth to bedrock are limitations for most nonfarm uses. (Capability unit IVe–3; woodland suitability group 2o1)

Loudonville silt loam, 12 to 18 percent slopes, moderately eroded (LoD2).—This soil is on hillsides. Most areas are 10 to 40 acres in size. This soil has a surface layer 2 to 4 inches thick. It has more stone fragments on the surface than the uneroded Loudonville soils. Past erosion has lowered the available moisture capacity and the organic-matter content of this soil.

Included with this soil in mapping were small areas of severely eroded soils in which small gullies and a few deep gullies have formed; bedrock is commonly visible at the bottom of the deep gullies. Also included in mapping were small areas of the well-drained Muskingum and Gilpin soils.

A very severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope, droughtiness, and shallowness to bedrock are limitations to nonfarm uses. (Capability unit IVe–3; woodland suitability group 2o1)

Loudonville silt loam, 18 to 25 percent slopes, moderately eroded (LoE2).—This soil occupies the upper part of wooded hillsides. The slopes are slightly concave and are seldom more than 500 feet long. Most areas range from 10 to 30 acres in size. Erosion is a very severe hazard.

Included with this soil in mapping were spots and small areas of moderately eroded soils that have more fragments of stones on the surface and a thinner surface layer than this soil. Also included in mapping were small areas of the Muskingum and Gilpin soils.

This soil is too steep for cultivated crops, and very severe erosion is a continuous hazard. The slope and droughtiness are limitations to use for hay and pasture. The slope is the dominant limitation for nonfarm uses. (Capability unit IVe–3; woodland suitability group 2r1)

Loudonville silt loam, 25 to 35 percent slopes, moderately eroded (LoF2).—This soil is not extensive in this county. It occurs on hillsides and occupies elongated areas 5 to 10 acres in size. This soil has lost much of its original surface layer through erosion.

Included with this soil in mapping were some areas of very steep Loudonville soils. Also included in mapping were some eroded spots in which shallow gullies and a few deep gullies have formed; sandstone bedrock is visible in the bottom of the deep gullies. Other inclusions were small areas of the Muskingum and Gilpin soils.

Steep slopes and a severe hazard of erosion are the major limitations to most uses of this soil. (Capability unit VIe–3; woodland suitability group 2r1)

Loudonville-Urban land complex, undulating (LuB).—This complex consists of areas of relatively undisturbed Loudonville soils and of areas where the soil material has been disturbed by cutting and filling. Slopes range from 2 to 6 percent. Areas of this complex are well drained or moderately well drained. Sandstone bedrock is dominant in this complex, but shale is at a depth of 20 to 40 inches in places. Water moves through the soil at a moderate rate in areas underlain by sandstone, but it moves at a slow rate in areas where the bedrock is shale.

Shallowness to bedrock is a limitation to use of this complex. In areas underlain by sandstone, pollution of ground water is a danger where septic tanks have been installed. (Capability unit not assigned; woodland suitability group 2o1)

Loudonville-Urban land complex, rolling (LuC).—This complex occurs mainly in south Canton. In about 75 percent of this complex the soil material has been so severely altered that the soil profile cannot be recognized. Bedrock of sandstone and shale is at a depth of 20 to 40 inches, but sandstone is dominant. Except in areas underlain by shale, water moves readily through the soil material.

On this complex, surface runoff is rapid, and the hazard of erosion is very severe in areas that have been used for construction. Shallowness to bedrock makes excavation difficult and limits the use of this complex for septic tank filter fields. (Capability unit not assigned; woodland suitability group 2o1)

Luray Series

The Luray series consists of very poorly drained, level and nearly level, dark-colored soils. These soils occupy level areas on broad valleys cut by small streams and areas in depressions and drainageways on uplands in the glaciated part of the county. They formed in silt and some clay and sand deposited by water.

A cultivated Luray soil has a very dark gray silty clay loam surface layer about 11 inches thick. The subsoil, about 27 inches thick, is gray and dark-gray silty clay loam mottled with strong brown, dark reddish brown, yellowish red, and dark brown. The underlying material is gray loam mottled with strong brown and light olive brown in the uppermost 10 inches and is dark yellowish-brown silt loam mottled with gray below.

The Luray soils have a deep root zone in drained areas. Available moisture capacity is high. Permeability is moderately slow in the subsoil. These soils have a seasonal high water table for long periods, and unless adequately drained, they are slow to dry out in spring.

The Luray soils are not extensive in this county. Drained areas are used for crops, and undrained areas are wooded or pastured.

Profile of a Luray soil that has a silty clay loam surface layer in an area of Luray silt loam, in cropland in Perry Township, section 24, T. 10 N., R. 9 W. (analytical data in table 10):

Ap1—0 to 8 inches, very dark gray (10YR 3/1) silty clay loam; weak, fine and medium, granular structure; friable; abundant roots; slightly acid; clear, wavy boundary.

Ap2—8 to 11 inches, very dark gray (10YR 3/1) silty clay loam; moderate, medium, subangular blocky structure; friable; abundant roots; slightly acid; abrupt, smooth boundary.

B21tg—11 to 13 inches, gray (10YR 5/1) silty clay loam; common, medium, distinct mottles of strong brown (7.5YR 5/6) and dark reddish brown (5YR 3/4); moderate, medium, subangular blocky structure; firm; abundant roots; slightly acid; clear, wavy boundary.

B22tg—13 to 15 inches, dark-gray (10YR 4/1) silty clay loam; common, medium, distinct mottles of yellowish red (5YR 4/6) and dark brown (7.5YR 4/4); weak, coarse, prismatic structure that breaks to weak, medium, subangular blocky structure; firm; common roots; thin very patchy clay films on vertical ped faces; slightly acid; gradual, wavy boundary.

B23tg—15 to 23 inches, dark-gray (10YR 4/1) silty clay loam; common, medium, distinct mottles of dark brown (7.5YR 3/2) and strong brown (7.5YR 5/6); weak, coarse, prismatic structure that breaks to weak, coarse, angular blocky structure; firm; occasional roots; medium, patchy, dark-gray (N 4/0) clay films on horizontal and vertical ped faces; slightly acid; gradual, wavy boundary.

B24tg—23 to 30 inches, gray (5Y 5/1) silty clay loam; common, medium, prominent mottles of yellowish red (5YR 4/6) and strong brown (7.5YR 5/6); weak, coarse, prismatic structure that breaks to weak, coarse, angular blocky structure; firm; occasional roots; medium, patchy, dark-gray (N 4/0) clay films on horizontal and vertical ped faces; neutral; clear, wavy boundary.

B3tg—30 to 38 inches, dark-gray (10YR 4/1) silty clay loam; common, medium, distinct mottles of strong brown (7.5YR 5/8); weak, coarse, angular blocky structure; friable; occasional roots; thin, patchy, light-gray (2.5Y 7/2) silt coatings, primarily on vertical ped faces; thin patchy clay films on vertical faces; few pebbles of sandstone; neutral; clear, wavy boundary.

IIC1—38 to 48 inches, gray (5Y 5/1) loam; common, medium, prominent mottles of strong brown (7.5YR 5/6) and light olive brown (2.5YR 5/4); massive (structureless); friable; occasional roots; medium, continuous, very dark gray (N 3/0) clay flows in old root channels; many pebbles as much as 1 inch in diameter; much disintegrated grayish and brownish sandstone; neutral; gradual, wavy boundary.

IIC2—48 to 60 inches. dark yellowish-brown (10YR 4/4) silt loam; many, medium, distinct mottles of gray (5Y 5/1); massive (structureless); friable; occasional roots; medium patchy clay films on horizontal ped faces; few fine pebbles; neutral.

In most places the A horizon is silt loam. It ranges from 11 to 15 inches in thickness. The Ap horizon includes very dark grayish brown (10YR 3/2) in some places. The B2tg horizon ranges from heavy silt loam to silty clay loam and clay loam. Coarse fragments in the lower part of the solum make up 1 to 10 percent of the soil mass. Depth to calcareous material is more than 50 inches. The C horizon is dominantly stratified silt loam, loam, and thin layers consisting of sand and some gravel, and in some places, glacial till.

The Luray soils are the very poorly drained members of the drainage sequence that includes the poorly drained Sebring soils, the somewhat poorly drained Fitchville soils, the moderately well drained Glenford soils, and the well drained Mentor soils. The Luray soils commonly are adjacent to the Sebring and Fitchville soils.

Luray silt loam (0 to 2 percent slopes) (Ly).—This soil occupies long, narrow strips, 5 to 10 acres in size, along drainageways throughout the glaciated part of the county. It also occurs in fairly round areas in low basins where some material is deposited from surrounding areas. This soil has a profile similar to the one described for the series except that it has a silt loam surface layer. It is subject to flooding and ponding, is soft when wet, and has unstable underlying material.

Included with this soil in mapping were areas of a Luray soil that has a silty clay loam surface layer.

Excessive wetness and a seasonal high water table are limitations to use of this soil for most purposes. Drained areas can be used for crops. (Capability unit IIw–6; woodland suitability group 2w1)

Luray Series, Gravelly Subsoil Variant

In this county the gravelly subsoil variant of the Luray series is similar to typical Luray soils but is underlain by gravelly material at a depth of 25 to 40 inches.

The profile of the gravelly subsoil variant of the Luray series has a plow layer of very dark gray silty clay loam about 8 inches thick. The subsoil, about 26 inches thick, is dark-gray and gray silty clay loam mottled with light olive brown, olive yellow, and dark gray in the uppermost 10 inches. Below this, it is light olive-brown and yellowish-brown silt loam mottled with gray, olive gray, very dark gray, light olive brown, and light brownish gray. To a depth of about 44 inches, the underlying material is dark yellowish-brown gravelly loam mottled with grayish brown and gray. Below this is light brownish-gray very gravelly sandy loam.

Profile of a gravelly subsoil variant of the Luray series that has a silty clay loam surface layer in an area of Luray silt loam, gravelly subsoil variant, in Lake Township, section 20, T. 12 N., R 8 W.:

Ap—0 to 8 inches, very dark gray (10YR 3/1) silty clay loam; moderate, fine and very fine, subangular blocky structure; slightly firm when moist, slightly plastic when wet; abundant roots; neutral; abrupt, smooth boundary.

B21tg—8 to 11 inches, dark-gray (5Y 4/1) silty clay loam; few, medium, distinct mottles of light olive brown (2.5Y 5/4); moderate, medium, subangular blocky structure; slightly plastic when wet; common roots; medium continuous clay films on ped faces; slightly acid; clear, wavy boundary.

B22tg—11 to 18 inches, gray (5Y 5/1) silty clay loam; many, medium, distinct mottles of light olive brown (2.5Y 5/4), olive yellow (2.5Y 6/6), and dark gray (5Y 4/1); moderate, medium and coarse, subangular blocky structure; slightly plastic when wet; few roots; medium discontinuous clay films on ped faces; slightly acid; clear, wavy boundary.

B23tg—18 to 28 inches, light olive-brown (2.5Y 5/6) silt loam; many, medium, distinct mottles of gray (5Y 5/1), olive gray (5Y 5/2), and very dark gray (10YR 3/1); weak, coarse, angular blocky structure; friable; few roots; medium clay flows in root channels; thick dark-gray clay coatings in seams; few rounded pebbles; slightly acid; gradual, wavy boundary.

B3tg—28 to 34 inches, yellowish-brown (10YR 5/6) silt loam; many, medium, distinct mottles of gray (5Y 5/1), light olive brown (2.5Y 5/4), and light brownish gray (2.5Y 6/2); weak, coarse, angular blocky structure; friable; few roots; clay enriched nodules as much as 2 inches in diameter; thick continuous clay films on vertical ped faces; 10 percent coarse fragments; neutral; clear, wavy boundary.

IIC1—34 to 44 inches, dark yellowish-brown (10YR 5/6) gravelly loam; many, medium, distinct mottles of grayish brown (2.5Y 5/2) and gray (N 5/0); very weak, thick, platy structure; friable; few roots; 40 percent gravel, by volume; neutral; clear, wavy boundary.

IIC2—44 to 60 inches, light brownish-gray (10YR 6/2) very gravelly sandy loam; massive (structureless); loose; 70 percent coarse fragments; neutral.

In most places the A horizon is silt loam. Depth from the surface to the gravelly material ranges from 25 to 40 inches. Reaction of the B2 horizon is medium acid in some places.

Luray silt loam, gravelly subsoil variant (Lz).—This soil occurs in nearly level and slightly depressed areas on outwash plains and along small streams. Except that it has a silt loam surface layer, this soil has a profile similar to the one described as typical for the gravelly subsoil variant of the Luray series. This soil is soft when wet, but the underlying gravelly material is stable.

Included with this soil in mapping were areas of the gravelly subsoil variant that have a silty clay loam surface layer. Also included in mapping were areas that have only 6 to 10 inches of dark-colored material on the surface. This Luray soil is commonly next to areas of the Weinbach soils, and small areas of Weinbach soils were included in mapping.

Excessive wetness is the major limitation to the use of this soil for most purposes. Drained areas are suited to cultivated crops. (Capability unit IIw–6; woodland suitability group 2w1)

Made Land

Made land (Ma) consists of nearly level areas that have been filled with gravelly and sandy soil material from adjacent terraces and with bricks, cinders, concrete, wood, and other debris. About 75 to 90 percent of these areas have been used for residential and light industrial developments. In more than 90 percent of each area, the original surface layer, consisting of alluvium, has been covered by 3 feet or more of fill material. (Capability unit VIIIs–1; woodland suitability group not assigned)

Mentor Series

The Mentor series consists of well-drained, level to moderately steep soils on terraces and outwash plains. These soils formed in sediments deposited by water.

In a typical profile the plow layer is dark grayish-brown silt loam about 8 inches thick. The subsoil, about 36 inches thick, is dark yellowish-brown silt loam in the uppermost 10 inches. Below this, and extending to a depth of 35 inches, is dark-brown light silty clay loam. The lower part of the subsoil is 9 inches of dark-brown and yellowish-brown silt loam. The underlying material is yellowish-brown loam.

The Mentor soils have a deep root zone and high available moisture capacity. Permeability is moderate or moderately rapid in the subsoil.

These soils are not extensive in this county. Most of the acreage is used for cultivated crops.

Typical profile of Mentor silt loam, 6 to 12 percent slopes, in a meadow in Plain Township, section 10, T. 11 N., R. 8 W.:

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

B1—8 to 11 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, thick, platy structure that breaks to weak, fine and very fine, subangular blocky structure; friable; common roots; medium acid; gradual, wavy boundary.

B21t—11 to 18 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, medium, subangular blocky structure; friable; common roots; thin, patchy

clay films on ped faces and thin clay films in pores and voids; strongly acid; gradual, wavy boundary.

B22t—18 to 31 inches, dark-brown (7.5YR 4/4) light silty clay loam; reddish-brown (5YR 4/4) coatings on some ped faces; moderate, medium, subangular blocky structure; friable; common roots; thin, continuous clay films on ped surfaces; strongly acid; gradual, wavy boundary.

B23t—31 to 35 inches, dark-brown (7.5YR 4/4) light silty clay loam; weak, medium and coarse, subangular blocky structure; friable; few, fine, distinct mottles of pale brown (10YR 6/2); clay seams surrounded by rinds of strong brown (7.5YR 5/8); thin continuous clay films on ped surfaces; medium films in voids and pores; few roots; strongly acid; gradual, wavy boundary.

B3—35 to 44 inches, dark-brown (7.5YR 4/4) and yellowish-brown (10YR 5/6) silt loam; massive (structureless); friable; discontinuous, light-gray (10YR 7/1) clay seams with layered rinds of pale brown (10YR 6/3) and strong brown (7.5YR 5/8); thin, dark-brown (7.5YR 3/2) clay films in voids and pores; few roots; strongly acid; gradual, wavy boundary.

C—44 to 50 inches, yellowish-brown (10YR 5/6) loam; massive (structureless); slightly firm; no roots; few light brownish-gray (2.5Y 6/2) clay seams with brownish-yellow (10YR 6/6) rinds; very few, medium, dark-brown (7.5YR 3/2) clay fillings in voids and pores; strongly acid.

The solum ranges from 40 to 60 inches in thickness. In some places the B horizon includes loam or very fine sandy loam. In the B2 horizon the matrix includes yellowish brown and the clay content ranges from 22 to 30 percent. Reaction ranges from slightly acid to very strongly acid in the B horizon and from strongly acid to slightly acid in the C horizon. Depth to calcareous material is more than 60 inches.

The Mentor soils are the well drained members of the drainage sequence that includes the moderately well drained Glenford soils, the somewhat poorly drained Fitchville soils, the poorly drained Sebring soils, and the very poorly drained Luray soils. The Mentor soils are adjacent to the Glenford soils and to the well-drained Chili and Wheeling soils. They formed in silty and some sandy material, whereas the Chili and Wheeling soils are underlain by gravelly and sandy material.

Mentor silt loam, 0 to 2 percent slopes (MeA).—This soil occupies elongated areas between the higher lying Chili soils and the Glenford soils on stream terraces and in lake-laid deposits. Its surface layer is thicker than that in the profile described as typical for the series. This soil is susceptible to crusting. Gravel commonly occurs at a depth of a little more than 4 feet.

Included with this soil in mapping, in spoon-shaped depressions and in small drainageways, were small areas of the somewhat poorly drained Fitchville soils.

This soil is well suited to cultivated crops. Limitations to farming and to most nonfarm uses are few or none. (Capability unit I–1; wodland suitability group 1o1)

Mentor silt loam, 2 to 6 percent slopes (MeB).—This soil is in rounded areas on stream terraces and in areas of water-laid deposits. In some places, on low rises near terraces and outwash plains, glacial till underlies a thick layer of silt. Seams of gravelly material are common below a depth of 4 feet.

Included with this soil in mapping, in small drainageways, were small areas of the somewhat poorly drained Fitchville soils.

On this soil, surface runoff is rapid and the hazard of erosion is moderate in cultivated areas. Limitations for nonfarm uses are few. (Capability unit IIe–1; woodland suitability group 1o1)

Mentor silt loam, 6 to 12 percent slopes (MeC).—This soil occupies crescent-shaped areas that occur at the head of small drainageways, and it is also in areas on the side slopes of drainageways that contain Fitchville soils. It has the profile described as typical for the Mentor series. Runoff is very rapid.

Included with this soil in mapping were small areas of the well-drained, gravelly Chili soils.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope limits use for nonfarm purposes. (Capability unit IIIe–5; woodland suitability group 1o1)

Mentor silt loam, 12 to 18 percent slopes (MeD).—This soil occupies short slopes along valley walls below the well-drained, gravelly Chili soils. In some areas glacial loam till is below a depth of 42 inches.

Included with this soil in mapping was a small acreage of moderately eroded Mentor soils. Also included in mapping were small areas of the well-drained Chili soils.

A very severe hazard of erosion is the major limitation to the use of this soil for cultivated crops, and erosion is difficult to control. The slope is the main limitation for most nonfarm uses. (Capability unit IVe–1; woodland suitability group 1o1)

Montgomery Series

The Montgomery series consists of very poorly drained, dark-colored, nearly level soils in low-lying areas throughout the glaciated part of the county. These soils formed in silty clay and clay material of Wisconsin age.

In a typical profile the surface layer is very dark grayish-brown silty clay loam about 5 inches thick. Below this is a layer of black silty clay about 4 inches thick. The subsoil, about 33 inches thick, is very dark gray and gray silty clay that is very sticky and plastic when wet. The underlying material is gray, mildly alkaline or moderately alkaline silty clay loam mottled with olive.

The Montgomery soils have a moderately deep root zone in most places. The available moisture capacity is high within the root zone. Permeability is very slow in the subsoil. The water table is at or near the surface in winter and late in spring.

These soils are not extensive in this county, but areas that have been drained are used mainly for cultivated crops. Undrained areas are pastured or wooded.

Typical profile of Montgomery silty clay loam, in a meadow in Washington Township, section 32, T. 18 N., R. 6 W. (analytical data in table 10):

A1—0 to 5 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, very fine, subangular blocky structure; firm; abundant roots; slightly acid; clear, wavy boundary.

A&B—5 to 9 inches, black (N 2/1) silty clay; strong, fine and medium, subangular blocky structure; firm; abundant roots; neutral; clear, wavy boundary.

B1tg—9 to 15 inches, very dark gray (N 3/0) silty clay; moderate, medium and coarse, subangular blocky structure; very plastic and sticky when wet, hard when dry; occasional roots; neutral; gradual, wavy boundary.

B21tg—15 to 26 inches, gray (N 5/0) silty clay; moderate, medium, prismatic structure that breaks to moderate, coarse, subangular blocky structure; very plastic and sticky when wet; occasional roots; root channels 2 millimeters thick and have rinds of yellowish brown (10YR 5/6) that grade to olive gray (5Y 5/2) away from roots; thin continuous clay films on all ped faces and some pressure faces; neutral; diffuse, wavy boundary.

B22tg—26 to 31 inches, gray (N 5/0) silty clay; weak, coarse, prismatic structure; very plastic and sticky when wet; occasional roots; yellowish-brown (10YR 5/4) grading to olive-gray (5Y 5/2) rinds 2 to 3 millimeters thick in root channels; thin continuous clay films on vertical prism faces; neutral; gradual, wavy boundary.

B3tg—31 to 42 inches, dark-gray (5Y 4/1) silty clay; massive (structureless); very plastic and sticky when wet; occasional roots; dark-brown (7.5YR 4/4) rinds in root channels; common black (N 2/0) organic stains; neutral; clear, wavy boundary.

Cg—42 to 60 inches, gray (5Y 5/1) silty clay loam; few, fine, faint mottles of olive (5Y 5/3); massive (structureless); sticky and slightly plastic when wet; no roots; mildly alkaline or moderately alkaline.

The A horizon includes very dark gray (10YR 3/1) and black in some places. There is a thin, black, mucky surface layer in some uncultivated areas. The B2 horizon generally is silty clay, but it is heavy silty clay loam or clay in some places. It ranges from gray (10YR 5/1) to very dark gray (10YR 4/1) to olive gray (5Y 5/2) in color and from 45 to slightly more than 55 percent in clay content. In some places the B3 and C horizons have thin strata of sandy and silty material. Reaction ranges from medium acid to neutral in the B horizon. Depth to calcareous material is 40 to 60 inches.

The Montgomery soils are the very poorly drained members of a drainage sequence that includes the poorly drained Canadice soils. They are adjacent to the Canadice, Carlisle, and Fitchville soils in many places. The Montgomery soils have a more clayey subsoil than the Luray soils. Unlike the Wallkill soils, which are underlain by muck, the Montgomery soils are underlain by mineral soil material.

Montgomery silty clay loam (0 to 2 percent slopes) (Mg).—This soil typically occupies depressions in valleys and swales and drainageways on uplands. It is subject to occasional flooding in spring in areas along the larger streams. Water is ponded in the swales and drainageways during long wet periods.

Included with this soil in mapping were areas of soils that have a silty clay and clay surface layer and are more sticky than this soil. Also included in the mapping were small areas of soils that have 4 to 10 inches of muck on the surface and areas where the dark colored soil material is less than 10 inches thick. Other inclusions were small areas of the Wallkill soils and, on low rises, areas of the light-colored, somewhat poorly drained Fitchville soils.

Excessive wetness is the major limitation to the use of this soil for most purposes. (Capability unit IIIw–6; woodland suitability group 2w1)

Muskingum Series

The Muskingum series consists of well-drained, gently sloping to very steep soils that occur in the unglaciated southern part of the county. These soils formed on sandstone, siltstone, and shale.

In a typical profile the plow layer is brown silt loam about 7 inches thick. To a depth of about 23 inches the subsoil is yellowish-brown silt loam. Below this is a layer of yellowish-brown fine sandy loam that is about 50 percent stone fragments. Beds of fractured sandstone and siltstone are at a depth of about 29 inches.

The Muskingum soils have a moderately deep root zone in most places. The available moisture capacity is low. Permeability is moderately rapid.

These soils are extensive in the southern part of the county. They are used primarily for pasture and trees.

A typical profile of Muskingum silt loam, 6 to 12 percent slopes, in an abandoned meadow in Sandy Township, section 17, T. 17 N., R. 7 W. (analytical data in table 10):

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; weak, fine, crumb structure; very friable; abundant roots; 5 percent skeletal material, by volume; strongly acid; abrupt, smooth boundary.

B1—7 to 12 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine and medium, subangular blocky structure; friable; common roots; 10 percent channery fragments, by volume; very strongly acid; diffuse, wavy boundary.

B2—12 to 17 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, subangular blocky structure; friable; patchy, thin accumulation of clay on upper surfaces of some sandstone fragments; 15 percent channery fragments, by volume; common roots; very strongly acid; diffuse, wavy boundary.

B3—17 to 23 inches, yellowish-brown (10YR 5/4) channery silt loam; weak, coarse, subangular blocky structure; friable; thin accumulation of clay on upper side of weathered stone fragments; 30 percent channery fragments, by volume; few roots, very strongly acid; gradual, wavy boundary.

C—23 to 29 inches, yellowish-brown (10YR 5/4) very channery fine sandy loam; weak, medium, subangular blocky structure; friable; thin clay films in some pores; 50 percent channery fragments, by volume; few roots; very strongly acid; clear, wavy boundary.

R—29 to 33 inches, very pale brown (10YR 6/3) beds of sandstone and siltstone 1 or 2 inches thick; fractures are 6 inches deep; vertical and horizontal cracks filled with soil material; no roots.

In uncultivated areas there is an A1 horizon 1 to 4 inches thick and an A2 horizon 3 to 6 inches thick. The B horizon includes loam in some places, and it is yellowish brown (10YR 5/4 to 5/6), dark yellowish brown (10YR 4/4), or strong brown (7.5YR 5/6). The matrix of the B2 and B3 horizons ranges from yellowish brown (10YR 5/4) to brown (7.5YR 4/4). The combined thickness of the B1, B2, and B3 horizons is 15 to 24 inches. Depth to bedrock ranges from 20 to 36 inches. Thin beds of sandstone, siltstone, and some shale occur at a depth of 20 to 36 inches.

The Muskingum soils are near or adjacent to the moderately well drained Tilsit soils and the well drained Wellston and Dekalb soils. The Muskingum soils are less clayey in the subsoil than the nearby Gilpin soils. They are deeper to bedrock and contain fewer stones than the Weikert soils.

Muskingum silt loam, 2 to 6 percent slopes (MsB).—This soil is on ridgetops, and in high benchlike areas,

and in many places is adjacent to the sandy Dekalb and Ramsey soils. Areas are slightly convex, irregular, and small.

This soil is less droughty than the other Muskingum soils in the county. A moderate hazard of erosion is a limitation to use for cultivated crops. Use for some nonfarm purposes is limited by shallowness to bedrock. (Capabilty unit IIe–4; woodland suitability group 3o1)

Muskingum silt loam, 6 to 12 percent slopes (MsC).—This soil occurs on the crests of narrow ridgetops and on hillsides. It has the profile described as typical for the series.

Included with this soil in mapping were areas of moderately eroded Muskingum soils that have more stones on the surface and a lighter colored surface layer than the uneroded Muskingum soils. Also included in the mapping were a few small areas of severely eroded Muskingum soils that are about 24 inches deep to bedrock. This soil commonly is next to areas of the Dekalb soils and small areas of those soils were included in the mapping.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. Droughtiness is also a hazard. The slope and shallowness to bedrock are limitations for some nonfarm uses. (Capability unit IIIe–3; woodland suitability group 3o1)

Muskingum silt loam, 12 to 18 percent slopes (MsD).—This soil is extensive in the southern half of Osnaburg Township. It occupies elongated areas on hillsides. These areas vary in width.

Included with this soil in mapping were areas of moderately eroded Muskingum soils that are lighter colored and have more stones on the surface than the uneroded soils; there are a few gullies 1 to 3 feet deep in some places. Also included in mapping, in areas where thin strata of clay shale outcrops, were small areas of the moderately well drained Keene soils.

A very severe hazard of erosion and droughtiness are the major limitations to the use of this soil for cultivated crops. The slope and shallowness to bedrock limit use for most nonfarm purposes. (Capability unit IVe–3; woodland suitability group 3o1)

Muskingum and Gilpin silt loams, 18 to 25 percent slopes (MvE).—This mapping unit consists of Muskingum silt loam and Gilpin silt loam that were mapped together, though they do not occur together in all areas mapped. Any area may consist of either the Muskingum soil or the Gilpin soil. Elsewhere in this section, a profile of a Gilpin silt loam is described as typical for the Gilpin series.

The soils in this mapping unit occur as narrow strips that follow the contour of hillsides. The Muskingum soil generally is adjacent to the Dekalb soils. The Gilpin soil is next to the Keene, Latham, or Weikert soils, generally on concave slopes and at the base of slopes.

Included in mapped areas were small areas of the Keene and Weikert soils and areas of moderately eroded soils.

A very severe hazard of erosion and the slope are the major limitations to the use of the soils in this mapping unit for cultivated crops. Shallowness to bedrock and the slope are limitations for most other uses. (Capability unit IVe–3; woodland suitability group 2r1 on north- and east-facing slopes and 3r1 on south- and west-facing slopes)

Muskingum and Gilpin silt loams, 18 to 25 percent slopes, severely eroded (MvE3).—These soils occur on the lower part of hillsides. Any area may consist of either the Muskingum soil or the Gilpin soil. These soils are shallower to bedrock and have more stones on the surface and in the subsoil than is typical of either the Muskingum or Gilpin soils. Erosion has removed most of the original surface layer from the soils in this mapping unit. Shallow gullies are common, and a few deep gullies have formed in some places.

Included in mapped areas were small areas of Weikert soils.

The main limitations to the use of the soils in this mapping unit for farming are the hazard of erosion and the slope. These soils are too steep and droughty for cultivated crops. The slope and shallowness to bedrock are the major limitations to use for nonfarm purposes. (Capability unit VIe–3; woodland suitability group 2r1 on north- and east-facing slopes and 3r1 on south- and west-facing slopes)

Muskingum and Gilpin silt loams, 25 to 35 percent slopes (MvF).—This mapping unit occurs in long, narrow strips that are on the middle part of hillsides and follow the contour of the hill. Any area may consist of either the Muskingum soil or the Gilpin soil. The profiles of both soils are shallower to bedrock than those described as typical for their respective series.

Included in mapped areas were a few areas of moderately eroded and severely eroded Muskingum and Gilpin soils in which shallow gullies are fairly common. Also included in the mapping were small areas of Weikert soils.

The soils in this mapping unit are limited in use mainly by the slope and the hazard of erosion. (Capability unit VIe–3; woodland suitability group 2r1 on north- and east-facing slopes and 3r1 on south- and west-facing slopes)

Muskingum and Gilpin silt loams, 35 to 50 percent slopes (MvG).—These soils are in narrow areas that follow the contour of hillsides. Any area may consist of either the Muskingum soil or the Gilpin soil, but the Muskingum soil is dominant. A few shallow gullies have formed in some places.

Included in mapped areas, where shale outcrops, were small areas of the Latham soils.

A hazard of erosion, droughtiness, and steepness are the major limitations to the use of the soils in this mapping unit for farming and for nonfarm purposes. Because of the slope, the use of machines is difficult and dangerous. (Capability unit VIIe–2; woodland suitability group 2r1 on north- and east-facing slopes and 3r1 on south- and west-facing slopes)

Muskingum and Gilpin-Urban land complex, steep (MwF).—This complex consists of moderately steep and steep Muskingum and Gilpin soils and disturbed

land. Runoff is very rapid from these soils, and erosion is a very severe hazard. The control of erosion is needed during and following construction so as to reduce siltation of the streams and storm sewers. About one-half of this complex is underlain by sandstone, and the rest is underlain by shale and siltstone. Depth to bedrock generally is 15 to 40 inches.

The slope and shallowness to bedrock are the major limitations to the use of these soils. The steeper areas are mostly wooded. (Capability unit not assigned; woodland suitability group 2r1 on north- and east-facing slopes and 3r1 on south- and west-facing slopes)

Plainfield Series

The Plainfield series consists of well-drained, level to moderately steep soils on terraces and outwash plains in the northwestern and southeastern parts of the county. These soils formed in sand and loamy sand deposited by water.

In a typical profile the plow layer is dark-gray loamy sand about 10 inches thick. The subsoil, about 24 inches thick, is brown and reddish-yellow sand. The underlying material is reddish-yellow gravelly coarse sand.

The Plainfield soils have a moderately deep root zone. Permeability is rapid in the subsoil and the underlying material, and the available moisture capacity is low. Water moves rapidly through these soils, and they dry out quickly in spring.

These soils are not extensive in this county. Except for an area near Bolivar Dam, most of the acreage is used for crops, The area near the dam is not used for farming, because it is subject to flooding when the level of water in the lake is high.

Typical profile of Plainfield loamy sand, 0 to 6 percent slopes, in an old meadow in Pike Township, section 30, T. 9 N., R. 8 W. (analytical data in table 10):

Ap—0 to 10 inches, dark-gray (10YR 4/1) loamy sand; weak, medium and fine, subangular blocky structure that breaks to single grain (structureless); very friable; abundant roots; strongly acid; abrupt, smooth boundary.

B2—10 to 22 inches, brown (7.5YR 4/4) sand; weak, fine and medium, subangular blocky structure that breaks to single grain (structureless); very friable; common roots; few reddish-brown (5YR 4/4) nodules of clay as much as ½ inch in diameter; clay bridging between sand grains; very strongly acid; gradual, wavy boundary.

B3—22 to 34 inches, reddish-yellow (7.5YR 6/8) sand; weak, medium, subangular blocky structure that breaks to single grain (structureless); very friable; occasional roots; very strongly acid; gradual, wavy boundary.

C—34 to 60 inches, reddish-yellow (7.5YR 6/8) gravelly coarse sand; single grain (structureless); loose; no roots; strongly acid.

The Ap horizon includes dark brown (7.5YR 3/2) and (10YR 4/3) and dark yellowish brown (10YR 4/4). The matrix of the B horizon includes strong brown (7.5YR 4/6) and yellowish brown (10YR 5/4 to 5/6), and that of the C horizon is yellowish brown (10YR 5/4) and pale brown (10YR 6/3) in some places. In the B horizon the content of sand ranges from 80 to 90 percent, and in some places the lower part contains few to common, strong-brown (7.5YR 5/6), weakly cemented clay nodules ½ inch to 2 inches in diameter. From 5 to 40 percent of the C horizon consists of coarse fragments. Depth to calcareous material is more than 60 inches.

The Plainfield soils are near the well-drained Conotton, Chili, Wheeling, and Arkport soils. Unlike the Chili, Conotton, and Wheeling soils, which have a silt loam or loam surface layer and subsoil, the Plainfield soils are loamy sand or sand throughout. Plainfield soils do not have alternating light-colored and dark-colored bands as do the Arkport soils, and they are generally more droughty than Arkport soils.

Plainfield loamy sand, 0 to 6 percent slopes (PlB).—This soil occupies small areas northeast of Canal Fulton, northeast of the Hartville Swamp, east of Bolivar Dam, and along Little Sandy Creek north of Waynesburg. It has the profile described as typical for the series, but in areas northeast of the Hartville Swamp, its surface layer and subsoil contain more gravel than do corresponding layers in the profile described as typical.

Included with this soil in mapping were small areas of Wheeling soils.

Droughtiness is a very severe limitation to the use of this soil for farming and for lawns and landscaping. (Capability unit IVs–1; woodland suitability group 2s1)

Plainfield loamy sand, 6 to 12 percent slopes (PlC).—This soil occurs on short, irregularly shaped slopes, mainly along streams and drainageways. Most areas are northeast of Canal Fulton, east of Bolivar Dam, and north of Waynesburg, and they range from 3 to 10 acres in size. This soil has a lighter colored surface layer than that in the profile described as typical for the series. In areas northeast of the Hartville Swamp its surface layer and subsoil contain more gravel than do corresponding layers in the profile described as typical.

Included with this soil in mapping were small areas of the gravelly Conotton soils and a few small areas of Plainfield soils that have slopes as much as 18 percent.

Droughtiness and the hazard of erosion are the major limitations to the use of this soil for farming. Slope, soil texture, and droughtiness are limitations for many nonfarm uses. (Capability unit IVs–1; woodland suitability group 2s1)

Quarries

Quarries (Qu) consist mainly of areas from which sandstone has been mined. Limestone is mined from a few small quarries. (Capability unit not assigned; woodland suitability group not assigned)

Rainsboro Series

The Rainsboro series consists of moderately well drained, gently sloping and sloping soils on terraces in the southern part of the county. These soils formed in silt loam and sandy loam over stratified lacustrine deposits of silty clay loam and silty clay.

In a typical profile the plow layer is dark grayish-brown silt loam about 8 inches thick. The subsoil is about 40 inches thick. To a depth of about 29 in-

ches, it is yellowish-brown silt loam mottled with pale brown and strong brown in the lower 12 inches. Below this, and extending to a depth of 48 inches, is a fragipan that is strong-brown silt loam mottled with light brownish gray in the upper part, is dark-brown gravelly loam mottled with grayish-brown in the middle part, and is dark yellowish-brown gravelly sandy loam in the lower part. Coarse fragments of sandstone and shale make up as much as 40 percent of the soil mass in the lower 14 inches of the fragipan. The underlying material is yellowish-brown silty clay loam mottled with gray.

The Rainsboro soils have a moderately deep root zone above the fragipan. The available moisture capacity is medium. Permeability is moderate in the upper part of the subsoil, moderately slow in the fragipan, and slow in the underlying material. These soils have a perched water table above the fragipan in winter and spring.

These Rainsboro soils are not extensive in this county, but most of their acreage is used for cultivated crops.

Typical profile of Rainsboro silt loam, 2 to 6 percent slopes, in a cultivated field in Sandy Township, section 18, T. 17 N., R. 7 W. (analytical data in table 10):

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

B21t—8 to 17 inches, yellowish-brown (10YR 5/6) silt loam; moderate, medium, subangular blocky structure; friable; common roots; medium acid; gradual, wavy boundary.

B22t—17 to 29 inches, yellowish-brown (10YR 5/6) silt loam; many, medium, distinct mottles of pale brown (10YR 6/3) and strong brown (7.5YR 5/8); moderate, medium and coarse, subangular blocky structure; firm; common roots; thin continuous clay flows in some root channels and pores; strongly acid; clear, wavy boundary.

Bx1—29 to 34 inches, strong-brown (7.5YR 5/8) silt loam; many, medium, distinct mottles of light brownish gray (2.5Y 6/2); massive (structureless); brittle; occasional roots; strongly acid; clear, wavy boundary.

IIBx2—34 to 41 inches, dark-brown (10YR 4/3) gravelly loam; many, medium, distinct mottles of grayish-brown (2.5YR 5/2); massive (structureless); brittle; occasional roots; clay bridging between sand grains; common black (N 2/0) stains; 30 percent coarse fragments of highly weathered sandstone and shale; strongly acid; gradual, irregular boundary.

IIBx3—41 to 48 inches, dark yellowish-brown (10YR 4/4) gravelly sandy loam; massive (structureless); slightly brittle; no roots; clay bridging between sand grains; medium clay films, 3.5 millimeters in diameter, in vesicular pores; 40 percent coarse fragments of highly weathered sandstone and shale; medium acid; clear, smooth boundary.

IIIC—48 to 60 inches, yellowish-brown (10YR 5/6) silty clay loam; common, medium, distinct mottles of gray (N 6/0); stratified lacustrine sediments of silt, clay, and some fine sand; no pebbles; neutral.

In some places the B2t horizon includes silty clay loam, a hue of 7.5YR, and chromas of 4 and 6. The fragipan is at a depth of 22 to 30 inches and includes gravelly clay loam in some places. The C horizon includes silt loam and silty clay in some places. The range in reaction includes very strongly acid in the solum and mildly alkaline in the C horizon.

The moderately well drained Rainsboro soils are the only members of this drainage sequence. They are adjacent to the moderately well drained Glenford soils. Rainsboro soils have a more dense, compact subsoil than Glenford soils and are more gravelly below the subsoil than those soils.

Rainsboro silt loam, 2 to 6 percent slopes (RaB).—This soil occurs on old alluvial terraces, primarily along Pleasant Valley Run in the southeastern part of the county. It has the profile described as typical for the series, but in some places the fragipan is thicker or thinner than that described as typical. The fragipan ranges from 10 to 30 inches in thickness.

Included with this soil in mapping, in drainageways and depressions, were small areas of the poorly drained Sebring soils. Also included in mapping were areas of an unnamed, well-drained soil having slopes of 4 to 6 percent and profile characteristics that are similar to those of the Rainsboro soils.

A moderate hazard of erosion limits the use of this soil for cultivated crops. Seasonal wetness is a limitation for many other uses. (Capability unit IIe–2; woodland suitability group 3w1)

Rainsboro silt loam, 6 to 12 percent slopes (RaC).—This soil occupies elongated strips along small drainageways and at the base of hillsides.

This soil is next to the moderately well drained Glenford and Licking soils, and small areas of either or both of those soils were included in mapping. Also included in mapping were a few moderately eroded spots that have more fragments of sandstone and shale on the surface than the surrounding soils. Other inclusions were small areas of an unnamed, well-drained soil and some eroded areas in which gullies 1 to 3 feet deep have formed.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope and seasonal wetness are limitations for many other uses. (Capability unit IIIe–2; woodland suitability group 3w1)

Ramsey Series

The Ramsey series consists of well-drained, sloping to very steep soils that occur in the unglaciated southern part of the county. These soils formed in material weathered from sandstone.

The profile of a typical wooded Ramsey soil has a thin layer of partly decomposed leaf litter on the surface. Below this the surface layer is gray channery sandy loam about 3 inches thick. The subsoil, about 16 inches thick, is strong-brown channery sandy loam in the uppermost 8 inches and is brown very channery sandy loam below. At a depth of 19 inches is light-gray and yellowish-brown, fractured, weathered sandstone that is hard and is very difficult to dig with a spade.

The Ramsey soils have a shallow root zone and very low available moisture capacity. Permeability is rapid. These soils are very droughty.

These soils are not extensive in this county. Most of the acreage is wooded or pastured.

Typical profile of Ramsey channery sandy loam, 18 to 25 percent slopes, moderately eroded, in woodland in Sandy Township, section 27, T. 17 N., R. 7 W.:

02—½ inch to 0, partly decomposed leaf litter from deciduous oak and hickory.
A1—0 to 3 inches, gray (N 4/0) channery sandy loam; very weak, medium, crumb structure that breaks to single grain (structureless); friable; abundant roots; 40 percent skeletal material, by volume; extremely acid; clear, wavy boundary.
B2—3 to 11 inches, strong-brown (7.5YR 5/6) channery sandy loam; weak, medium, subangular blocky structure that breaks to single grain (structureless); loose and friable; abundant roots; very few, thin, patchy clay films; some weak bridging between sand grains; 50 percent skeletal material, by volume; very strongly acid; clear, wavy boundary.
B3—11 to 19 inches, brown (7.5YR 5/4) very channery sandy loam; weak, fine and medium, subangular blocky structure that breaks to single grain (structureless); loose and friable; common roots; very few clay films; some weak bridging between sand grains; 65 percent skeletal material, by volume; very strongly acid; clear, wavy boundary.
R—19 inches +, light-gray (N 7/0) and yellowish-brown (10YR 5/6) fractured, weathered sandstone; very strongly acid.

The A1 horizon ranges from 2 to 5 inches in thickness. It is very dark grayish brown (10YR 3/2) or black (10YR 2/1) in some places. In addition to 7.5YR the B horizon has a hue of 10YR in some places. Coarse fragments range from about 25 percent in the A horizon to more than 75 percent in the B2 horizon. Reaction ranges from extremely acid to strongly acid in the B horizon. Depth to bedrock ranges from 12 to 20 inches.

The Ramsey soils are adjacent to the well-drained Muskingum, Gilpin, Weikert, and Dekalb soils. They are more sandy than the Muskingum, Gilpin, and Weikert soils. Ramsey soils have more fragments of stones on the surface and in the subsoil than Dekalb soils, and they are shallower to bedrock.

Ramsey channery sandy loam, 6 to 12 percent slopes (RcC).—This soil occurs in convex areas on the top of rounded knolls and in convex, narrow, elongated areas on ridgetops. Its surface layer is thicker than that in the profile described as typical for the series.

This soil commonly is adjacent to the well-drained Muskingum, Gilpin, and Weikert soils, and small areas of those soils were included in mapping.

Use of this soil for farming is limited mainly by the erosion hazard and severe droughtiness. This soil is better suited to hay or pasture than to cultivated crops. Shallowness to sandstone is a limitation to most nonfarm uses. (Capability unit VIs–1; woodland suitability group 4d1 on north- and east-facing slopes, 5d1 on south- and west-facing slopes).

Ramsey channery sandy loam, 12 to 18 percent slopes (RcD).—This soil occupies areas below ridgetops. These areas are about 5 acres in size and are fairly rounded.

Included with this soil in mapping, where siltstone and shale outcrop in the hillsides, were small areas of the Muskingum and Gilpin soils.

The major limitations to the use of this soil for farming are a severe erosion hazard and severe droughtiness. This soil is better suited to hay or pasture than to cultivated crops. The slope and shallowness to bedrock are limitations for most nonfarm uses. (Capability unit VIs–1; woodland suitability group 4d1 on north- and east-facing slopes and 5d1 on south- and west-facing slopes)

Ramsey channery sandy loam, 18 to 25 percent slopes, moderately eroded (RcE2).—This soil occurs in small, irregularly shaped, uniform or slightly convex areas on hillsides. It has the profile described as typical for the series.

Included with this soil in mapping were areas of Ramsey soils that are only slightly eroded, have a less stony surface layer, and are slightly deeper to bedrock than the eroded soils. Also included in the mapping, in areas where outcrops of siltstone and shale occur, were areas of the nearby Muskingum, Gilpin, and Weikert soils.

A very severe hazard of erosion and steepness are the major limitations to use of this soil for all purposes. (Capability unit VIIs–1; woodland suitability group 4d1 on north- and east-facing slopes and 5d1 on south- and west-facing slopes)

Ramsey channery sandy loam, 25 to 50 percent slopes, moderately eroded (RcF2).—This soil occurs on hillsides. It is in strips that follow the contour of the slope.

Included with this soil in mapping were small areas of severely eroded Ramsey soils that have more stones on the surface than this soil. In these areas are a few shallow gullies in which bedrock is exposed. Also included in the mapping, where siltstone and shale outcrop, were areas of the Weikert, Muskingum, and Gilpin soils.

The very severe hazard of erosion and droughtiness are the major limitations to the use of this soil. (Capability unit VIIs-1; woodland suitability group 4d2 on north- and east-facing slopes and 5d1 on south- and west-facing slopes)

Ravenna Series

The Ravenna series consists of somewhat poorly drained, level to sloping soils that occur in broad areas in the glaciated part of the county. These soils formed in loam glacial till of Wisconsin age.

In a typical profile the surface layer is silt loam about 10 inches thick. It is dark grayish brown in the uppermost 8 inches and is grayish brown and mottled with dark yellowish brown in the lower 2 inches. The subsoil is 45 inches thick. To a depth of about 23 inches, it is yellowish-brown silt loam and heavy silt loam that is mottled with light brownish gray, gray, and strong brown and contains more clay than the surface layer. Below this, and extending to a depth of 43 inches, is a yellowish-brown and dark yellowish-brown, firm loam fragipan mottled with grayish brown and strong brown in the uppermost 7 inches. The lower part of the subsoil is 17 inches of yellowish-brown, firm loam.

The Ravenna soils have a moderately deep root zone above the fragipan. Permeability is moderately slow in the fragipan and the underlying glacial till. The available moisture capacity is medium. These soils have a seasonal high water table for significant periods, and unless adequately drained, they are slow to dry out in spring.

These soils are extensive in this county. Most of the acreage is used for cultivated crops, and many acres have been drained.

Typical profile of Ravenna silt loam, 0 to 2 percent

slopes, in a cultivated field in Tuscarawas Township, section 17, T. 12 N., R. 10 W.:

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

A2—8 to 10 inches, grayish-brown (10YR 5/2) silt loam; few, fine, faint mottles of dark yellowish brown (10YR 4/4); weak, thin, platy structure; friable; abundant roots; few black concretions 1 to 3 millimeters in diameter; medium acid; clear, smooth boundary.

B21t—10 to 15 inches, yellowish-brown (10YR 5/4) silt loam; common, fine, distinct mottles of light brownish gray (10YR 6/2); light brownish-gray (10YR 6/2) silt coatings; weak, fine and medium, subangular blocky structure; friable; common roots; thin patchy clay films; very strongly acid; clear, wavy boundary.

B22t—15 to 23 inches, yellowish-brown (10YR 5/4) heavy silt loam; many, medium, distinct mottles of gray (10YR 5/1) and strong brown (7.5YR 5/6); moderate, medium and coarse, subangular blocky structure; friable; common roots; thin, discontinuous, grayish-brown (10YR 5/2) clay films on ped faces; light-gray (10YR 7/1) silt coatings on some ped faces; few dark-gray (N 4/0) clay veins in peds; few pebbles; very strongly acid; gradual, wavy boundary.

Bx1—23 to 30 inches, yellowish-brown (10YR 5/4) loam; many, medium, distinct mottles of grayish brown (10YR 5/2) and strong brown (7.5YR 5/6); weak, coarse, prismatic structure that breaks to moderate, medium, subangular blocky structure; firm, brittle; few roots; few pebbles and stones; thin, discontinuous, gray (10YR 6/1) clay films on ped surfaces and prism faces; dark-gray (N 4/0) clay flows in polygonal seams; very strongly acid; gradual, wavy boundary.

Bx2—30 to 43 inches, dark yellowish-brown (10YR 4/4) loam; weak, coarse, prismatic structure; light-gray (N 7/0) silt coatings on prism faces; dark-gray (N 4/0) clay flows between polygons; firm, brittle; few roots; black stains in prism interiors; few pebbles and stones; very strongly acid; gradual, wavy boundary.

B3—43 to 60 inches, yellowish-brown (10YR 5/4) loam; massive (structureless); firm; no roots; 5 percent, by volume, pebbles and stones; few black concretions 1 to 3 millimeters in diameter; few prisms from Bx2 horizon extend for several inches into this horizon; strongly acid.

Typically, the Ap horizon is dark grayish brown (10YR 4/2), but it ranges from dark gray (10YR 4/1) to dark brown (10YR 4/3). The B2t horizon ranges from 10 to 20 inches in thickness and from silt loam to silty clay loam in texture. The clay content of the B2t horizon is 20 to 30 percent. Depth to the top of the Bx1 horizon (fragipan) is 20 to 30 inches. The Bx1 and Bx2 (fragipan) horizons range from 15 to 30 inches in thickness and include silt loam or very fine sandy loam in some places. Coarse fragments make up 1 to 5 percent of the Bx1 and Bx2 horizons; the polygons range from 5 to 12 inches in diameter. Depth to calcareous material ranges from 60 to 100 inches or more.

The Ravenna soils are the somewhat poorly drained members of a drainage sequence that includes the moderately well drained Canfield soils and the well drained Wooster soils. Ravenna soils are commonly adjacent to the Canfield soils in many places. They have a less clayey subsoil and underlying glacial till than the Wadsworth soils, and they are deeper to limy material than those soils. Ravenna soils contain a dense, compact fragipan in the subsoil, which is lacking in the Fitchville soils.

Ravenna silt loam, 0 to 2 percent slopes (ReA).—This soil is in shallow drainageways and small basinlike depressions. It has the profile described as typical for the series.

Included with this soil in mapping were areas of a Ravenna soil that has more clay in the upper part of the subsoil than is typical of Ravenna soils. Also included, in drainageways, were small areas of a Ravenna soil that has a thicker, darker colored surface layer than that described as typical. Other inclusions were small areas of poorly drained Sebring silt loam, till substratum.

Seasonal wetness is the major limitation to the use of this soil for farming and nonfarm purposes. (Capability unit IIw-2; woodland suitability group 2w2)

Ravenna silt loam, 2 to 6 percent slopes (ReB).—This soil occupies large, irregularly shaped areas. Slopes are uniform and are mainly moderately long.

Included with this soil in mapping were areas of a soil that have more clay in the upper part of the subsoil than is typical of Ravenna soils. Also included, at the base of slopes, were a few small areas of soils that have a dark-colored surface layer 12 to 18 inches thick. This Ravenna soil is commonly next to the moderately well drained Canfield soils and, on convex slopes, small areas of those soils were included in the mapping.

The main limitation to the use of this soil is seasonal wetness, but erosion is a hazard in cultivated or other disturbed areas. (Capability unit IIw-2; woodland suitablilty group 2w2)

Ravenna-Urban land complex (Rn).—This complex occupies areas in cities and towns within the glaciated part of the county. Because the Ravenna soils in this complex have a dense, compact subsoil that restricts the movement of water, areas of this complex tend to dry out slowly in spring. Ponding is likely in the nearly level areas and in depressions. In the gently sloping areas of this complex the hazard of erosion is moderate during and following construction. Because water seeps along the top of the dense, compact subsoil of these soils, basements are wet and roadways are damaged by frost heaving. (Capability unit not assigned; woodland suitability group 2w2)

Remsen Series

The Remsen series consists of somewhat poorly drained, mainly nearly level to gently sloping soils on uplands in the extreme northeastern part of the county. These soils formed in silty clay glacial till of Wisconsin age..

In a typical profile the plow layer is dark grayish-brown silt loam about 7 inches thick. The subsoil, about 29 inches thick, is brown silty clay loam mottled with strong brown and yellowish brown in the upper part; is dark-brown clay mottled with strong brown, yellowish red, and dark red in the middle part; and is dark-brown and yellowish-brown silty clay mottled with strong brown, brown, and gray in the lower part. At a depth of about 36 inches is a layer of dark yellowish-brown silty clay about 10 inches thick. The underlying material is yellowish-brown silty clay glacial till.

The Remsen soils have a moderately deep root zone

in most places. Permeability is very slow in the subsoil and the underlying glacial till. The available moisture capacity is medium. These soils have a seasonal high water table, and they are slow to dry out in spring.

These soils are not extensive in this county. Most of the acreage is not farmed. Some areas are woodland, and some are strip mined. Some areas north of Alliance are in community development.

Typical profile of a Remsen silt loam, 500 feet south of German Church Street and 220 feet east of Teel Road, 5 miles north of downtown Alliance, in Lexington Township, section 2, T. 19 N., R. 6 W. (analytical data in table 10):

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

B1—7 to 13 inches, brown (10YR 5/3) silty clay loam; few, fine, distinct mottles of strong brown (7.5YR 5/6) and yellowish brown (10YR 5/4); strong, fine and medium, subangular blocky structure; roots common; few stones 3 to 4 inches in diameter; very strongly acid; clear, wavy boundary.

B21—13 to 16 inches, dark-brown (7.5YR 4/4) clay; many, medium, prominent mottles of strong brown (7.5YR 5/8), yellowish red (5YR 4/8), and dark red (2.5YR 3/6); strong, fine and medium, prismatic structure that breaks to weak, fine and medium, angular blocky structure; sticky when wet; roots common; very strongly acid; clear, wavy boundary.

B22—16 to 24 inches, dark-brown (7.5YR 4/4) silty clay; many, medium, distinct mottles of strong brown (7.5YR 5/8), brown (7.5YR 5/4), and gray (N 6/1); moderate, medium and coarse, prismatic structure; sticky when wet; roots common; very strongly acid; gradual, wavy boundary.

B3t—24 to 36 inches, yellowish-brown (10YR 5/4) silty clay; grayish-brown (2.5Y 5/2) clay coatings; weak, coarse, prismatic structure, in place, that breaks to thick and very thick platy structure and to weak, medium and coarse, blocky structure; sticky when wet; few roots; slightly effervescent in lower part; slightly acid; diffuse, wavy boundary.

B3—36 to 46 inches, dark yellowish-brown (10YR 4/4) silty clay; grayish-brown (2.5Y 5/3) and gray (N 5/1) clay coatings; weak, coarse and very coarse, prismatic structure that breaks to weak, medium and coarse, blocky structure; sticky when wet; no roots; slightly effervescent; moderately alkaline; gradual, diffuse boundary.

C—46 to 72 inches, yellowish-brown (10YR 5/4) silty clay; gray (N 6/0) and grayish-brown (2.5Y 5/2) clay coatings on prism faces; weak, coarse, prismatic structure that breaks to thick and very thick, platy structure; no roots; moderately alkaline.

The Ap horizon ranges from 2 to 12 inches in thickness, and in some places, it is grayish brown (10YR 5/2) or dark gray (10YR 5/1). In many areas there is a thin A2 horizon 1 or 2 inches thick that has a hue of 2.5Y and chroma of 2 or 3. In addition to 10YR and 7.5YR, the B horizon has hues of 2.5Y and 5Y. The clay content of the B2 horizon ranges from 50 to 60 percent. The range in reaction includes strongly acid or extremely acid in the A horizon and the upper part of the B horizon and may be neutral or moderately alkaline in the lower part of the B horizon. Depth to calcareous soil material ranges from 28 to 46 inches.

The Remsen soils are the somewhat poorly drained members of a drainage sequence that includes the moderately well drained Geeburg soils. The Remsen soils are adjacent to the Wadsworth soils in some places, but they are more clayey in their subsoil and underlying till than those soils. Unlike Wadsworth soils, Remsen soils do not have a fragipan. Remsen soils are more clayey than the Fitchville soils.

Remsen silt loam, 0 to 2 percent slopes (RoA).—This soil occurs in depressions in some areas.

Included with this soil in mapping were areas of an unnamed soil that has gravelly material to a depth of 10 to 20 inches. Also included were a few small areas that are underlain by sandstone or shale bedrock at a depth of less than 48 inches. Other inclusions were small areas of the very poorly drained Montgomery soils.

Wetness is the major limitation to the use of this soil for cultivated crops. Seasonal wetness, a high shrink-swell potential, and very slow permeability are limitations for many nonfarm uses. (Capability unit IIIw-1; woodland suitability group 2w2)

Remsen silt loam, 2 to 6 percent slopes (RoB).—This soil occurs in large areas in the northeastern part of Lexington Township.

Included with this soil in mapping were a few small areas of an unnamed soil in which gravelly soil material extends to a depth of 10 to 20 inches. Also included in the mapping, in the vicinity of Klinger Road north of Alliance, were a few small areas in which the soil is underlain by shale bedrock at a depth of 4 or 5 feet. Other inclusions were some spots of a moderately eroded Remsen soil that has a more clayey surface layer than this soil and, in convex areas on knolls, were small areas of the moderately well drained Geeburg soils.

Seasonal wetness is the main limitation to use of this soil for farming, but the hazard of erosion is also a concern in cultivated areas, particularly on long slopes. Seasonal wetness, a high shrink-swell potential, and very slow permeability are limitations to nonfarm uses. (Capability unit IIIw-1; woodland suitability group 2w2)

Remsen-Urban land complex (Rr).—This complex occurs in the northern part of the city of Alliance. It consists of areas of nearly level and gently sloping Remsen soils and of areas where the soil material has been severely altered or disturbed by cutting and filling. In about 75 percent of the area, the soil profile cannot be recognized. The Remsen soils have a very slowly permeable, dense, clayey subsoil, are wet late in spring, and are ponded in some places. Their use for nonfarm purposes is severely limited by the clayey subsoil, a seasonal high water table, and high shrink-swell potential. (Capability unit not assigned; woodland suitability group 2w2)

Rittman Series

The Rittman series consists of moderately well drained, gently sloping and moderately steep soils that occur in the northeastern part of the county. These soil formed in silty clay loam and clay loam glacial till of Wisconsin age.

In a typical profile the plow layer is dark grayish-brown silt loam about 7 inches thick. The subsoil, about 42 inches thick, is mottled pale-brown, yellowish-brown, and brown silt loam in the uppermost 3

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inches. To a depth of about 22 inches is dark-brown and dark yellowish-brown clay loam. Below this, and extending to a depth of 41 inches, is a fragipan that is dark-brown clay loam in the upper part and is dark grayish-brown loam in the lower part. The lower part of the subsoil is 8 inches of dark-brown clay loam. The underlying material is olive-brown clay loam.

The Rittman soils have a moderately deep root zone in most places. The available moisture capacity is medium. Permeability is slow in the subsoil.

These soils are not extensive in this county. Most of the acreage is used for cultivated crops.

Typical profile of Rittman silt loam, 2 to 6 percent slopes, in a meadow, in Lexington Township, section 32, T. 19 N., R. 7 W.:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, coarse, granular structure that breaks to weak, very fine, crumb structure; friable; abundant roots; slightly acid; abrupt, smooth boundary.

B1—7 to 10 inches, coarsely mottled pale-brown (10YR 6/3), yellowish-brown (10YR 5/4), and brown (7.5YR 4/4) silt loam; yellowish brown (10YR 5/4) when crushed; moderate, medium, subangular blocky structure; friable; slightly hard when dry; abundant roots; very thin, yellowish-brown (10YR 5/4) clay films on ped faces; 5 percent of horizon is pebbles; strongly acid; abrupt, smooth boundary.

B21t—10 to 17 inches, dark-brown (7.5YR 4/4) clay loam; many, fine, distinct mottles of dark grayish brown (10YR 4/2) and brown (7.5YR 5/4); strong, medium and coarse, angular blocky structure; very firm when moist, slightly plastic when wet; common roots on faces of smaller peds; medium, dark grayish-brown (10YR 4/2) clay films on ped faces; very strongly acid; gradual, wavy boundary.

B22t—17 to 22 inches, dark yellowish-brown (10YR 4/4) clay loam; strong, medium and coarse, angular blocky structure; very firm when moist, slightly plastic when wet; common roots; dark grayish-brown (10YR 4/2) clay films on vertical faces, and dark-brown (10YR 4/3), medium clay films on horizontal faces; black manganese stains on faces of small peds; 5 percent of horizon is pebbles; very strongly acid; gradual, wavy boundary.

Bx1—22 to 27 inches, dark-brown (10YR 4/3) clay loam; moderate, coarse and medium, angular blocky structure within weak coarse prisms; very firm (brittle); few roots; thin, continuous, dark grayish-brown (10YR 4/2) clay films on vertical ped faces, and discontinuous dark-brown (7.5YR 3/2) clay films on horizontal faces; many dark-colored manganese stains on ped faces; 5 percent of horizon is pebbles; very strongly acid; gradual, wavy boundary.

Bx2—27 to 34 inches, dark-brown (10YR 4/3) clay loam; moderate, coarse and medium, angular blocky structure inside of weak, coarse prisms; very firm (brittle) when moist, nonplastic when wet; few roots; thick, dark grayish-brown (10YR 4/2) clay films on vertical faces, and thick, dark-brown (7.5YR 3/2) clay films on horizontal faces; dark-colored manganese stains on horizontal faces; 5 percent of horizon is pebbles; strongly acid; clear, wavy boundary.

Bx3—34 to 41 inches, dark grayish-brown (10YR 4/2) loam; dark brown (10YR 4/3) when crushed; moderate, coarse, angular blocky structure within weak coarse prisms; very firm when moist, slightly plastic when wet; no roots; very thin clay films; many black manganese stains; 5 percent of horizon is pebbles; neutral; clear, smooth boundary.

B3—41 to 49 inches, dark-brown (10YR 4/3) clay loam; moderate, medium, angular blocky structure; firm; no roots; very thin, dark grayish-brown (10YR 4/2) clay films; 5 percent of horizon is pebbles; pieces of unweathered limestone; slightly effervescent; mildly alkaline; clear, wavy boundary.

C—49 to 78 inches, olive-brown (2.5Y 4/4) clay loam; massive (structureless); firm; no roots; gray and yellowish-brown vertical streaks and few clay seams in upper part of horizon; 5 percent of horizon is pebbles; calcareous.

The clay content of the B21t horizon ranges from 27 to 37 percent. Depth to the Bx1 (fragipan) horizon is 18 to 30 inches. In Bx1, Bx2, and Bx3 horizons the polygons range from 5 to 12 inches in diameter and the clay films have hues of 10YR, 7.5YR. and 2.5Y and chromas of 1, 2, and 3. The texture of the C horizon is clay loam, silt loam, or loam. Depth to calcareous material ranges from 36 to 75 inches or more.

The Rittman soils are the moderately well drained members of a drainage sequence that includes the somewhat poorly drained Wadsworth soils, and they are adjacent to those soils in many places. Along the boundary between soil associations 3 and 8, on the general soil map, Rittman soils are commonly adjacent to the moderately well drained Canfield soils. Rittman soils have a more clayey subsoil than Canfield soils and generally are more shallow to limy material.

Rittman silt loam, 2 to 6 percent slopes (RsB).—This soil is on the till plains in the northeastern part of the county, and it generally occurs in slightly convex areas. It has a perched water table late in winter and early in spring. Because runoff is rapid, the hazard of erosion is moderate. This soil has the profile described as typical for the series.

Included with this soil in mapping, on the upper part of slopes, were areas of moderately eroded soils that are lighter colored and contain more pebbles and stone fragments than the uneroded Rittman soils. Also included in mapping, near Woods Lake, were small areas of soils that have a loamy surface layer as much as 18 inches thick. Other inclusions, in small drainageways, were narrow strips of the poorly drained Sebring soils and, in nearly level or slightly concave areas, were small areas of the somewhat poorly drained Wadsworth soils.

A moderate hazard of erosion restricts the use of this soil for farming. Slow permeability and seasonal wetness are limitations for many nonfarm uses. (Capability unit IIe–7; woodland suitability group 1o1).

Rittman silt loam, 6 to 12 percent slopes (RsC).—This soil occupies elongated strips, 5 to 10 acres in size, on short slopes. It receives very little runoff from surrounding areas.

Included with this soil in mapping were a few areas of soils that have a loamy surface layer about 12 inches thick.

A severe hazard of erosion and wetness are the major limitations to use of this soil for farming and for many nonfarm purposes. (Capability unit IIIe-7; woodland suitablility group 1o1)

Rittman silt loam, 6 to 12 percent slopes, moderately eroded (RsC2).—This soil occupies convex areas along drainageways. Its surface layer is lighter colored and thinner than the one in the profile described as typical for the series. There are many pebbles and stone fragments on the surface in some areas where erosion has

removed most of the original surface soil. This soil receives runoff from higher areas. The hazard of erosion is severe.

A severe hazard of erosion is the major limitation to the use of this soil for farming. The slope, the hazard of erosion, and slow permeability are limitations to many nonfarm uses. (Capability unit IIIe-7; woodland suitability group 1o1)

Rittman silt loam, 12 to 18 percent slopes, moderately eroded (RsD2).—This soil occupies elongated, narrow strips along streams and large drainageways. Its surface layer is only 4 or 5 inches thick.

Included with this soil in mapping were areas of severely eroded Rittman soils that have lost most or all of their original surface soil; in these areas a few U-shaped gullies occur in some places; the depth of the gullies is controlled by the hard, dense fragipan. Also included in mapping were a few wooded areas of uneroded Rittman soils. Other inclusions were a few small areas of well-drained, brown, silty soils.

Use of this soil for farming and for nonfarm purposes is limited mainly by the slope and a severe hazard of erosion. (Capability unit IVe-2; woodland suitability group 1o1)

Sebring Series

The Sebring series consists of poorly drained, nearly level soils on low stream terraces and along drainageways on uplands. These soils formed in sediments deposited by water.

In a typical profile the surface layer is silt loam about 7 inches thick. It is very dark gray in the uppermost 3 inches and is dark gray mottled with dark yellowish brown in the lower 4 inches. The subsoil is 33 inches thick and mottled with light yellowish brown, brown, yellowish brown, and pale olive. To a depth of 16 inches, it is grayish-brown silt loam. Below this is about 24 inches of grayish-brown and gray silty clay loam. The underlying material is gray silt loam mottled with light yellowish brown and yellowish brown.

The Sebring soils have a deep root zone when the water table is low. Permeability is moderately slow in the subsoil, and available moisture capacity generally is high. These soils have a seasonal high water table. They are subject to ponding and to occasional flooding.

These soils are extensive in this county. The drained areas are used for crops, but the undrained areas are commonly in pasture or trees.

Typical profile of Sebring silt loam on slopes of 0 to 2 percent in idle land in Sugar Creek Township, section 29, T. 11 N., R. 10 W.:

A1—0 to 3 inches, very dark gray (10YR 3/1) silt loam; moderate, medium and coarse, granular structure; friable; abundant roots; strongly acid; clear, smooth boundary.

A2—3 to 7 inches, dark-gray (10YR 4/1) silt loam; few, fine, faint mottles of dark yellowish brown (10YR 4/4); moderate, medium and coarse, granular structure; friable; abundant roots; very strongly acid; clear, smooth boundary.

B1g—7 to 16 inches, grayish-brown (2.5Y 6/2) silt loam; common, medium, faint mottles of light yellowish brown (2.5Y 6/4); moderate, medium, subangular blocky structure; friable; common roots; very strongly acid; clear, wavy boundary.

B21tg—16 to 24 inches, grayish-brown (2.5Y 6/2) light silty clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/6) and brown (10YR 5/3); moderate, medium, subangular blocky structure; friable; few roots; thin discontinuous clay films on most ped faces; strongly acid; gradual, wavy boundary.

B22tg—24 to 30 inches, gray (5Y 5/1) silty clay loam; common, medium and coarse, distinct mottles of light yellowish brown (2.5Y 6/4) and yellowish brown (10YR 5/8); moderate, coarse, angular blocky structure; firm when moist, slightly sticky when wet; few roots; thin discontinuous clay films on ped faces; thin, dark-brown (7.5YR 4/4) stains on some ped faces; strongly acid; gradual, wavy boundary.

B3tg—30 to 40 inches, gray (5Y 5/1) light silty clay loam; many, medium and coarse mottles of yellowish brown (10YR 5/8) and pale olive (5Y 6/3); weak, medium, subangular blocky structure; firm; few roots; thin, patchy clay films on ped faces; medium acid; gradual, wavy boundary.

C—40 to 60 inches, gray (N 6/0) silt loam; common, medium, distinct mottles of light yellowish brown (2.5Y 6/3) and yellowish brown (10YR 5/6); massive (structureless); friable; no roots; few pebbles; neutral.

The A horizon ranges from very dark gray (10YR 3/1) to dark grayish brown (10YR 4/2) in uncultivated areas. It ranges from dark gray (10YR 4/1) to dark grayish brown (10YR 4/2) or grayish brown (10YR 5/2) in cultivated areas. The matrix of the B horizon ranges from grayish brown (2.5Y 6/2) to gray (5Y 5/1, N 5/0, or N 6/0) or dark gray (5Y 4/1). The Bt horizon is at a depth of 14 to 30 inches and ranges from silt loam to silty clay loam. Typically, the clay content of the Bt horizon is about 30 percent, but it ranges from 27 to 35 percent. In some places the C horizon is stratified and ranges from fine silty clay loam to sandy loam. Reaction ranges from very strongly acid to medium acid or neutral in the B and C horizons.

The Sebring soils are the poorly drained members of a drainage sequence that includes the very poorly drained Luray soils, the somewhat poorly drained Fitchville soils, the moderately well drained Glenford soils, and the well drained Mentor soils. The Sebring soils are commonly next to the Fitchville soils throughout the county. Their subsoil is not so clayey as that of the Canadice soils. The Sebring soils are more silty in their subsoil and underlying material than are the poorly drained Ginat soils.

Sebring silt loam (0 to 2 percent slopes) (Sb).—This soil is on uplands in the glaciated part of the county. It occurs on outwash plains and in basinlike areas and blocked drainageways. This soil has the profile described as typical for the series.

Included with this soil in mapping, in low areas, were small areas of soils that have a silty clay loam surface layer and are slightly sticky. Also included in mapping were a few slightly higher areas of the somewhat poorly drained Fitchville soils.

Excessive wetness is the major limitation to the use of this soil for most purposes. (Capability unit IIIw–4; woodland suitability group 1w1)

Sebring silt loam, till substratum (Se).—This soil occurs in concave areas in shallow drainageways and in wide broad basinlike areas on the glacial till plain. Its profile is similar to the one described as typical for the series, but it contains loamy glacial till below a depth of 40 inches.

Included with this soil in mapping were small areas of a soil that contains a weak fragipan and is better drained than this Sebring soil. Also included in the mapping were small areas of the moderately well drained Canfield soils.

Use of this soil for farming and for most nonfarm purposes is limited mainly by excessive wetness. (Capability unit IIIw–4; woodland suitability group 1w1)

Sebring-Urban land complex (Sg).—This complex occurs in drainageways and on low stream terraces. It consists of the poorly drained, nearly level Sebring soils and of disturbed land that includes some areas of dark-colored, very poorly drained soils and of areas in which the soil profile cannot be recognized.

Use of this complex for nonfarm purposes is limited mainly by a seasonal high water table and ponding. Buildings constructed on the Sebring soils have wet foundations unless adequate drainage is provided. (Capability unit not assigned; woodland suitability group 1w1)

Shoals Series

The Shoals series consists of somewhat poorly drained, level to gently sloping soils on bottom lands along the perennial streams and the Tuscarawas River. These soils formed in recent alluvium washed from the uplands.

In a typical profile the plow layer is dark-brown silt loam about 9 inches thick. The subsoil, about 33 inches thick and mottled with brownish yellow and dark gray, is light-gray silt loam in the uppermost 15 inches and is light-gray loam below. The underlying material is stratified silt loam, sandy loam, and light silty clay loam.

The Shoals soils have a deep root zone when the water table is low. The available moisture capacity is high. These soils have a seasonal high water table, mainly late in winter and in spring. They are subject to flooding.

These soils are the dominant soils on bottom lands in this county. Most of their acreage is used for cultivated crops and pasture, but some narrow areas along the perennial streams are used for woodlots or are pastured.

Typical profile of a Shoals silt loam on slopes of 0 to 2 percent in a cultivated field in Bethlehem Township, section 16, T. 9 N., R. 9 W.:

Ap—0 to 9 inches, dark-brown (10YR 4/3) silt loam; moderate, very fine and fine, crumb structure; friable; abundant roots; neutral; clear, smooth boundary.

B21g—9 to 24 inches, light-gray (10YR 7/2) silt loam; many, medium, distinct mottles of brownish yellow (10YR 6/6) and dark gray (10YR 4/1); weak, fine, subangular blocky structure that breaks to moderate, fine, crumb structure; friable; abundant roots; common black concretions; mildly alkaline; clear, wavy boundary.

B22g—24 to 42 inches, light-gray (10YR 7/2) loam; many, medium, distinct mottles of dark gray (10YR 4/1) and brownish yellow (10YR 6/6); weak, fine, subangular blocky structure; friable; few roots; common black concretions; mildly alkaline; gradual, wavy boundary.

C—42 to 60 inches, stratified silt loam, sandy loam, and light silty clay loam; mildly alkaline.

The A horizon includes dark grayish brown (10YR 4/2) and brown (10YR 4/3) in some places. In addition to light gray (10YR 7/2), the matrix of the B horizon is grayish brown (10YR 5/2) or dark grayish brown (10YR 4/2) in some places. The content of coarse fragments in the B22g horizon generally is less than 5 percent but ranges from 1 to 10 percent. Reaction ranges from medium acid to moderately alkaline throughout the profile.

The Shoals soils are the somewhat poorly drained members of a drainage sequence that includes the well drained Chagrin soils, the moderately well drained Lobdell soils, the poorly drained Wayland soils, and the very poorly drained Sloan soils, and in some places they are adjacent to any one of those soils. The Shoals soils are less clayey throughout the profile than the somewhat poorly drained Fitchville soils.

Shoals silt loam (0 to 2 percent slopes) (Sh).—This soil occurs as long bands along the perennial streams. It lies just above the dark-colored Sloan soils and the Wayland soils.

Included with this soil in mapping were small areas of a soil that has a loam surface layer; these included areas were above the Shoals soils, and they occupy about 100 areas in the county. Also included in mapping, in depressions, were small areas of the poorly drained Wayland soils and small areas of the very poorly drained Sloan soils.

A hazard of flooding is the major limitation to the use of this soil for farming and for nonfarm purposes. (Capability unit IIw–3; woodland suitability group 2w2)

Sloan Series

The Sloan series consists of very poorly drained, nearly level, dark-colored soils on bottom lands. These soils formed in recent alluvium that washed from soils at a higher elevation.

In a typical profile the surface layer, about 17 inches thick, is very dark gray silt loam in the uppermost 13 inches and is dark-gray heavy silt loam mottled with light olive brown and yellowish brown below. The subsoil, about 21 inches thick, is dark grayish-brown heavy silt loam mottled with yellowish brown in the upper part and is light brownish-gray loam mottled with strong brown in the lower part. The underlying material is grayish-brown loam mottled with light olive brown.

The Sloan soils have a deep root zone when the water table is low. The available moisture capacity is high. The water table is high much of the year, and it is at or near the surface late in winter and in spring. These soils are subject to flooding.

In this county the Sloan soils are moderately extensive. Most of the acreage is used for pasture, trees, or an occasional crop.

Typical profile of a Sloan silt loam on slopes of 0 to 2 percent in a cultivated field in Bethlehem Township, section 22, T. 9 N., R. 9 W.:

A11—0 to 13 inches, very dark gray (10YR 3/1) silt loam; moderate, medium, granular structure; friable; abundant roots; neutral; gradual, wavy boundary.

A12—13 to 17 inches, dark-gray (10YR 4/1) heavy silt loam; many, medium, distinct mottles of light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6); weak, medium, angular blocky structure that

breaks to massive (structureless); friable; common roots; neutral; clear, wavy boundary.

B21g—17 to 25 inches, dark grayish-brown (2.5Y 4/2) heavy silt loam; many, medium, distinct mottles of yellowish brown (10YR 5/6); massive (structureless) but breaks to weak, coarse, subangular blocky structure; friable; common roots; neutral; gradual, diffuse boundary.

IIB22g—25 to 38 inches, light brownish-gray (2.5Y 6/2) loam; common, fine, distinct mottles of strong brown (7.5YR 5/8); massive (structureless); friable; occasional roots; few, fine, black (N 2/0) concretions; neutral; gradual, diffuse boundary.

IICg—38 to 50 inches, grayish-brown (10YR 5/2) loam; few, fine, faint mottles of light olive brown (2.5Y 5/4); massive (structureless); very friable; no roots; few black (N 2/0) concretions and stains; neutral.

The A11 horizon is very dark grayish brown (10YR 3/2), very dark gray (10YR 3/1), or black (10YR 2/1), and it ranges from 10 to 15 inches in thickness. The clay content of the A12 and B2 horizons is 20 to 30 percent. The C horizon is heavy silt loam and sandy loam in some places. Reaction ranges from medium acid to moderately alkaline.

The Sloan soils are the very poorly drained members of a drainage sequence that includes the well drained Chagrin soils, the moderately well drained Lobdell soils, the somewhat poorly drained Shoals soils, and the poorly drained Wayland soils. They are commonly adjacent to the Shoals soils. Sloan soils are similar to the Luray soils, but they occupy lower positions and are less clayey than those soils.

Sloan silt loam (0 to 2 percent slopes) (Sl).—This soil occupies slightly concave areas along most of the streams in the county. It occurs mainly in old oxbows and abandoned channels of the Tuscarawas River and its tributaries. Because of its low-lying position, this soil tends to accumulate soil material.

Included with this soil in mapping were a few areas of Sloan soils that have a sticky silty clay loam surface layer. Also included in mapping were small areas of the poorly drained Wayland soils.

Excessive wetness and the hazard of flooding are the major limitations to use of this soil. (Capability unit IIIw–3; woodland suitability group 2wl)

Strip Mine Spoil

Strip mine spoil consists of sandstone and shale material, acid clay shale material, and nonacid glacial till, sandstone, and limestone material. This material has been piled up during strip mine operations. These areas occur in the hilly parts of Stark County. The gradient in these areas is undulating, rolling, and steep. Little or no soil has developed on the unconsolidated material. The spoil varies in acidity; it is extremely acid and is toxic to plants in some areas.

Most areas of Strip mine spoil can be used for pasture, hay, or trees.

Strip mine spoil, sandstone and shale materials, undulating (SoC).—This spoil occurs in nearly level to sloping areas that have been strip mined. Some areas have been partly leveled. Runoff is rapid, and the hazard of erosion is severe unless a protective plant cover is established. This spoil contains a moderate amount of plant nutrients. In some areas the spoil has a pH value of less than 3.5 and is toxic to plants.

In most places this spoil is suited to the pasture and meadow plants that are commonly grown on the surrounding soils that are not strip mined. There are numerous stones in some small areas that may interfere with the use of machinery, and these areas are better suited to trees than to pasture and meadow. The main limitation to the use of this material is the hazard of erosion in bare areas. Establishing a cover of vegetation is the major concern of management. (Capability unit VIs–2; woodland suitability group not assigned)

Strip mine spoil, sandstone and shale materials, rolling (SoE).—This spoil is mainly moderately steep and steep, but a few areas are hummocky and have sharp peaks. Runoff is rapid in bare areas, and erosion is a severe hazard. This material contains a moderate amount of plant nutrients.

This material is suited to the pasture plants and trees commonly grown in the county, but the numerous stones that are on the surface of a few small areas hinder the operation of machinery. The main limitations to the use of this spoil are the severe hazard of erosion and the limited amount of fine material on the surface. Establishing pasture plants or trees is the main concern of management. (Capability unit VIs–2; woodland suitability group not assigned)

Strip mine spoil, sandstone and shale materials, steep (SoF).—This material occurs in very steep areas. Runoff is rapid, and erosion is a very severe hazard in bare areas. The spoil contains a moderate amount of plant nutrients. The pH value is 3.5 or lower in a few areas, and the spoil is toxic to plants.

This material is suited to pine and black locust trees. Steepness and a very severe hazard of erosion are the major limitations to use of this spoil. Establishing trees and controlling erosion are the main concerns of management. (Capability unit VIIs–2; woodland suitability group not assigned)

Strip mine spoil, acid clay shale materials, undulating (SsC).—This spoil material occurs in nearly level, gently sloping, and sloping areas. Cracks form in this clayey material when it is dry, and revegetation of this kind of spoil is more difficult than on any of the other spoil material in the county. About 50 percent of this spoil material has a pH value of less than 3.5 and is toxic. Only acid-tolerant plants are suited to this kind of spoil. The hazard of erosion is the main limitation to use of this kind of spoil. (Capability unit VIIs–2; woodland suitability group not assigned)

Strip mine spoil, acid clay shale materials, rolling (SsE).—This land type consists of moderately steep and steep, acid, clay shale material that contains a moderate amount of plant nutrients. This material is slow to dry, and cracks form when it is dry. In some places this spoil has a pH value of less than 3.5 and is toxic to plants. These areas make up about 15 percent of the area mapped.

The hazard of erosion is severe on this spoil material. Volunteer plants grow very slowly, and until a protective cover is established, erosion removes the surface material and the small plants growing on it. Trees and pasture can be established on this material.

(Capability unit VIIs–2; woodland suitability group not assigned)

Strip mine spoil, acid clay shale materials, steep (SsF).—This land type consists of very steep spoil banks of acid clay shale material. Runoff is rapid, and erosion is a very severe hazard in bare areas. This spoil contains a moderate amount of plant nutrients. About 40 percent of the area mapped consists of material that has a pH value of less than 3.5 and is toxic to plants.

Steepness and a very severe hazard of erosion are the main limitations to use of this land. Establishing trees and controlling erosion on the spoil banks are main concerns of management.

Areas consisting of this kind of spoil can be revegetated by planting pine and black locust trees. (Capability unit VIIs–2; woodland suitability group not assigned)

Strip mine spoil, nonacid materials, undulating (StC).—The spoil banks that make up this land type consist of glacial till, sandstone, and siltstone material. The gradient ranges from nearly level to sloping. This spoil material is nonacid, has a moderate to high content of plant nutrients, and is not toxic to plants. Vegetation is more easily established on this kind of spoil than on the other spoil material in this county.

A hazard of erosion in bare areas is the major limitation to the use of this spoil material, and establishing a plant cover of any kind is the main concern of management.

This spoil material is moderately well suited to the pasture and meadow plants commonly grown in the county. (Capability unit VIs–2; woodland suitability group not assigned)

Strip mine spoil, nonacid materials, rolling (StD).—This land type consists of glacial till, sandstone, and limestone spoil material. The gradient is moderately steep or steep. There are some small, hummocky areas of glacial till on irregular slopes, and about 10 percent of the area mapped has very irregular slopes. This spoil material is nonacid and contains moderate amounts of plant nutrients. Runoff is rapid, and erosion is a severe hazard unless a cover of vegetation is maintained on the spoil banks.

This land type is moderately well suited to permanent pasture and trees. The pasture plants and the trees that are commonly grown in the county are suitable for planting. (Capability unit VIs–2; woodland suitability group not assigned)

Strip mine spoil, nonacid materials, steep (StF).—This land type occurs on the very steep part of strip mines. It consists of glacial till, sandstone, and limestone spoil material. This material is stony in some areas. Runoff is rapid, and erosion is a very severe hazard in bare areas. This spoil material is nonacid and has a moderate to high content of plant nutrients.

Controlling erosion and establishing trees are the main concerns in managing these strip-mined areas. Black locust and pines are suitable trees for planting. (Capability unit VIIs–2; woodland suitability group not assigned)

Tilsit Series

The Tilsit series consists of moderately well drained, sloping to moderately steep soils that occur in the unglaciated southeastern part of the county. These soils formed on stratified sandstone, siltstone, and shale.

In a typical profile the plow layer is dark-brown silt loam about 7 inches thick. The subsoil is about 34 inches thick. To a depth of about 23 inches, it is yellowish-brown silt loam and heavy silt loam. Below this, and extending to a depth of 34 inches, is a yellowish-brown silty clay loam fragipan that is mottled with grayish brown and yellowish red. The lower part of the subsoil is 7 inches of yellowish-brown silt loam mottled with light brownish gray and strong brown. The underlying material is brown silt loam that is mottled with gray and brownish yellow and contains coarse fragments. Stratified sandstone, siltstone, and shale is at a depth of 47 inches.

The Tilsit soils have a moderately deep root zone. The available moisture capacity is medium. Permeability is moderate in the upper and lower parts of the subsoil and in the underlying material, but it is slow in the fragipan. The water table is high late in winter and early in spring.

These soils are not extensive in this county. They are used primarily for cultivated crops.

Typical profile of Tilsit silt loam, 6 to 12 percent slopes, in a meadow in Paris Township, section 33, T. 17 N., R. 6 W.:

Ap—0 to 7 inches, dark-brown (10YR 4/3) silt loam; moderate, fine, crumb structure; friable; abundant roots; strongly acid; abrupt, smooth boundary.

B1—7 to 12 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, subangular blocky structure; friable; abundant roots; few small fragments of stone; strongly acid; clear, wavy boundary.

B2t—12 to 23 inches, yellowish-brown (10YR 5/6) heavy silt loam; moderate, fine and medium, subangular blocky structure; friable when moist, slightly sticky when wet; common roots; thin discontinuous clay films on ped faces; few coarse fragments; strongly acid; clear, wavy boundary.

Bx—23 to 34 inches, yellowish-brown (10YR 5/6) silty clay loam; few, medium, distinct mottles of grayish brown (10YR 5/2) and yellowish red (5YR 4/6); moderate, medium and coarse, angular blocky structure; firm, slightly brittle; very few roots; thin discontinuous clay films on ped faces and in old root channels; some dark stains of manganese; few coarse fragments; strongly acid; gradual, wavy boundary.

B3—34 to 41 inches, yellowish-brown (10YR 5/4) silt loam; common, medium, distinct mottles of light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8); moderate, medium and coarse, angular blocky structure; firm; very few roots; few, thin, patchy clay films on some ped faces; many dark concretions of manganese; 15 percent, by volume, coarse fragments of siltstone and sandstone; strongly acid; clear, wavy boundary.

C—41 to 47 inches, brown (10YR 5/3) channery silt loam; common, fine and medium, distinct mottles of gray (10YR 6/1) and brownish yellow (10YR 6/6); weak, medium and coarse, angular blocky structure; friable; few dark stains of manganese on stone surfaces; no roots; 40 percent coarse fragments; strongly acid; clear, wavy boundary.

R—47 inches +, stratified sandstone, siltstone, and shale.

The silty mantle ranges from 1 to 2 feet in thickness. The

fragipan occurs at depths ranging from 18 to 24 inches; it is weakly to moderately developed, but it is typically weak. The matrix of the B2t horizon ranges from strong brown (7.5YR 5/16) to yellowish brown (10YR 5/6) to dark yellowish brown (10YR 4/4). Reaction is very strongly acid or strongly acid in the solum. The coarse fragments in the upper part of the solum make up 5 to 10 percent of the soil mass. Depth to bedrock ranges from 3 to 5 feet.

The Tilsit soils are near, or adjacent to the well-drained Wellston, Muskingum, and Gilpin soils. Unlike the Keene soils, the Tilsit soils have a fragipan in their subsoil, and they are less clayey in their subsoil than those soils. The Tilsit soils formed in residuum derived from sandstone, siltstone, and shale, whereas the Canfield soils formed in glacial till.

Tilsit silt loam, 6 to 12 percent slopes (TlC).—This soil occupies elongated, small, concave areas at the base of steep hillsides. It has the profile described as typical for the series.

Included with this soil in mapping were areas of an unnamed, poorly drained soil. Also included in the mapping were small areas of gently sloping Tilsit soils that were too small to map separately.

A severe hazard of erosion is the major limitation to the use of this soil for farming. This soil also dries out slowly in spring. Slow permeability and the slope are the main limitations for many nonfarm uses. (Capability unit IIIe–2; woodland suitability group 3w2)

Tilsit silt loam, 12 to 18 percent slopes (TlD).—This soil occurs at the base of hillsides and in concave areas on uplands. Its surface layer generally is thinner than that in the profile described as typical for the series. Runoff is very rapid.

Included with this soil in mapping were areas of moderately eroded Tilsit soils. Also included in the mapping, on concave slopes, were small areas of the well-drained Wellston soils.

A very severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope is the dominant limitation to use for most nonfarm purposes. (Capability unit IVe–2; woodland suitability group 3w2)

Trumbull Series

The Trumbull series consists of poorly drained, nearly level soils on uplands in the northeastern part of the county. These soils formed in silty clay glacial till of Wisconsin age.

In a typical profile the surface layer is gray silt loam about 6 inches thick. The subsoil is about 36 inches thick. It is light-gray and pale-brown silty clay loam in the uppermost 6 inches. Below this, and extending to a depth of 42 inches, is light-gray, yellowish-brown, gray, brownish-yellow, dark-gray, and olive-gray, firm clay mottled with yellowish brown, gray, brownish yellow, grayish brown, light gray, and light yellowish brown. The underlying material is olive-gray, firm, mildly alkaline silty clay mottled with grayish brown and light yellowish brown.

The Trumbull soils have a moderately deep root zone in most places. The available moisture capacity is medium. Permeability is slow in the subsoil and the underlying glacial till. These soils have a seasonal high water table for fairly long periods, and they are slow to dry out in spring.

The Trumbull soils are not extensive in this county. Most of the acreage is woodland or is pastured (fig. 12).

Typical profile of Trumbull silt loam on slopes of 0 to 2 percent in a wooded area in Lexington Township, section 2, T. 19 N., R. 6 W.:

A11—0 to 3 inches, gray (10YR 5/1) silt loam; moderate, medium, granular structure; friable; abundant roots; dark-gray (10YR 4/1) organic leaf mulch; fine roots; extremely acid; gradual, wavy boundary.

A12—3 to 6 inches, gray (10YR 6/1) silt loam; moderate, medium and fine, subangular blocky structure; friable; common roots; extremely acid; gradual, wavy boundary.

B1g—6 to 12 inches, light-gray (N 6/0) and pale-brown (10YR 6/3) silty clay loam; gray (N 6/0), yellowish-brown (10YR 5/6), and brownish-yellow (10YR 6/8) mottles on ped interiors; moderate, medium and fine, subangular blocky structure; slightly plastic when wet; common roots; extremely acid; gradual, wavy boundary.

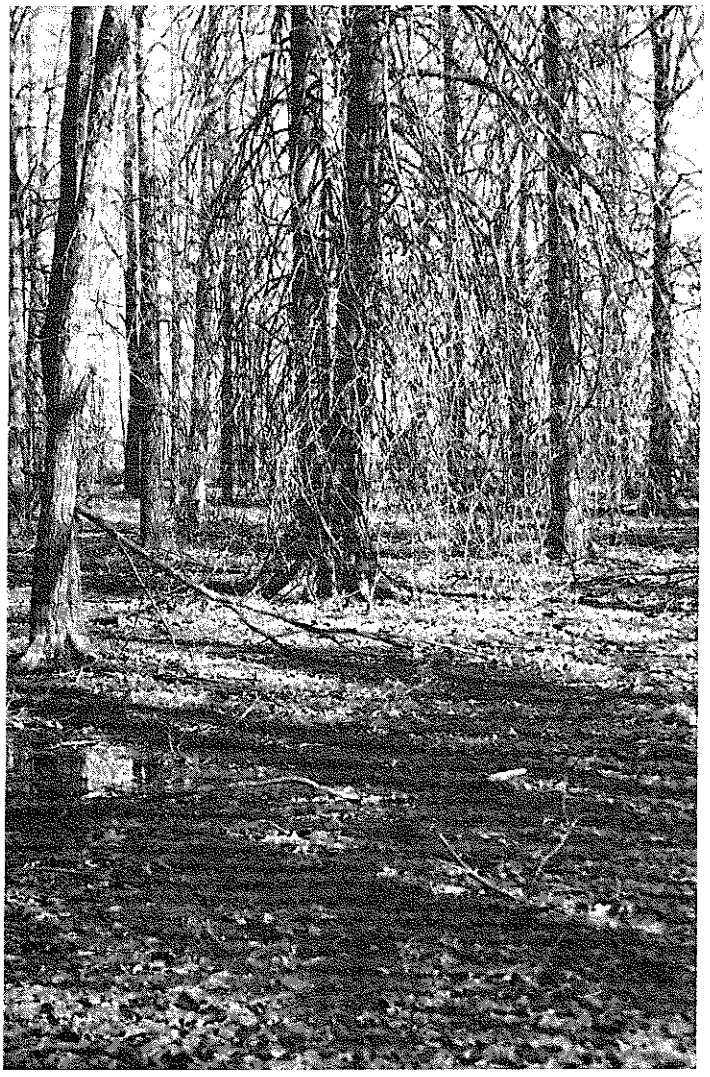

Figure 12.—**Stand of pin oaks on Trumbull silt loam.**

B21tg—12 to 17 inches, light-gray (N 6/0) and yellowish-brown (10YR 5/4) clay; medium, distinct mottles of gray (N 6/0), yellowish brown (10YR 5/6), and brownish yellow (10YR 6/8) on ped interiors; strong, medium and coarse, angular blocky structure; firm when moist, plastic when wet; common roots; thin continuous clay films on ped faces; few pebbles; very strongly acid; gradual, wavy boundary.

B22tg—17 to 29 inches, gray (10YR 5/1) and brownish-yellow (10YR 6/6) clay; fine, distinct mottles of gray (10YR 5/1) and brownish yellow (10YR 6/6) on ped interiors; strong, medium and coarse, angular blocky structure; firm when moist, plastic when wet; common roots; thin continuous clay films on ped faces; pebbles 1 to 2 percent, by volume; medium acid; gradual, wavy boundary.

B23tg—29 to 33 inches, dark-gray (10YR 4/1) and gray (10YR 6/1) clay; fine, distinct mottles of grayish brown (10YR 5/2), yellowish brown (10YR 5/4), and light gray (10YR 6/1) on ped interiors; strong, medium, angular blocky structure; firm when moist, plastic when wet; few roots; few, thin, discontinuous clay films; pebbles 1 to 2 percent, by volume; neutral; clear, wavy boundary.

B24tg—33 to 42 inches, olive-gray (5Y 5/2) clay; many, medium, distinct mottles of light yellowish brown (2.5Y 6/4); strong, medium, angular blocky structure; firm when moist, plastic when wet; very few roots; thin discontinuous clay films on ped faces; rounded pebbles 1 to 2 percent, by volume; mildly alkaline in lower part; gradual, wavy boundary.

C—42 to 60 inches, olive-gray (5Y 5/2) silty clay; many, medium, distinct mottles of grayish brown (2.5Y 5/2) and light yellowish brown (2.5Y 6/4); weak, coarse, angular blocky structure; firm when moist, plastic when wet; no roots; rounded pebbles 1 to 2 percent, by volume; mildly alkaline.

The A11 horizon ranges from dark gray (10YR 4/1) to dark grayish brown (10YR 4/2) to gray (10YR 5/1), and the A12 horizon ranges from dark gray (10YR 4/1) to dark grayish brown (10YR 4/2) to gray (10YR 5/1 or 6/1). The clay content of the B2 horizon ranges from 50 to 60 percent. In some places the A horizon and the B1g horizon are very strongly acid and the B22tg horizon is neutral. Depth to calcareous material ranges from 36 to 48 inches. Coarse fragments make up from 1 to 5 percent of the soil mass.

The Trumbull soils are the poorly drained members of a drainage sequence that includes the somewhat poorly drained Remsen soils and the moderately well drained Geeburg soils. They are adjacent to the Remsen soils in many places. The Trumbull soils are more clayey than the Canadice soils, and unlike them, are not underlain by stratified silty clay loam, silt loam, sand, and gravel. Trumbull soils are more clayey in their subsoil and underlying material than Sebring soils.

Trumbull silt loam (0 to 2 percent slopes) (Tr).—This soil occurs in level and slightly concave areas. Soil material from higher areas tends to accumulate on this soil, and in some places its surface layer is darker colored than that in the profile described as typical for the series.

Included with this soil in mapping, on breaks along drainageways, were small areas of the moderately well drained Geeburg soils. Also included in the mapping, in depressions, were a few small areas of the very poorly drained Montgomery soils.

Excessive wetness is the major limitation to the use of this soil for farming and for nonfarm purposes. (Capability unit IVw–1; woodland suitability group 1w1)

Urban Land

Urban land (Ur) occurs in the central business districts of Canton, Massillon, and Alliance and in surrounding areas. It also occurs in large industrial complexes. This mapping unit consists of land used for buildings, streets, and sidewalks and of areas where soil material has been removed or the soil has been covered by fill material. In most areas cut and fill operations have so altered the original soils that the soil profile cannot be recognized. (Capability unit not assigned; woodland suitability group not assigned)

Wadsworth Series

The Wadsworth series consists of somewhat poorly drained, level to sloping soils on uplands in the northeastern part of the county. These soils formed in clay loam or silty clay loam glacial till of Wisconsin age.

In a typical profile the plow layer is dark grayish-brown silt loam about 7 inches thick. The subsoil is about 35 inches thick. To a depth of about 20 inches, it is brownish-yellow and brown, friable silty clay loam mottled with gray. Below this, and extending to a depth of 31 inches, is a brown clay loam fragipan that is mottled with light gray. The lower part of the subsoil is 11 inches of brown clay loam mottled with light brownish gray. The underlying material also is brown clay loam mottled with light brownish gray.

The Wadsworth soils have a moderately deep root zone in most places. Permeability is slow in the fragipan. The available moisture capacity is low to medium. These soils have a seasonal high water table for fairly long periods, and unless adequately drained, they are slow to dry out in spring.

These soils are not extensive in this county, but many areas have been drained and are used for cultivated crops.

Typical profile of Wadsworth silt loam, 2 to 6 percent slopes, in a cultivated field in Marlboro Township, section 36, T. 20 N., R. 7 W.:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine and medium, crumb structure; friable; abundant roots; no stones or pebbles; medium acid; abrupt, smooth boundary.

B1t—7 to 12 inches, brownish-yellow (10YR 6/5) silty clay loam; many, fine, faint mottles of light gray (10YR 7/1); moderate, fine and medium, subangular blocky structure; friable; medium, patchy, light-gray (10YR 7/2) and brownish-yellow (10YR 6/6) clay films on some ped faces; few stones in lower part of horizon; strongly acid; clear, wav boundary.

IIB2t—12 to 20 inches, brown (7.5YR 4/4) (ped interiors) silty clay loam; common, medium, prominent mottles of light brownish gray (10YR 6/2); moderate, medium and coarse, subangular blocky structure; slightly firm and somewhat brittle when moist slightly plastic when wet; nearly continuous, medium, light-gray (10YR 7/1) and grayish-brown (10YR 5/2) coats on horizontal and vertical ped faces; few stones; strongly acid; clear, wavy boundary.

IIBx—20 to 31 inches, brown (10YR 5/3) clay loam; many medium, faint mottles of light gray (10YR 7/2); weak, coarse, prismatic structure that breaks to weak, coarse, subangular blocky structure; very firm and somewhat brittle when moist, slightly

plastic when wet; 60 percent of horizontal and vertical ped faces have light-gray (10YR 7/2) and brownish-yellow (10YR 6/6) rinds next to gray clay flows 4 millimeters thick; strongly acid; clear, wavy boundary.

IIB3—31 to 42 inches, brown (10YR 5/3) clay loam; many, medium, faint mottles of light brownish gray (2.5Y 6/2); weak, coarse, prismatic structure that breaks to weak, coarse, subangular blocky structure; slightly firm when moist, plastic when wet; no roots; thick, light brownish-gray (2.5Y 6/2) clay films on 30 percent of horizontal and vertical ped faces; clay flows 6 millimeters thick; few stones; slightly acid.

IIC—42 to 48 inches, brown (10YR 5/3) clay loam; common, medium, faint mottles of light brownish gray (2.5Y 6/2); massive (structureless); slightly firm; neutral.

The clay content of the IIB2t and IIBx horizons ranges from 27 to 35 percent. The matrix of the IIB2t horizon is dark brownish yellow (10YR 6/5), yellowish brown (10YR 5/4), brown (10YR 5/3), or dark brown (7.5YR 4/4). Depth to the top of the IIBx horizon (fragipan) ranges from 18 to 26 inches; the IIBx horizon ranges from 10 to 25 inches in thickness. Depth to calcareous soil material ranges from 36 to 60 inches or more. Below a depth of 60 inches, the glacial till is firm, is limy, and contains numerous pebbles and fragments of sandstone.

The Wadsworth soils are the somewhat poorly drained members of a drainage sequence that includes the moderately well drained Rittman soils. Along the boundary between soil associations 3 and 8, Wadsworth soils are commonly adjacent to Ravenna soils. The Wadsworth soils have a more clayey subsoil than the Ravenna soils and are more shallow to limy material.

Wadsworth silt loam, 0 to 2 percent slopes (WaA).—This soil occupies areas that vary in shape and size. In some places it occurs in depressions and is ponded. This soil commonly has a thicker surface layer and fragipan than corresponding layers in the profile described as typical for the series.

This soil commonly is next to areas of poorly drained Sebring soils, and small areas of Sebring soils were included in mapping.

Excessive wetness is the main limitation to the use of this Wadsworth soil for cultivated crops. For many nonfarm uses, it is limited by slow permeability and a seasonal high water table. (Capability unit IIIw–2; woodland suitability group 1w1)

Wadsworth silt loam, 2 to 6 percent slopes (WaB).—This soil generally occupies large areas in the northeastern part of the county. It has the profile described as typical for the series, but in many places the fragipan is thicker than that described as typical.

Included with this soil in mapping were areas of a Wadsworth soil that is heavy silt loam in the upper part of the subsoil. Also included were small areas of a moderately eroded Wadsworth soil that has a lighter colored and thinner surface layer than that described as typical. Other inclusions were small areas of the poorly drained Sebring soils.

Seasonal wetness is the major limitation to the use of this soil for farming. The hazard of erosion also is important and practices of erosion control are needed, particularly on slopes of 4 to 6 percent. Excessive wetness is the main limitation to most nonfarm uses. (Capability unit IIIw–2; woodland suitability group 1w1)

Wadsworth silt loam, 6 to 12 percent slopes (WaC).—This soil occupies narrow strips along drainageways. It is better drained than Wadsworth silt loam, 2 to 6 percent slopes, which has the profile described as typical for the series. The better drainage is indicated by colors that are browner and less gray than typical.

Included with this soil in mapping were a few areas of moderately eroded soils that have a thinner, lighter colored surface layer than is typical of Wadsworth soils.

A severe hazard of erosion is the primary limitation to the use of this Wadsworth soil for cultivated crops. Use for many nonfarm purposes is limited by the slope and slow permeability. (Capability unit IIIe–2; woodland suitability group 1w1)

Wadsworth silt loam, 6 to 12 percent slopes, moderately eroded (WaC2).—This soil occurs in narrow areas along drainageways and streams. Its surface layer is 3 to 5 inches thick and is lighter colored than that described as typical. This soil is more sticky and has more pebbles on the surface than the uneroded Wadsworth soils. It is somewhat better drained than Wadsworth silt loam, 2 to 6 percent slopes, which is the soil described as typical for the series. The better drainage is indicated by the colors that are less gray than typical in the upper part of the subsoil.

Use of this soil for cultivated crops is limited mainly by a severe hazard of erosion. Seasonal wetness, slow permeability, and the slope are limitations to use for nonfarm purposes. (Capability unit IIIe–2; woodland suitability group 1w1)

Wadsworth Series, Moderately Shallow Variant

The Wadsworth, moderately shallow variant, soils in this county are similar to normal Wadsworth soils but are thinner to bedrock.

The profile of the moderately shallow variant of the Wadsworth series has a dark grayish-brown silt loam plow layer about 8 inches thick. The subsurface layer is yellowish-brown, friable silt loam about 4 inches thick. The subsoil, about 28 inches thick, has a fragipan in the uppermost 12 inches. The fragipan is dark-brown silt loam distinctly mottled with yellowish brown. Below the fragipan is a layer of dark yellowish-brown silty clay loam mottled with gray and a layer of mottled dark yellowish-brown, gray, and dark-gray heavy silty clay loam to silty clay that contains many fragments of weathered shale. Dark-gray shale is at a depth of 40 inches.

Profile of Wadsworth silt loam, moderately shallow variant, 2 to 6 percent slopes, in Lexington Township, section 30, T. 20 N., R. 7 W.:

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

A2—8 to 12 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, platy structure; friable; common roots; light brownish-gray (10YR 6/2) silt coats; very strongly acid; clear, wavy boundary.

Bx1—12 to 24 inches, dark-brown (7.5YR 4/4) silt loam; common, medium, distinct mottles of yellowish

brown (10YR 5/6); many grayish-brown (2.5Y 5/2) silty coats on platy surfaces; weak, coarse prismatic structure that breaks to moderate, medium, platy structure; slightly firm, brittle; strongly acid; clear, wavy boundary.

IIB2—24 to 32 inches, dark yellowish-brown (10YR 4/4) silty clay loam; common, medium, distinct mottles of gray (5Y 5/1); weak, medium and coarse, prismatic structure that breaks to weak, medium, subangular blocky structure; firm; thin discontinuous clay films of gray (5Y 6/1), primarily on vertical faces; very strongly acid; abrupt, smooth boundary.

IIB3—32 to 40 inches, mottled dark yellowish-brown (10YR 4/4), gray (5Y 5/1), and dark-gray (5Y 4/1) heavy silty clay loam to silty clay; massive (structureless); abundant dark-gray fragments of weathered shale; very strongly acid; clear, wavy boundary.

IIR—40 to 50 inches, dark-gray shale; very strongly acid.

Depth to the Bx1 horizon (fragipan) ranges from 12 to 20 inches. This horizon is 10 to 20 inches thick. Depth to bedrock ranges from 20 to 48 inches. The shale bedrock is shattered and partly weathered in the top 12 inches or more.

Wadsworth silt loam, moderately shallow variant, 2 to 6 percent slopes (WbB).—This soil occurs in the northeastern part of the county. It occupies long areas south of the Tannenhauf Golf Course and north of Marlington High School. The fragipan in this soil is weak in most places. Depth to bedrock ranges from 20 to 48 inches.

Included with this soil in mapping were small areas of soils that do not contain a fragipan and a few areas where slopes are less than 2 percent. Also included in mapping were small areas of the moderately well drained Rittman soils.

Excessive wetness is the major limitation to use of this Wadsworth soil for farming. For many nonfarm uses, this soil is limited by wetness and shallowness to shale. (Capability unit IIIw–2; woodland suitability group 1w1)

Wallkill Series, Clayey Subsoil Variant

The Wallkill, clayey subsoil variant, soils are dark colored and very poorly drained. These soils occur in the north-central part of the county. They formed in recent alluvium or lacustrine sediments over organic material. The clayey subsoil variant from the Wallkill series has a finer textured subsoil than normal Wallkill soils. These soils occupy spoon-shaped areas in depressions along drainageways and pockets on uplands.

A profile of the clayey subsoil variant from the Wallkill series has a very dark brown silt loam surface layer about 10 inches thick. The subsoil, about 15 inches thick, is grayish-brown silty clay in the uppermost 10 inches and is grayish-brown silty clay loam below. Below the subsoil is a layer of very dark brown muck 25 inches thick.

The Wallkill soils have a deep root zone and high available moisture capacity. Permeability is slow in the subsoil and is variable in the layer of muck. These soils have a high water table much of the year and, unless adequately drained, they are slow to dry out in spring. Flooding is a hazard.

These soils are not extensive in this county. Some areas have been drained and are used for corn, wheat, and hay. The undrained areas are commonly pastured.

Typical profile of Wallkill silt loam, clayey subsoil variant, in a meadow in Marlboro Township, section 28, T. 20 N., R. 7 W.:

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

B2tg—10 to 20 inches, grayish-brown (2.5Y 5/2) silty clay; common, medium, distinct mottles of light olive brown (2.5Y 5/6); weak, coarse, prismatic structure in place that breaks to moderate, medium and coarse, subangular blocky structure; very plastic when wet; common roots; thick, continuous, gray (N 5/0) clay films on vertical and horizontal ped faces; neutral; gradual, smooth bondary.

B3—20 to 25 inches, grayish-brown (10YR 5/2) silty clay loam; common, fine, faint mottles of brown (10YR 5/3), mainly around old root channels; massive (structureless); plastic when wet; common roots; 15 percent of mass is black (N 2/0) organic stains; neutral; abrupt, smooth boundary.

IIIb—25 to 50 inches, very dark brown (10YR 2/2) muck; weak, thick, platy structure; slightly fibrous; plant remains are visible; medium acid.

The B horizon includes silt loam in some places, and it ranges from grayish brown (10YR 5/2 and 2.5Y 5/2) to dark grayish brown (10YR 4/2) in color. Depth to the layer of muck is 20 to 40 inches. Reaction ranges from medium acid to neutral in the B horizon.

The Wallkill soils are most commonly adjacent to the very poorly drained Carlisle soils. In the Wallkill soils mineral material is over organic material, whereas in the Carlisle soils, organic material is over mineral soil. Other adjacent soils are alluvial very poorly drained Sloan soil over mineral material. The Wallkill soils are also next to the very poorly drained Luray and Sloan soils but, unlike those soils, Wallkill soils contain a layer of muck.

Wallkill silt loam, clayey subsoil variant (Wc).—This soil occupies pockets in drainageways and areas on uplands. In some places the layer of muck that is below the subsoil is, at a depth of more than 4 feet, underlain by mineral soil material.

Included with this soil in mapping were areas of soils, too small to map separately, that have a silty clay loam surface layer. Also included in mapping were small areas of soils that have only 12 inches of mineral soil material over the muck. Other inclusions were small areas of the poorly drained Canadice soils and small areas of the very poorly drained Montgomery soils.

Excessive wetness and the hazard of flooding are the major limitations to the use of this soil for farming. Wetness and unstable soil material are limitations for nonfarm uses. (Capability unit IIIw–3; woodland suitability group 2w1)

Wayland Series

The Wayland series consists of poorly drained, level and nearly level soils along the larger streams and rivers throughout the county. These soils formed in recent alluvium that washed from soils on uplands.

In a typical profile the surface layer is dark grayish-brown silt loam about 2 inches thick. The subsoil, about 19 inches thick, is gray and grayish-brown silt loam that is distinctly mottled with gray, yellowish red, and strong brown in the lower 11 inches. The underlying material is light brownish-gray silt loam

mottled with yellowish brown, gray, and light olive brown.

The Wayland soils have a deep root zone when the water table is low. The available moisture capacity is high. The water table is at or near the surface for long periods.

These soils are moderately extensive in this county. Most of the acreage is woodland or is used for pasture.

Typical profile of Wayland silt loam in a pasture in Paris Township, section 31, T. 17 N., R. 6 W.:

A1—0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, crumb structure; friable; abundant roots; slightly acid; clear, smooth boundary.

B1g—2 to 10 inches, gray (5Y 5/1) silt loam; grayish brown (2.5Y 5/2), yellowish red (5YR 4/6), and strong brown (7.5YR 5/6) rinds in root channels; weak, coarse, subangular blocky structure; friable; common roots; slightly acid; worm casts; diffuse, wavy boundary.

B21g—10 to 14 inches, grayish-brown (2.5Y 5/2) silt loam; many, fine, distinct mottles of gray (5Y 5/1), yellowish red (5YR 4/6), and strong brown (7.5YR 5/6); weak, very coarse, subangular blocky structure; friable; common roots; few, fine, distinct stains of very dark brown (10YR 2/2) ferromanganiferous stains on ped surfaces; few worm casts; slightly acid; diffuse, wavy boundary.

B22g—14 to 21 inches, grayish-brown (2.5Y 5/2) silt loam; many, fine and medium, distinct mottles of strong brown (7.5YR 5/6), yellowish red (5YR 4/6), and gray (5Y 5/1); weak, very coarse subangular blocky structure; friable; common roots; few, fine, black (N 2/0) stains on ped surfaces; few worm casts; slightly acid; diffuse, wavy boundary.

Cg—21 to 50 inches, light brownish-gray (2.5Y 6/2) silt loam; many, medium, distinct mottles of yellowish brown (10YR 5/6), gray (5Y 6/1), and light olive brown (2.5Y 5/6); massive (structureless); friable; few roots; few, fine, black (N 2/0) concretions; slightly acid.

The A horizon contains a layer of muck 2 to 5 inches thick in some places. In some places the A horizon is very dark gray and is as much as 10 inches thick. In some places the C horizon contains strata of sandy loam and silty clay loam and lenses and pockets of gravelly loamy sand. Reaction ranges from medium acid to mildly alkaline.

The Wayland soils are the poorly drained members of a drainage sequence that includes the well drained Chagrin soils, the moderately well drained Lobdell soils, the somewhat poorly drained Shoals soils, and the very poorly drained Sloan soils. The Wayland soils are generally adjacent to the Sloan and Shoals soils in some places. The Wayland soils are less clayey and have less profile development than the Sebring soils.

Wayland silt loam (0 to 2 percent slopes) (Wd).—This soil occupies old abandoned stream channels and other slightly depressed areas along streams.

Included with this soil in mapping were a few areas of soils that contain thin, mucky organic layers; these soils have a darker colored surface layer than is typical for Wayland soils. Also included in mapping, on the outer edge of Wayland soils, were small areas of Shoals soils. Other inclusions, near the center of depressions, were areas of Sloan soils.

The hazard of flooding is the major limitation to the use of this soil for farming. Wetness and flooding are limitations to nonfarm uses. (Capability unit IIIw-3; woodland suitability group 2w1)

Weikert Series

The Weikert series consists of well-drained, sloping to very steep soils that occur in the unglaciated southern part of the county. These soils formed in thin beds of residuum from siltstone, sandstone, and shale.

In a typical profile the plow layer is yellowish-brown channery silt loam about 7 inches thick. The subsoil, about 7 inches thick, is light yellowish-brown very channery silt loam. The underlying material also is light yellowish-brown very channery silt loam. Light yellowish-brown and light olive-brown, fractured siltstone bedrock is at a depth of 18 inches.

The Weikert soils have a shallow root zone. Available moisture capacity is very low. These soils are low in organic-matter content and are strongly acid.

These soils are moderately extensive in this county, and generally they are not suited to cultivated crops. Most of the acreage remains wooded or is used for pasture.

Typical profile of Weikert channery silt loam, 18 to 25 percent slopes, moderately eroded, in a pastured field in Sandy Township, section 27, T. 17 N., R. 7 W.:

Ap—0 to 7 inches, yellowish-brown (10YR 5/4) channery silt loam; moderate, fine and medium, crumb structure; friable; abundant roots; fragments of siltstone 15 percent, by volume; very strongly acid; abrupt, smooth boundary.

B2—7 to 14 inches, light yellowish-brown (10YR 6/4) very channery silt loam; weak, fine and very fine, subangular blocky structure; friable; common roots; very few, thin, patchy clay films on ped surfaces and on skeletal material; 70 percent skeletal material of siltstone; very strongly acid; clear, smooth boundary.

C—14 to 18 inches, light yellowish-brown (10YR 6/4) very channery silt loam; massive (structureless); friable; few roots; 90 percent skeletal material; soil material between stones; thin, patchy clay films on flat stones; strongly acid; clear, smooth boundary.

R—18 to 24 inches, light yellowish-brown (10YR 6/4) and light olive-brown (2.5Y 5/4) fractured siltstone bedrock; some weathered material on surfaces in upper part; strongly acid.

In wooded areas the A horizon ranges from very dark grayish brown (10YR 3/2) to dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2). The B horizon is from 50 to 80 percent skeletal material. Reaction ranges from very strongly acid to medium acid in the B horizon. Depth to bedrock is 12 to 20 inches. The bedrock contains variable amounts of siltstone and shale.

The Weikert soils are adjacent to or near the well drained Muskingum and Gilpin soils and the moderately well drained Keene soils. They contain more coarse fragments in their subsoil than the Gilpin or Muskingum soils, and they are shallower to bedrock. The Weikert soils have a less clayey subsoil than the Keene soils, and they contain more stone fragments throughout the profile.

Weikert channery silt loam, 6 to 12 percent slopes (WeC).—This soil occupies narrow, rounded ridgetops near areas of the Gilpin and Keene soils. It is less droughty than any other Weikert soil in the county.

Included with this soil in mapping, in small saddles on ridges, were small areas of the well-drained Gilpin soils. Also included in mapping, in areas where clay shale crops out, were narrow, horizontal strips of the moderately well drained Keene soils.

Shallowness to bedrock and a very severe hazard of erosion are the major limitations to the use of this

soil for farming. Shallowness to bedrock is the main limitation to nonfarm uses. (Capability unit VIs–1; woodland suitability group 4d1)

Weikert channery silt loam, 12 to 18 percent slopes (WeD).—This soil occurs on breaks between slopes and on upper slopes near the Muskingum, Gilpin, and Keene soils.

Included with this soil in mapping, in small concave draws, were small areas of Muskingum and Gilpin soils. Also included in mapping, along outcrops of acid clay shale, were nearly horizontal strips of Keene soils.

Shallowness to bedrock and the hazard of erosion limit the use of this soil for farming and for nonfarm purposes. (Capability unit VIs–1; woodland suitability group 4d1 on north- and east-facing slopes and 5d1 on south- and west-facing slopes)

Weikert channery silt loam, 18 to 25 percent slopes, moderately eroded (WeE2).—This soil occupies areas on the upper part of hillsides near the Dekalb, Muskingum, Gilpin, and Latham soils. It has the profile described as typical for the series.

Included with this soil in mapping, in areas of sandstone outcrops, were areas of the Dekalb soils. Also included in the mapping, in small concave ravines, were areas of the Muskingum and Gilpin soils. Other inclusions, in areas where acid clay shale outcrops, were horizontal strips of Latham soils.

The main limitations to the use of this soil are shallowness to bedrock, droughtiness, and the hazard of erosion. Because of the slope the use of heavy machinery is dangerous. (Capability unit VIIs–1; woodland suitability group 4d1 on north- and east- facing slopes and 5d1 on south- and west- facing slopes)

Weikert channery silt loam, 25 to 50 percent slopes, moderately eroded (WeF2).—This soil occurs on hillsides. Its surface layer is only 2 inches thick. The profile of this soil contains more skeletal material and is shallower to bedrock than that described as typical for the series.

This soil is commonly near, or adjacent to, the well-drained Ramsey, Muskingum, Gilpin, and Dekalb soils, and areas of those soils were included in mapping. These inclusions make up about 20 percent of each area mapped.

The use of this soil for farming and for nonfarm purposes is limited by steepness and, in cleared areas, by a hazard of erosion. (Capability unit VIIs–1; woodland suitability group 4d2 on north- and east- facing slopes and 5d1 on south- and west- facing slopes)

Weinbach Series

The Weinbach series consists of somewhat poorly drained, level to sloping soils on stream terraces. These soils formed in silt loam and light silty clay loam glacial outwash that is underlain by sandy and gravelly material.

In a typical profile the plow layer is dark grayish-brown silt loam about 8 inches thick. The subsoil is about 30 inches thick. To a depth of about 19 inches, it is pale-brown silt loam and light brownish-gray silty clay loam distinctly mottled with grayish brown and strong brown. Below this, and extending to a depth of about 30 inches, is a strong-brown, very firm sandy loam fragipan that is mottled with pinkish gray. The lower part of the subsoil is 8 inches of strong-brown gravelly sandy loam distinctly mottled with gray. The underlying material is dark-brown, gravelly coarse loamy sand. In the lower part of this profile coarse fragments make up about 40 percent of the soil mass.

The Weinbach soils have a moderately deep root zone. The available moisture capacity is medium. Permeability is moderately slow in the fragipan and is moderate to moderately rapid below. These soils have a high water table late in winter and early in spring.

These soils are only moderately extensive in this county, but many acres have been drained and are used for cultivated crops.

Typical profile of Weinbach silt loam, 0 to 2 percent slopes, in a meadow in Lake Township, section 28, T. 12 N., R. 8 W. (analytical data in table 10):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine and medium, crumb structure; friable; abundant roots; few stones as much as 4 inches on long axis; slightly acid; abrupt, smooth boundary.

B1g—8 to 13 inches, pale-brown (10YR 6/3) silt loam; common, medium, distinct mottles of grayish brown (2.5Y 5/2); weak, fine, subangular blocky structure; friable; abundant roots; few stones; very strongly acid; clear, smooth boundary.

B2tg—13 to 19 inches, light brownish-gray (10YR 6/2) silty clay loam; common, medium, distinct mottles of strong brown (7.5YR 5/6); moderate, fine and medium, subangular blocky structure; friable; common roots; few stones; very strongly acid; clear, wavy boundary.

IIBx—19 to 30 inches, strong-brown (7.5YR 5/8) sandy loam; common, medium, distinct mottles of pinkish gray (7.5YR 6/2); massive (structureless); weakly developed fragipan; very firm, brittle; few roots; continuous grayish-brown (2.5Y 5/2) clay flows on vertical surfaces; thin silt coatings between clay flows; dark ferromanganiferous stains; oxidized root channels; few large stones; strongly acid; clear, wavy boundary.

IIIB3—30 to 38 inches, strong-brown (7.5YR 5/8) gravelly sandy loam; few, medium, distinct mottles of gray (N 6/0); massive (structureless); slightly firm; no roots; grayish-brown clay flows terminate in this horizon as 2- or 3-inch, clay-enriched nodules; material appears to be weakly cemented; 40 percent coarse fragments; medium acid; gradual, wavy boundary.

IIIC—38 to 60 inches, dark-brown (7.5YR 4/4), gravelly coarse loamy sand; massive (structureless); compacted and very weakly cemented; no roots; some cobblestones as much as 6 inches in diameter; 40 percent, by volume, coarse fragments; neutral.

In the B2 horizon the matrix is light olive gray (5Y 6/2). light brownish gray (10YR 6/2), or gray (10YR 6/2), and the clay content ranges from 24 to 32 percent. Typically, depth to the top of the IIBx horizon (fragipan) is about 23 inches, but it ranges from 18 to 30 inches. The IIBx horizon is weakly developed in most places, but its development ranges from weak to moderate. Coarse fragments make up 1 to 10 percent of the upper part of the B horizon and from 30 to 60 percent of the lower part of the B horizon and the upper part of the C horizon. Reaction ranges from slightly acid to mildly alkaline in the IIIC horizon.

The Weinbach soils are the somewhat poorly drained members of a drainage sequence that includes the poorly drained Ginat soils and the well-drained Wheeling soils. Weinbach soils are adjacent to the Ginat and Bogart soils

in many places. Unlike the Fitchville soils the Weinbach soils contain a fragipan. The Weinbach soils are underlain by sandy and gravelly outwash material, whereas the Ravenna soils are underlain by loam glacial till.

Weinbach silt loam, 0 to 2 precent slopes (WhA).—This soil occupies areas that vary in size. The profile of this soil is that described as typical for the series.

Included with this soil in mapping were a few small areas of soils that have a dark-colored surface layer 8 to 16 inches thick. Also included in mapping were small bumps of the moderately well drained Bogart soils and spots, in depressions, of the poorly drained Ginat soils. Other inclusions were a few small areas of Weinbach soils that are underlain by loam glacial till at a depth of 30 to 40 inches.

Wetness is the major limitation to the use of this soil for farming. Moderately slow permeability and seasonal wetness are limitations for many nonfarm uses. (Capability unit IIw–2; woodland suitability group 2w2)

Weinbach silt loam, 2 to 6 percent slopes (WhB).—This soil occupies broad, undulating areas on outwash plains and smooth, uniform areas on the walls of shallow depressions and at the base of valley walls.

This soil is commonly next to the moderately well drained Bogart soils and the well drained Chili soils, and small areas of those soils were included in the mapping. Also included, at the base of slopes, were a few small areas of soils that have a dark-colored surface layer. Other inclusions were a few small areas of Weinbach soils that are underlain by loam glacial till at a depth of 30 to 40 inches.

Wetness is the main limitation to the use of this soil for farming. The hazard of erosion is also a concern, and practices of erosion control are needed, particularly on slopes of 4 to 6 percent. Moderately slow permeability and seasonal wetness are limitations to many nonfarm uses. (Capability unit IIw–2; woodland suitability group 2w2)

Weinbach-Urban land complex (Wk).—This complex occupies a large area southwest of the Mahoning River in the northern part of Alliance, areas in North Canton that are 10 to 30 acres in size, and smaller areas in the cities, towns, and villages throughout the county. This complex consists of the somewhat poorly drained Weinbach soils and disturbed land. Most areas are nearly level.

Seasonal wetness is the major limitation to the use of this complex for nonfarm purposes. Buildings constructed in areas of this complex are likely to have wet foundations and basements in winter and spring unless adequate drainage is provided. In wet periods, trafficability is generally poor during construction. (Capability unit not assigned; woodland suitability group 2w2)

Wellston Series

The Wellston series consists of well-drained, gently sloping and sloping soils on uplands in the unglaciated southern part of the county. These soils formed in stratified material underlain by sandstone, siltstone, and shale.

In a typical profile the plow layer is dark yellowish-brown silt loam about 7 inches thick. The subsoil, about 24 inches thick, is yellowish-brown silt loam in the upper part, strong-brown heavy silt loam in the middle part, and reddish-yellow heavy silt loam in the lower part. The underlying material is light yellowish-brown very channery silt loam that is about 80 percent coarse fragments of siltstone. Light olive-brown, bedded siltstone is at a depth of 38 inches. In some places the bedrock is fractured in the uppermost 12 inches.

The Wellston soils have a moderately deep or deep root zone and medium available moisture capacity. Permeability is moderate in the subsoil.

These soils are not extensive in this county. Most of the acreage is used for cultivated crops.

Typical profile of Wellston silt loam, 2 to 6 percent slopes, in an old meadow in Canton Township, section 20, T. 10 N., R. 8 W:

Ap—0 to 7 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, fine and medium, crumb structure; friable; common roots; no stones or fragments; medium acid; abrupt, smooth boundary.

B1t—7 to 12 inches, yellowish-brown (10YR 5/6) silt loam; weak, fine and medium, subangular blocky structure; friable; common roots; thin discontinuous clay films on horizonal and vertical ped faces; no coarse fragments; very strongly acid; clear, wavy boundary.

B21t—12 to 20 inches, strong-brown (7.5YR 5/6) heavy silt loam; moderate, fine and medium, subangular blocky structure; friable when moist, slightly sticky when wet; occasional roots; medium discontinuous clay films on ped faces; few fragments of siltstone; very strongly acid; clear, wavy boundary.

B22t—20 to 31 inches, reddish-yellow (7.5YR 6/8) heavy silt loam; moderate, fine and medium, subangular blocky structure; friable; occasional roots; medium discontinuous clay films on ped faces; 10 percent, by volume, light brownish-gray (2.5Y 6/2) fragments of siltstone; very strongly acid; clear, wavy boundary.

C—31 to 38 inches, light yellowish-brown (2.5Y 6/4) very channery silt loam; very weak, medium and coarse, subangular blocky structure; friable; 80 percent coarse fragments of siltstone; strongly acid; gradual, wavy boundary.

R—38 to 50 inches, light olive-brown (2.5Y 5/4), bedded siltstone bedrock.

In some places there is a mantle of silt that is 12 to 20 inches thick and that contains only a few, if any, coarse fragments. The Bt horizon ranges from 18 to 30 inches in thickness. The matrix of the B21t and B22t horizons is yellowish brown (10YR 5/5 to 5/8), strong brown (7.5YR 5/6), or reddish yellow (7.5YR 6/6 to 6/8). Reaction in the B horizon is very strongly acid or strongly acid.

The Wellston soils are the well drained members of a drainage sequence that includes the moderately well drained Tilsit soils. The Wellston soils are commonly adjacent to the Tilsit, Muskingum, and Gilpin soils. They have more clay and less stone fragments in the subsoil than the Muskingum or Gilpin soils. The Wellston soils formed in material deposited over bedrock by the wind, whereas, the Loudonville soils formed in thin deposits of glacial till underlain by bedrock.

Wellston silt loam, 2 to 6 percent slopes (WlB).—This soil occurs on ridgetops and on benches or saddles below the ridgetops. It has the profile described as typical for the series, but there are small areas that

are underlain by nearly impervious clay shale. A few stones are on the surface in some areas.

Included with this soil in mapping were small areas of the moderately well drained Tilsit soils. This soil is next to the moderately well drained Keene soils in some places, and small areas of those soils were inclued in mapping.

A moderate hazard of erosion limits the use of this soil for cultivated crops. Shallowness to bedrock is a limitation to nonfarm uses. (Capability unit IIe–1; woodland suitability group 2o1)

Wellston silt loam, 6 to 12 percent slopes (WlC).—This soil occupies areas just below the ridgetops and a few areas on narrow ridgetops. It also occurs at the base of slopes of hillsides.

Included with this soil in mapping were a few small areas of moderately eroded Wellston soils that have a lighter colored surface layer and a profile that is shallower to bedrock than the profile of this soil. Also included in mapping, in areas where clay shale outcrops, were small areas of the moderately well drained Keene soils.

A severe hazard of erosion is the major limitation to the use of this soil for farming. The slope and shallowness to bedrock are limitations for some nonfarm uses. (Capability unit IIIe–1; woodland suitability group 2o1)

Wheeling Series

The Wheeling series consists of well-drained, level to steep soils on stream terraces, outwash plains, and kames. These soils formed in silt loam glacial material of Wisconsin age that is underlain by gravelly and sandy outwash material.

In a typical profile the plow layer is dark grayish-brown silt loam about 8 inches thick. The subsoil, about 33 inches thick, is yellowish-brown silt loam in the uppermost 3 inches and is dark-brown heavy silt loam and silt loam below. Below the subsoil is about 9 inches of dark yellowish-brown very gravelly fine sandy loam that is underlain by dark-brown, very gravelly loamy coarse sand at a depth of about 50 inches.

The Wheeling soils have a moderately deep or deep root zone. The available moisture capacity is medium to high. Permeability is moderate in the subsoil and is rapid in the underlying material. These soils dry out fairly early in spring. They have very little, if any, gravel in the subsoil.

The Wheeling soils are extensive in this county. Most of the acreage is used for cultivated crops.

Typical profile of Wheeling silt loam, 2 to 6 percent slopes, in a cultivated field in Jackson Township, section 16, T. 11 N., R. 9 W. (analytical data in table 10):

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

B1—8 to 11 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, platy structure; friable; abundant roots; common wormcasts; medium acid; clear, wavy boundary.

B21t—11 to 21 inches, dark-brown (7.5YR 4/4) heavy silt loam; moderate, fine and medium, subangular blocky structure; friable; common roots; thin discontinuous clay films on peds; few, fine, dark, discontinuous ferromanganiferous stains; very strongly acid; gradual, wavy boundary.

B22t—21 to 32 inches, dark-brown (7.5YR 4/4) heavy silt loam; moderate, medium, subangular blocky structure; friable; common roots; thin, discontinuous clay films; few, fine, dark ferromanganiferous stains; very strongly acid; clear, wavy boundary.

B23t—32 to 41 inches, dark-brown (7.5YR 4/4) silt loam; weak, medium and coarse, subangular blocky structure; friable; common roots; thin patchy clay films on ped faces; yellowish-brown (10YR 5/4), patchy silt coatings; few, thin, flat, sedimentary stones as much as 2 inches in diameter; very strongly acid; abrupt, wavy boundary.

IIC1—41 to 50 inches, dark yellowish-brown (10YR 4/4) very gravelly fine sandy loam; massive (structureless); firm; few roots; dark stains on some stone surfaces; 70 percent coarse fragments, by volume; very strongly acid; abrupt, smooth boundary.

IIC2—50 to 70 inches, dark-brown (7.5YR 4/4) very gravelly loamy coarse sand; loose; few roots; strongly acid.

The A horizon is loam in some places. The clay content of the B2 horizon ranges from 18 to 30 percent. In the B21t, B22t, and B23t horizons, the matrix ranges from dark brown (7.5YR 4/4) to dark yellowish brown (10YR 4/4). Depth to the C horizon is 30 to 50 inches. In this county the sand content in the Wheeling silt loams is less than is typical for those soils elsewhere.

The Wheeling soils are the well-drained members of a drainage sequence that includes the poorly drained Ginat soils and the somewhat poorly drained Weinbach soils. The Wheeling soils are commonly next to the Weinbach soils, the well-drained Chili soils, and the moderately well drained Bogart soils. They are underlain by glacial outwash material at a depth of 50 inches or less.

Wheeling loam, 0 to 2 percent slopes (WmA).—This soil is on terraces along streams and rivers. It occupies areas that are irregular in size and shape. This soil is more sandy throughout than the Wheeling silt loams, and it is less susceptible to surface crusting.

This soil commonly is adjacent to areas of the Chili and Plainfield soils, and small areas of those soils were included in the mapping. Also included in the mapping were areas of soils that have a surface layer of sandy loam or silt loam.

This soil has few or no limitations to use for farming or for nonfarm purposes. (Capability unit I–1; woodland suitability group 2o1)

Wheeling loam, 2 to 6 percent slopes (WmB).—This soil occupies terraces along the Tuscarawas River and other large streams in the county. Its profile is coarser textured than that of Wheeling silt loam, 2 to 6 percent slopes, which has the profile described as typical for the series. This soil is much less susceptible to surface crusting than Wheeling silt loam.

This soil is adjacent to areas of Arkport, Chili, and Plainfield soils, and small areas of those soils were included in mapping. Also included in mapping, in drainageways, were small areas of the moderately well drained Bogart soils. Other inclusions were areas of soils that have a surface layer of sandy loam or silt loam.

A moderate hazard of erosion is the major limitation to the use of this soil for cultivated crops. Limitations to nonfarm uses are few or none. (Capability unit IIe–1; woodland suitability group 2o1)

Wheeling loam, 6 to 12 percent slopes, moderately eroded (WmC2).—This soil is near the Arkport and Chili soils. It occurs in convex areas along the Tuscarawas River and in higher areas of kames, primarily in Lawrence Township. The slopes are generally short and irregular. This soil is more sandy throughout than the Wheeling silt loams, and it is much less susceptible to surface crusting.

Included with this soil in mapping were a few small areas of Chili soils.

A severe hazard of erosion is the main limitation to the use of this soil for cultivated crops. The slope is the dominant limitation for many nonfarm uses. (Capability unit IIIe–5; woodland suitability group 2o1)

Wheeling silt loam, 0 to 2 percent slopes (WrA).—This soil occupies areas that vary in size. Soil material has accumulated in some slightly depressed areas, and in these areas the surface layer is thicker than that in the profile described as typical for the series. This soil is susceptible to surface crusting.

Included with this soil in mapping, in drainageways and depressions, were small areas of the moderately well drained Bogart soils.

Limitations to use of this soil for farming and for most nonfarm purposes are few or none. (Capability unit I–1; woodland suitability group 2o1)

Wheeling silt loam, 2 to 6 percent slopes (WrB).—This soil occurs on terraces and in broad areas on outwash plains. Some areas are 40 to 50 acres in size. The profile of this soil is that described as typical for the series.

Included with this soil in mapping were a few areas of the Chili soils. On this soil, runoff is rapid, and the hazard of erosion is moderate in cultivated areas. The slope is a slight limitation to some nonfarm uses. (Capability unit IIe–1; woodland suitability group 2o1)

Wheeling silt loam, 6 to 12 percent slopes (WrC).—This soil occupies areas along the base of slopes and rolling areas on kames.

This soil commonly is next to areas of Chili soils, and areas of those soils were included in mapping. Also included in mapping were areas of soils that contain loam glacial till at a depth of 40 inches or more and that are less permeable than is typical of Wheeling silt loam. Other inclusions were small areas of the Wooster soils.

Because runoff is very rapid from this soil, the hazard of erosion is severe in cultivated areas. The slope and the hazard of erosion are limitations for some nonfarm uses. (Capability unit IIIe–5; woodland suitability group 2o1)

Wheeling silt loam, 6 to 12 percent slopes, moderately eroded (WrC2).—This soil occupies convex slopes of knolls. Its surface layer is lighter colored and thinner than that in the profile described as typical for the series, and the gravelly and sandy underlying material is about 30 inches from the surface. This soil is more droughty than the uneroded Wheeling soils.

Included with this soil in mapping were areas of soils that contain loam glacial till at a depth of 40 inches or more and that are less permeable than is typical of Wheeling silt loam. Also included in mapping were some areas of the Chili soils.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope is the main limitation for many nonfarm uses. (Capability unit IIIe–5; woodland suitability group 2o1)

Wheeling soils, 12 to 18 percent slopes, moderately eroded (WsD2).—These soils occur on short slopes of rounded knolls and at the head of drainageways. The surface layer is loam, silt loam, or sandy loam. It is lighter colored than that in the profile described as typical for the series, and the gravelly and sandy underlying material is 30 inches from the surface.

Included with this soil in mapping were small areas of the Chili soils.

The use of this soil for cultivated crops is limited mainly by a very severe hazard of erosion. The slope severely limits use for most nonfarm purposes. (Capability unit IVe–1; woodland suitability group 2o1)

Willette Series

The Willette series consists of very poorly drained, dark-colored, level and nearly level, organic soils that occur in the glaciated part of the county. These soils formed in moderately thick organic material over mineral material. The native vegetation consisted of tamarack, willows, reeds, sedges, and other water tolerant plants.

A typical Willette soil is very dark brown and mucky to a depth of 26 inches. Below 26 inches is gray, calcareous heavy clay loam mottled with yellowish brown.

The Willette soils have a moderately deep root zone in most places. Available moisture capacity is high. Permeability is variable in the muck and is moderately slow in the underlying mineral material. The water table is high most of the year.

These soils are not extensive in this county. Drained areas are used for vegetables and other special crops. Undrained areas are wooded or are pastured.

Typical profile of Willette muck on slopes of 0 to 2 percent, in a cultivated field in Marlboro Township, section 28, T. 20 N., R. 7 W.:

1—0 to 10 inches, very dark brown (10YR 2/2) muck; moderate, fine and medium, granular structure; very friable; abundant roots; medium acid; clear, wavy boundary.

2—10 to 26 inches, very dark brown (10YR 2/2) muck; massive (structureless) that breaks to weak, thick, platy structure; decomposed peat; some woody material; very friable; common roots; medium acid; clear, smooth boundary.

IIC—26 to 50 inches, gray (N 5/0) heavy clay loam; few, fine, distinct mottles of yellowish brown (10YR 5/4); massive (structureless); firm; no roots; calcareous.

The uppermost organic horizon is black (10YR 2/1) in some places. Depth to the IIC horizon ranges from 20 to 40 inches. The IIC horizon is silty clay loam, silty clay, or clay in some places. Reaction ranges from strongly acid to slightly acid in the lower part of the organic horizon.

The Willette soils are adjacent to the very poorly drained Carlisle and Linwood soils. Willette soils are similar to Linwood soils but are underlain by finer textured mineral material. The Willette soils have thinner layers of organic material than the Carlisle soils.

Willette muck (0 to 2 percent slopes) (Wt).—This soil is in nearly level and depressional areas that vary in size and shape. Its muck surface layer is soft, spongy, and extremely dark colored. Undrained areas are generally swampy.

Included with this soil in mapping were small areas that have less than 18 inches of muck over mineral material. This soil is commonly next to areas of the Carlisle soils, and small areas of those soils were included in mapping.

Excessive wetness is a main limitation to the use of this soil for farming. Soil blowing and fire are hazards during dry periods, particularly in drained areas. The muck is likely to subside and oxidize in drained areas. This soil is unstable if used as sites for buildings and for other nonfarm purposes. (Capability unit IIIw–5; woodland suitability group not assigned)

Wooster Series

The Wooster series consists of well-drained, gently sloping to very steep soils on uplands in the glaciated part of the county. These soils formed in loam glacial till of Wisconsin age.

In a typical profile the surface layer is silt loam about 10 inches thick that is dark grayish brown in the uppermost 7 inches and is yellowish brown below. The subsoil is about 40 inches thick. To a depth of about 21 inches, it is yellowish-brown, friable heavy loam. Below this, and extending to a depth of 40 inches, is a dark yellowish-brown, very firm and brittle loam fragipan. The lower part of the subsoil is 10 inches of dark yellowish-brown, slightly firm light loam.

The Wooster soils have a deep root zone in most places. The available moisture capacity is high. Permeability is moderate in the fragipan layers. These soils dry out fairly early in spring.

The Wooster soils are extensive in this county. Most of the acreage is used for cultivated crops.

Typical profile of Wooster silt loam, 6 to 12 percent slopes, in a meadow in Perry Township, section 9, T. 10 N., R. 9 W.:

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

A2—7 to 10 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, subangular blocky structure; friable; common roots; few pebbles; very strongly acid; clear, wavy boundary.

B2t—10 to 21 inches, yellowish-brown (10YR 5/4) heavy loam; moderate, medium, subangular blocky structure; friable; common roots; thin discontinuous clay films on ped faces; common dark-brown (7.5YR 3/2) ferromanganiferous stains on some ped faces and pebbles; very strongly acid; clear, wavy boundary.

Bx1—21 to 30 inches, dark yellowish-brown (10YR 4/4) loam; moderate, very coarse, prismatic structure that breaks to weak, medium and coarse, subangular blocky structure; very firm, brittle; few roots; nearly vertical polygonal seams of yellowish brown (10YR 5/4) in upper part of horizon and of very pale brown (10YR 7/4) in lower part; thin patchy clay films on ped faces; 10 percent pebbles; abundant dark-brown (7.5Y 3/2) stains on ped faces; strongly acid; gradual, wavy boundary.

Bx2—30 to 40 inches, dark yellowish-brown (10YR 4/4) loam; moderate, very coarse, prismatic structure that breaks to weak, thick, platy structure; very firm, brittle; few roots; very dark brown (10YR 2/2) stains on platy faces; coats of very pale brown (10YR 7/4) and gray (10YR 5/1) on prism faces; thin clay flows between prisms; thin patchy clay films on ped faces; 20 percent pebbles; strongly acid; gradual, diffuse boundary.

B3—40 to 50 inches, dark yellowish-brown (10YR 4/4) light loam; weak, medium, angular blocky structure; slightly firm; no roots; thin clay films in pores and voids; few concretions of ironstone; 20 percent pebbles; strongly acid.

The clay content of the B horizon ranges from 18 to 27 percent. In the B2t horizon the matrix ranges from strong brown (7.5YR 5/6) to yellowish brown (10YR 5/4 to 5/6). The matrix of the Bx horizons (fragipan) includes yellowish brown (10YR 5/6) in some places. Depth to the Bxl horizon (fragipan) ranges from 20 to 36 inches. The content of gravel in the profile ranges from 1 to 30 percent. Typically, calcareous material is at a depth of more than 60 inches, but it ranges from 60 to 100 inches.

The Wooster soils are the well drained members of a drainage sequence that includes the moderately well drained Canfield soils, the somewhat poorly drained Ravenna soils, and the poorly drained Sebring, till substratum, soils. The Wooster soils are adjacent to the Canfield soils in many places, and they commonly are next to the Loudonville soils. The Wooster soils are deeper to bedrock than the Loudonville soils; they contain a fragipan, which is lacking in the Loudonville soils.

Wooster silt loam, 2 to 6 percent slopes (WuB).—This soil occupies convex areas on uplands. In most areas the slopes are short. This soil receives little or no runoff from surrounding soils. It has a thicker surface layer than that in the profile described as typical for the series. In some areas this soil does not contain a fragipan, and in these areas the soil is more permeable than is typical of Wooster soils. Sandstone bedrock or sandy and gravelly material commonly is at a depth of 4 to 6 feet.

Included with this soil in mapping, on concave slopes of 2 to 4 percent, were small areas of the moderately well drained Canfield soils.

A moderate hazard of erosion is the main limitation to the use of this soil for cultivated crops. Moderate permeability and the slope are limitations for some nonfarm uses. (Capability unit IIe–1; woodland suitability group 1o1)

Wooster silt loam, 6 to 12 percent slopes (WuC).—This soil occupies areas that vary in size and shape. It has the profile described as typical for the series, but in a few areas the profile does not contain a fragipan like that described as typical. In these areas water moves through the soil at a more rapid rate. Depth to sandstone bedrock is 5 to 8 feet.

Included with this soil in mapping, on slopes of 10 to 12 percent, were a few, small, moderately eroded areas that have more pebbles and stone fragments on the surface than the surrounding Wooster soils. Also included in mapping, in small drainageways, were areas of the somewhat poorly drained Ravenna soils.

A severe hazard of erosion is the major limitation to the use of this soil for cultivated crops. The slope and restricted permeability limit use for many nonfarm purposes. (Capability unit IIIe–1; woodland suitability group 1o1)

Wooster silt loam, 6 to 12 percent slopes, moderately eroded (WuC2).—This soil occurs mainly in long, convex areas, but it is also on short, irregular slopes along drainageways. Its surface layer is 3 to 5 inches thick and is lighter colored than that in the profile described as typical for the series. As a result of erosion, this soil is more droughty than Wooster silt loam, 6 to 12 percent slopes, which has the profile described as typical for the series. Numerous pebbles and stones are on the surface of this soil. In a few places the profile does not contain a fragipan.

This soil commonly is next to areas of the well-drained Chili soils and, in areas adjacent to streams, small areas of those soils were included in mapping. Also included in mapping were areas of somewhat poorly drained Ravenna soils.

Use of this soil for cultivated crops is limited mainly by a severe hazard of erosion. The slope and restricted permeability are limitations for many nonfarm uses. (Capability unit IIIe–1; woodland suitability group 1o1)

Wooster silt loam, 12 to 18 percent slopes, moderately eroded (WuD2).—This soil occurs in long, narrow strips along drainageways and in areas at the head of drainageways. Its surface layer is thinner and lighter colored than that in the profile described as typical for the series. This soil has more stones and pebbles on the surface than the uneroded Wooster soils. In some areas its profile does not contain a fragipan. Depth to sandstone bedrock or to sand and gravel commonly is 5 to 10 feet.

Included with this soil in mapping were small areas of Chili soils.

A very severe hazard of erosion is the major limitation to the use of this soil for farming. The slope, a hazard of erosion, and restricted permeability are limitations to most nonfarm uses. (Capability IVe–1; woodland suitability group 1o1)

Wooster silt loam, 18 to 25 percent slopes, moderately eroded (WuE2).—This soil occupies long, narrow strips, mainly along streams. Erosion has removed most of the original surface layer from this soil and, in most areas, has cut shallow gullies and a few deep gullies. Many fragments of sandstone and shale are on the surface of this soil.

This soil commonly is next to areas of the well-drained Chili soils, and small areas of those soils were included in mapping. Also included in mapping were areas of a Wooster soil that has a loam surface layer.

Use of this Wooster soil for most purposes is limited mainly by steep slopes and a severe hazard of erosion. (Capability unit VIe–1; woodland suitability group 1r1)

Wooster silt loam, 25 to 50 percent slopes, moderately eroded (WuF2).—This soil occupies a small acreage in the county. It occupies narrow strips, mainly along streams. Its surface layer is thinner and lighter colored than that in the profile described as typical for the series. Also, there are more pebbles and fragments of stones on the surface.

Included with this soil in mapping were small severely eroded areas in which shallow gullies and a few deep gullies have formed.

A severe hazard of erosion and the steep slope are the main limitations to the use of this soil for farming and for nonfarm purposes. (Capability unit VIe–1; woodland suitability group 1r1)

Wooster-Urban land complex, steep (WvD).—This mapping unit is in the glaciated part of the county, and it consists of areas of Wooster soils and disturbed land that are used mainly for community development. About 50 to 75 percent of the area has been severely altered by cut and fill operations. The hazard of erosion is very severe during and following construction; open ditches are susceptible to washouts and severe gullying. The use of this complex for most nonfarm purposes is severely limited by the slope. (Capability unit not assigned; woodland suitability group 1o1)

Formation and Classification of Soils

In this section the factors that affected the formation of the soils in Stark County are discussed. Then the current system of soil classification is explained, and the soil series are placed in some classes of that system and in great soil groups of an older system. The soil series in the county, including a profile typical for each series, are described in the section "Descriptions of the Soils."

Factors of Soil Formation

Soils are natural bodies that are the products of the factors of soil formation. The five major factors of soil formation are parent material, relief, climate, time, and living organisms, primarily vegetation.

Climate and living organisms, particularly vegetation, are the most active factors of soil formation in Stark County. Their effect on parent material is influenced by topography and by the length of time the parent material has been in place. The relative importance of each factor differs from place to place. The interaction of all of the factors determines the kind of soil that develops in any given place.

Parent material

The soils of Stark County formed in residuum, in alluvium, and in material transported by glacial action. The most extensive soils in the county are those that formed in glacial till, or drift, outwash material transported by glacial melt water, and sediments deposited on the bottom of old glacial lakes. Most of the glacial till, or drift, in the county is of Wisconsin age, but glacial drift of Illinoian age covers a narrow belt in the east-central part of the county. The Chili, Conotton, and other sandy and gravelly soils that formed in glacial outwash occupy a hummocky, V-shaped area that extends northward from the city of Canton (fig. 13). The Carlisle, Linwood, Willette, and other poorly drained, organic soils occur as pockets within this area. The silty Fitchville and Sebring soils in this area developed in material deposited by slack water in old

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glacial or postglacial lakes. Soils that formed in sediments deposited in ponded water also occur in areas near the boundary between the glaciated part of the county and the unglaciated part. These areas extend from Canton southwest to Brewster.

The parent material of the soils in the northeastern quarter of Lexington Township is clayey glacial till in which the clay content ranges from 50 to 60 percent. Formed in it are the Geeburg and Remsen soils. The content of clay in the till ranges from about 27 to 35 percent in the Rittman and Wadsworth soils, but that of the Ravenna and Wooster soils averages less than 27 percent. The soils formed in clay loam or loam till have a dense, compact subsoil or contain a fragipan. The Canfield and Ravenna soils in the east-central and western parts of the county have a fragipan. Throughout the county, the wave action of the glacial lakes or of glacial melt water has reworked and modified the till to some extent. In some places the Wooster and Canfield soils are underlain by stratified soil material.

The Chili and Wheeling soils formed on glacial outwash terraces that contain sand and gravel. These broad, benchlike terraces occur along the Tuscarawas River and other streams that flow southward.

In the unglaciated southeastern part of the county, the soils formed in residuum weathered from acid, gray sandstone, siltstone, or shale and, in small areas, from limestone. The Muskingum, Gilpin, and Weikert soils formed in silty material weathered from siltstone and shale. The Dekalb and Ramsey soils are sandy because they formed from weathered sandstone. The Latham and Keene soils developed in residuum from clay shale. The Tilsit and Wellston soils also developed in residuum from siltstone and shale bedrock. These soils have a mantle of silty material deposited partly by the wind. The Brooke soils occupy a few benches near the hilltops in areas underlain by limestone.

The Lobdell, Chagrin, Shoals, Wayland, and Sloan soils occupy bottom lands along streams throughout the county. These soils formed in recent alluvium washed from soils in higher areas.

Figure 13.—An area northwest of Canton. The soils are a Chili gravelly loam and a Conotton gravelly loam.

Relief

Relief has affected soil formation in this county, mainly through its effect on the movement of water and the degree of erosion. To a lesser extent, relief, by affecting soil temperature, influences the plant and animal life on and in the soil.

In the hilly southeastern part of the county runoff is rapid on the steep slopes, and in these areas, soil material is washed away almost as fast as it is formed. In this county the Muskingum, Gilpin, Dekalb, Ramsey, and Weikert soils are strongly affected by relief. Near the glacial border, east of Canton, the smoothing effect of the glacier on the landscape can be observed to the north. To the south, the strongly dissected, unglaciated hills can be observed.

Relief is favorable for the formation of soils in the rolling, glaciated part of the Allegheny Plateau. In the north-central part of the county hummocky areas consist of sandy and gravelly material deposited by glaciers. Water that runs off or moves through these sandy and gravelly, sloping soils tends to collect in the low areas where the soils are wet for long periods. Soils of this kind are in the Carlisle, Willette, and Fitchville series.

Climate

Climate has a dynamic effect on the formation and future development of soils. It influences the rate of plant growth, removal of plant nutrients by leaching, removal of soil material by water or wind, and the temperature of the soils. Stark County has a humid, temperate, continental climate. Climatic data for the county are given in the section "General Nature of the County."

The climate is fairly uniform throughout the county. There are, however, microclimate differences that have influenced the soils. For example, soils in the Wooster, Canfield, and Ravenna series are similar except for differences in natural drainage that result in differences in soil climate. These differences cause differences in the color and in the degree of mottling of these soils. The well drained Wooster soils contain few or no gray mottles, but the moderately well drained Canfield soils are mottled with gray within about 24 inches of the surface. The somewhat poorly drained Ravenna soils are dominantly gray. The gray colors and mottles of the Trumbull, Sebring, and other poorly drained soils reflect a wet environment and fluctuating water table. Because organic matter decomposes slowly in wet soils, the very poorly drained Luray and Montgomery soils have a thick, dark-colored surface layer.

Locally, climatic factors are interrelated with relief and the kinds of vegetation and, on a regional basis, affect the development of the soils.

Plant and animal life

The native vegetation in Stark County consisted mainly of hardwoods. Red oak, white oak, sugar maple, and American beech commonly grew on the glacial till plains. Pin oak, shagbark hickory, red maple, American elm, and white ash were dominant on the somewhat poorly drained to very poorly drained soils. The muck soils were covered by willow, tamarack, tag alder, and water-tolerant reeds and sedges. Tulippoplar, basswood, dogwood, wild cherry, white oak, and hickory were common in the southern part of the county, which is on the unglaciated Allegheny Plateau.

Most hardwoods use large amounts of calcium and other bases available in the soils. Soils that are normally high in bases remain so under a cover of hardwoods because a large part of the bases is returned to the soil each year when the leaves fall. When the leaves decompose, the bases reenter the soil and are again used by plants. Thus, a forest tends to conserve plant nutrients. Most of the soils in Stark County, however, have always been low in plant nutrients. Because of the humid climate, a large part of the bases has been leached away.

Man has changed the direction and rate of development of the soils by clearing the original forests and using the land for different purposes. Important changes were brought about by cultivating the soils; by introducing new kinds of plants; by accelerating loss of soil material through erosion, which resulted from improper practices; by draining large areas causing a change in the effective microclimate; and by applying lime and fertilizer, which has improved the percentage of the base saturation of the soils in some areas. Man's activity continues to affect the development and use of the soils in the county and will do so in the future.

Time

Time is required for the formation of soils. The length of time the parent material has been in place and exposed to the active forces of climate and plant and animal life is important in the development of soils. The soils in the glaciated part of the county are much younger geologically than those that formed in residuum in the unglaciated areas. Relief, however, has so affected soil development in many of the residual soils that their profiles are less developed than those of some younger soils. In the soils in the glaciated areas, carbonates have been leached to depths ranging from 3 feet to more than 5 feet. Most of the residual soils were originally acid and free of carbonates.

The effects of time on the development of soils can best be observed by comparing the soils on flood plains with those on uplands. Geologically, the deposits of soil material on the flood plains are young. Compared with the soils on uplands, where the soil-forming processes have been active for a considerable period, most of the soils on the flood plains have little profile development. They developed in recently deposited material, and they receive new material in periodic floods. On these soils profile development is interrupted by the next deposition of sediments.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole

environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification and then through use of soil maps, we can apply knowledge of soils to specific fields and other tracts of land.

Thus in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing farms, fields, and woodland, in developing residential, industrial, and recreational areas, in engineering work, and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*3*) and later revised (*12*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965 (*10, 14*). It is under continual study. Therefore, readers interested in developments of this system should refer to the latest literature available. In table 9, the soils series of Stark County are placed in some categories of the current system and in the great soil groups of the older system.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and

TABLE 9.—*Soil series classified according to the current system of classification and the 1938 system with later revisions*

Series	Current Classification [1]			1938 classification with later revisions
	Family	Subgroup	Order	Great soil group
Arkport	Coarse-loamy, mixed, mesic	Psammentic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Bogart	Fine-loamy, mixed, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Brooke	Fine, mixed, mesic	Mollic Hapludalfs	Alfisols	Sols Bruns Acides.
Canadice	Fine, illitic, mesic	Typic Ochraqualfs	Alfisols	Low-Humic Gley soils.
Canfield	Fine-loamy, mixed, mesic	Aquic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils.
Carlisle	Euic, mesic	Typic Medisaprists	Histosols	Bog soils.
Chagrin	Fine-loamy, mixed, mesic	Dystric Fluventic Eutrochrepts.	Inceptisols	Alluvial soils.
Chili	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Conotton	Loamy-skeletal, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Dekalb	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Edwards	Marly, euic, mesic	Limnic Medisaprists	Histosols	Bog soils.
Fitchville	Fine-silty, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Geeburg	Fine, illitic, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Gilpin [2]	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Ginat	Fine-silty, mixed, mesic	Typic Fragiaqualfs	Alfisols	Low-Humic Gley soils.
Glenford	Fine-silty, mixed, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Keene	Fine-silty, mixed, mesic	Aquic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Killbuck	Fine-loamy, mixed, nonacid, mesic	Fluventic Haplaquepts	Inceptisols	Alluvial soils.
Latham	Clayey, mixed, mesic	Aquic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Licking	Fine, mixed, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Linwood	Loamy, euic, mesic	Terric Medisaprists	Histosols	Gray-Brown Podzolic soils.
Lobdell	Fine-loamy, mixed, mesic	Aquic Fluventic Eutrochrepts.	Inceptisols	Alluvial soils.
Loudonville	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Luray	Fine-silty, mixed, noncalcareous, mesic.	Typic Argiaquolls	Mollisols	Humic Gley soils.
Luray, gravelly subsoil variant.	Fine-silty, mixed, mesic	Udollic Ochraqualfs	Alfisols	Humic Gley soils.
Mentor	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Montgomery	Fine, mixed, noncalcareous, mesic	Typic Haplaquolls	Mollisols	Humic Gley soils.
Muskingum	Fine-loamy, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Plainfield	Mixed, mesic	Typic Udipsamments	Entisols	Gray-Brown Podzolic soils.
Rainsboro	Fine-silty, mixed, mesic	Typic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils.
Ramsey	Loamy, siliceous, mesic	Lithic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Ravenna	Fine-loamy, mixed, mesic	Aeric Fragiaqualfs	Alfisols	Gray-Brown Podzolic soils.
Remsen	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Rittman	Fine-loamy, mixed, mesic	Aquic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils.
Sebring	Fine-silty, mixed, mesic	Typic Ochraqualfs	Alfisols	Low-Humic Gley soils.
Shoals	Fine-loamy, mixed, nonacid, mesic	Aeric Fluventic Haplaquents.	Inceptisols	Alluvial soils.
Sloan	Fine-loamy, mixed, noncalcareous, mesic.	Fluventic Haplaquolls	Mollisols	Alluvial soils.
Tilsit	Fine-silty, mixed, mesic	Typic Fragiudults	Ultisols	Gray-Brown Podzolic soils.
Trumbull	Fine, illitic, mesic	Typic Ochraqualfs	Alfisols	Low-Humic Gley soils.
Wadsworth	Fine-silty, mixed, mesic	Aeric Fragiaqualfs	Alfisols	Gray-Brown Podzolic soils.
Wallkill	Fine-loamy, mixed, nonacid, mesic	Thapto-Histic Haplaquepts.	Inceptisols	Humic Gley soils.
Wayland	Fine-silty, mixed, nonacid, mesic	Fluventic Haplaquepts	Inceptisols	Alluvial soils.
Weikert	Loamy-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols	Sols Bruns Acides.

TABLE 9.—*Soil series classified according to the current system of classification and the 1938 system with later revisions*—Continued

Series	Current Classification [1]			1938 classification with later revisions
	Family	Subgroup	Order	Great soil group
Weinbach	Fine-silty, mixed, mesic	Aeric Fragiaqualfs	Alfisols	Gray-Brown Podzolic soils.
Wellston	Fine-silty, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Wheeling [3]	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Willette	Clayey, euic, mesic	Terric Medisaprists	Histosols	Bog soils.
Wooster	Fine-loamy, mixed, mesic	Typic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils.

[1] Placement of some series in the current system of classification, particularly in families and subgroups, may change as more precise information becomes available.

[2] According to test data, the Gilpin soils have a higher base saturation than is permitted in the Gilpin series; this high base saturation is typical for all the Gilpin soils in Stark County. In the more recent correlations, soils similar to these have been named Westmoreland.

[3] This soil is a taxadjunt to the series. The Wheeling silt loams in this county contain less sand than Wheeling soils elsewhere.

series. In this system soil properties that are observable and measurable are used as a basis for classification. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped together. The classes that make up the current system are briefly defined in the folowing paragraphs.

ORDER: Ten soil orders are recognized in this 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. The exceptions are the Entisols and Histosols, which occur in many different climates. Six of the soil orders are represented in Stark County. They are Entisols, Inceptisols, Mollisols, Alfisols, Ultisols, and Histosols.

Entisols are recent soils in which there has been little, if any, horizon development.

Inceptisols are mineral soils in which horizons have started to develop but do not have an accumulation of illuvial clay.

Mollisols are mineral soils that have a dark-colored surface layer 10 inches or more thick and a base saturation of more than 50 percent.

Alfisols are mineral soils that have horizons of clay accumulation 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.

Histosols are organic soils that formed in peat or muck. The order Histosols has not been completely defined, but in Stark County Carlisle muck, Edwards muck, Linwood muck, and Willette muck are Histosols.

SUBORDER: Each order is divided into suborders, primarily on the basis of those soil characteristics that produce classes having the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders mainly reflect either the presence or absence of waterlogging or soil differences resulting from the climate or vegetation.

GREAT GROUP: Suborders are separated into great groups according to the presence or absence of genetic horizons and the arrangement of these horizons. The horizons used to make separations are those in which clay, iron, or humus has accumulated or those that have pans that interfere with the growth of roots or the movement of water. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like. The great group is not shown separately in table 9, because it is the last word in the name of the subgroup.

SUBGROUP: Each great group is subdivided into subgroups. One of these subgroups represents the central, or typic, segment of a group, and the others, called intergrades, contain those soils that have properties mostly of one great group, but also one or more properties of soils in another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order.

FAMILY: Each subgroup is divided into families, primarily on the basis of properties important to the growth of plants or to the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence.

Laboratory Data

The physical and chemical analysis reported in table 10 were made of selected soils in Stark County by the Ohio Agricultural Research and Development Center, Ohio State University. Except for Wooster silt loam, detailed descriptions of the soils sampled, including locations of the profiles described, are given in alphabetical order in the section "Descriptions of the Soils." A profile description for the Wooster soil is given in this section; it is not typical of the Wooster series but is within the range for that series.

In addition to the data given in table 10, laboratory data are available for soils in the following series: Bogart, Canfield, Geeburg, Ravenna, Wadsworth, and Weikert. These data are on file at Columbus, Ohio, at the Soils Department, Ohio State University; the Ohio Department of Natural Resources, Division of Lands and Soil; and the State Office, Soil Conservation Service.

TABLE 10.—*Physical and chemical*

[Analyses made at Ohio Agricultural Research and Development Center,

Soil and site number	Depth	Horizon	Particle-size distribution					
			Very coarse sand (2 to 1 mm.)	Coarse sand (1 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)	Very fine sand (0.10 to 0.5 mm.)	Silt (0.05 to 0.002 mm.)
	Inches		*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Arkport fine sandy loam (SK–17).	0–9	Ap	1.8	7.3	14.4	28.2	14.4	27.5
	9–15	B21	.8	6.0	12.7	38.6	18.8	20.1
	15–18	B22t	.9	5.2	10.9	37.4	18.0	18.5
	18–21	B23	.6	5.2	11.4	41.7	18.6	16.8
	21–22	B24t	.9	5.8	12.4	40.6	16.7	15.1
	22–25	B25	1.4	6.2	12.9	42.4	17.5	14.6
	25–26	B26t	2.5	7.6	14.5	38.7	15.7	12.1
	26–31	B31	2.7	11.3	22.5	38.3	13.7	9.1
	31–32	B27t	2.8	11.6	24.0	33.6	10.6	8.8
	32–36	B32	2.4	11.4	30.3	37.8	10.0	6.6
Carlisle muck (SK–16).	0–9	1						
	9–22	2						
	22–60	3						
Chili silt loam (SK–8).	0–9	Ap	2.0	3.9	4.7	6.2	5.5	65.8
	9–12	B1	.9	2.6	3.5	5.1	4.8	64.2
	12–19	B2t	1.5	3.9	4.8	6.6	6.7	54.7
	19–29	IIB3t	9.2	25.5	17.5	11.6	3.1	13.9
	36–60	IIIC	6.3	30.7	25.0	14.3	10.2	9.4
Dekalb sandy loam (SK–22).	0–7	Ap	1.4	12.2	22.5	23.3	4.7	26.8
	7–15	B1	.4	14.0	30.5	23.9	5.2	15.6
	15–25	B2	.7	10.4	21.6	32.4	6.7	17.5
	25–34	B and C	.3	17.7	32.6	22.3	6.5	12.1
Edwards muck (SK–19).	0–5	1						
	5–13	2						
	13–24	3						
	24–28	4						
	28–42	IICca						
Fitchville silt loam (SK–9).	0–9	Ap	1.5	3.3	2.6	4.6	4.7	66.5
	9–12	A2	2.7	3.2	3.7	3.4	3.5	62.1
	12–20	B21tg	.9	1.3	1.4	2.4	3.2	58.7
	20–32	B22tg	.4	.5	.4	1.2	5.2	62.9
	32–40	B23	.6	.4	.2	.6	5.5	67.9
	40–52	B and C	.4	.7	.5	.7	1.6	61.8
Gilpin silt loam (SK–25).	0–9	Ap	1.4	2.4	3.5	11.4	5.6	60.4
	9–13	B21t	1.4	2.0	2.3	5.2	3.6	60.1
	13–18	B22t	.7	1.8	2.3	4.9	4.2	55.3
	18–30	B23t	1.6	2.6	1.3	2.8	4.4	55.4
Keene silt loam (SK–27).	0–8	Ap	4.6	5.1	2.2	2.6	2.6	61.2
	8–13	B1	3.9	3.4	1.2	1.2	1.6	61.3
	13–19	B21t	3.2	3.4	1.0	1.0	1.6	60.1
	19–25	IIB22t	1.4	2.4	.9	1.0	1.8	57.1
	25–34	IIB3	4.3	6.2	2.1	2.4	3.8	44.7
	34–40	IIIC	.2	.3	.2	.7	.8	32.4
Licking silt loam (SK–29).	0–7	Ap	.4	1.6	1.6	3.1	3.2	73.5
	7–15	B1	.2	1.3	1.2	2.3	3.0	67.6
	15–20	B21t	.3	1.1	1.1	2.2	3.1	65.7
	20–26	IIB22t	.1	.2	.5	1.2	1.5	50.4
	26–33	IIB31t	0	0	.1	.3	.6	37.3
	33–44	IIB32t	0	.1	.1	.3	.3	33.2
	44–60	IIB and C	0	.1	.2	.9	5.1	56.2
Luray silt loam (SK–10).[3]	0–8	Ap1	.4	.8	1.0	2.2	4.6	62.6
	8–11	Ap2	.2	.9	1.0	2.1	4.2	63.3
	11–13	B21tg	.1	.5	.8	1.8	3.0	60.3
	13–15	B22tg	.5	1.7	2.1	3.3	5.0	51.5
	15–23	B23tg	.7	2.0	2.0	3.1	4.8	55.8
	23–30	B24tg	.1	.7	1.2	2.6	4.1	56.1
	30–38	B3tg	.5	1.0	1.4	2.4	4.9	62.9
	38–48	IIC1	3.8	7.9	6.0	8.7	17.7	37.0
	48–60	IIC2	.5	.8	1.2	1.4	5.9	66.6

data for selected soils

Ohio State University. Absence of data indicates determination was not made]

Clay (less than 0.002 mm.)	Reaction	Organic matter	Exchangeable cations (meq. per 100 grams of soil)					Base saturation	CaCo3 equivalent
			H[1]	Ca	Mg	K	Cation exchange capacity (sum)		
Percent	*pH*	*Percent*						*Percent*	*Percent*
6.4	5.7	1.9	4.6	3.1	0.5	0.28	8.5	46	
3.4	6.3	.1	1.9	1.6	.2	.17	3.9	51	
9.1	5.8	.2	3.6	2.6	.5	.20	6.9	48	
5.7	5.5		2.3	1.3	.4	.20	4.2	45	
8.5	5.1		4.1	1.9	.6	.13	6.7	39	
5.0	5.0		2.8	1.3	.6	.15	4.9	43	
8.9	5.0		4.1	2.0	.5	.13	6.7	39	
2.4	5.2		1.8	1.0	.4	.13	3.3	45	
8.6	5.2		2.7	2.1	.8	.15	5.8	53	
1.5	5.3		1.5	.7	.4	.09	2.7	44	
	4.8	92.0	87.9	45.6	3.7	.56	137.8	36	
	4.0	91.1	90.4	17.6	3.2	.70	111.9	19	
	4.8	98.6	69.9	21.1	3.8	1.1	95.9	27	
11.9	5.2	2.2	8.8	3.6	1.1	.49	14.0	37	
18.9	4.9	.7	6.6	3.4	1.4	.31	11.7	44	
21.8	4.9	.3	7.2	4.8	1.6	.31	13.9	48	
19.2	4.7	.2	7.1	4.4	1.3	.26	13.1	46	
4.1	5.2	.1	2.5	1.5	.7	.08	4.8	48	
9.1	4.5		6.0	.1	.2	.11	6.4	6	
10.4	4.5		4.7	.1	.2	.14	5.1	9	
10.7	5.4		2.5	2.0	.5	.15	5.1	51	
8.5	5.6		1.7	1.6	.4	.13	3.8	56	
	4.7	86.9	54.3	60.9	4.3	.18	119.7	55	
	5.1	79.1	43.5	64.4	8.8	.13	116.8	63	
	5.0	77.8	42.9	50.4	7.2	.12	100.6	57	
	5.9	57.4	25.6	83.0	8.5	.23	117.3	78	
	7.5	8.3							86
16.8	5.2	2.6	9.2	5.2	1.6	.13	16.1	43	
21.4	4.6	.7	8.7	3.2	1.3	.15	13.4	35	
32.1	4.6	.5	8.1	6.3	3.1	.26	17.8	54	
29.4	5.0	.3	11.8	8.3	5.1	.33	25.5	54	
24.8	5.7		4.3	8.9	4.9	.28	18.4	77	
34.3	6.0		5.7	12.1	6.2	.40	24.4	77	
15.3	5.6		7.1	3.3	.9	.31	11.6	[2] 39	
25.4	5.4		4.6	4.8	1.2	.22	10.8	[2] 57	
30.8	5.0	.2	7.3	5.7	1.9	.26	15.2	[2] 52	
31.9	5.1	.2	9.1	5.8	3.6	.30	18.8	[2] 52	
21.7	4.8		12.1	1.1	.7	.41	14.3	15	
27.4	4.9		11.3	1.5	.6	.32	13.7	18	
39.7	4.7		11.4	1.8	1.2	.29	14.7	22	
35.4	4.7		15.3	1.9	1.2	.29	18.7	18	
36.5	4.5		16.1	.9	1.2	.24	18.4	13	
65.4	4.1		21.4	.8	2.4	.36	25.0	14	
16.6	4.8		11.9	1.5	.2	.57	14.2	16	
24.4	4.8		12.2	2.2	1.2	.49	16.1	24	
26.5	4.8		12.0	2.6	1.5	.41	16.5	27	
46.1	4.7		13.9	3.3	3.5	.31	21.0	34	
61.7	4.7		13.0	7.2	10.0	.31	30.5	57	
66.0	5.3		9.9	4.3	6.8	.29	21.3	53	
37.5	6.0		4.9	6.3	7.2	.20	18.6	74	
28.4	6.0	5.3	9.4	17.5	3.8	.36	31.1	70	
28.3	6.2	4.6	7.5	18.4	3.8	.29	30.0	75	
33.5	6.3	1.2	5.2	16.3	4.0	.31	25.8	80	
35.9	6.4	1.1	6.1	17.5	4.0	.36	28.0	78	
31.6	6.5	.8	6.6	16.8	4.4	.36	28.2	77	
35.2	6.8	.8	5.4	17.9	3.5	.43	27.2	80	
26.9	6.6		4.5	12.4	3.9	.33	21.1	79	
18.9	6.7		2.6	7.2	2.1	.13	12.0	78	
23.6	7.0		2.4	7.7	2.2	.15	12.5	81	

TABLE 10.—*Physical and chemical*

Soil and site number	Depth	Horizon	Particle-size distribution					
			Very coarse sand (2 to 1 mm.)	Coarse sand (1 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)	Very fine sand (0.10 to 0.5 mm.)	Silt (0.05 to 0.002 mm.)
	Inches		*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Montgomery silty clay loam (SK–20).[1]	0–5	A1	.3	.4	.5	1.5	1.7	39.9
	5–9	A and B	.1	.2	.2	.7	1.3	29.8
	9–15	B1tg	0	.1	.1	.3	.8	31.6
	15–26	B21tg	0	.2	.1	.3	.3	23.8
	26–31	B22tg	0	.1	.1	.3	.4	25.8
	31–42	B3tg	.9	1.4	1.4	3.7	2.7	39.2
	42–48	Cg	.2	.2	.2	.4	.5	63.2
Muskingum silt loam (SK–26).	0–7	Ap	.9	6.6	9.4	24.5	6.6	40.8
	7–12	B1	.9	5.4	8.7	21.6	5.9	41.7
	12–17	B2	1.2	5.2	9.7	24.2	6.6	37.7
	17–23	B3	1.2	5.7	11.1	29.8	9.2	28.4
	23–29	B and C	1.1	5.7	12.3	33.1	9.6	25.5
Plainfield loamy sand (SK–23).	0–10	Ap	.6	24.8	36.4	17.7	3.2	10.7
	10–22	B2	.6	21.2	42.4	22.8	3.2	5.5
	22–34	B3	.7	22.0	38.1	23.6	3.3	7.2
	34–46	C	5.3	53.1	26.5	6.8	1.2	3.0
Rainsboro silt loam (SK–21).	0–8	Ap	1.7	2.6	2.6	5.4	3.7	66.7
	8–17	B21t	.8	2.0	3.7	9.1	6.1	55.2
	17–29	B22t	1.0	2.3	4.8	13.9	10.0	46.8
	29–34	IIBx1	15.4	15.2	11.8	14.7	6.7	21.8
	34–41	IIBx2	14.3	17.7	14.6	17.6	5.9	18.5
	41–48	IIBx3	9.2	15.0	14.5	21.1	5.3	17.4
	48–60	IIIC	0	.1	.1	.3	.5	60.6
Remsen silt loam (SK–11).	0–7	Ap	.6	2.7	3.1	4.6	3.4	61.6
	7–13	B1t	.4	.7	.9	1.7	2.0	44.2
	13–16	B21t	.3	.5	.7	1.3	1.8	37.1
	16–24	B22t	.4	.6	.7	1.5	1.8	39.4
	24–36	B3t	.4	.8	.9	1.6	1.8	40.5
	36–46	B3–C1	.5	.8	.8	1.5	1.6	41.1
	46–56	C1	.4	1.1	1.1	2.2	2.3	42.6
	56–66	C1–C2	.7	1.0	1.0	2.0	2.1	41.6
	66–72	C2–C3	.3	.7	.8	1.6	2.0	48.2
Weinbach silt loam (SK–14).	0–8	Ap	1.2	1.8	2.7	3.2	3.5	73.7
	8–13	B1g	.4	1.6	2.5	2.8	3.2	65.1
	13–19	B21tg	1.0	1.7	1.7	2.1	2.9	61.7
	19–30	IIBx	3.2	13.4	18.2	14.5	5.6	31.5
	30–38	IIIB3	9.4	23.9	22.5	10.5	4.4	13.0
	38–60	IIIC	14.0	28.5	21.7	12.1	4.8	13.7
Wheeling silt loam (SK–7).	0–8	Ap	.3	.8	.8	1.4	4.6	76.2
	8–11	B1	.2	.6	.7	1.0	3.4	71.4
	11–21	B21t	.1	.2	.5	.8	3.8	69.6
	21–32	B22t	.1	.5	.9	1.8	5.7	70.4
	32–41	B23t	.1	.5	1.2	2.1	6.7	71.3
	41–50	IIC1	3.2	9.5	14.5	24.4	8.9	27.7
	50–70	IIC2	27.9	41.8	11.3	3.9	2.3	8.4
Wooster silt loam (SK–13).	0–8	Ap	.9	2.8	4.3	6.5	5.5	64.4
	8–15	B1	2.5	5.2	7.6	12.5	7.7	42.8
	15–22	B2t	4.7	8.2	11.3	17.7	10.0	30.5
	22–30	Bx	4.7	9.1	11.6	17.8	10.2	31.4
	30–39	B3	3.6	9.0	12.6	21.0	10.9	31.5
	39–51	C1	3.2	6.7	10.7	18.5	10.1	37.5
	51–62	C2	2.7	6.5	11.6	2.2	10.1	36.9

[1] Exchangeable acidity.
[2] Higher than is normal for Gilpin soils in other parts of the country but is common for Ohio for those soils.

data for selected soils—Continued

Clay (less than 0.002 mm.)	Reaction	Organic matter	Exchangeable cations (meg. per 100 grams of soil)					Base saturation	CaCo3 equivalent
			H [3]	Ca	Mg	K	Cation exchange capacity (sum)		
Percent	*pH*	*Percent*						*Percent*	*Percent*
55.7	6.5		17.1	31.1	5.5	.82	54.5	69	
67.7	6.7		11.5	39.8	6.1	.51	57.9	80	
67.1	6.9		9.1	35.6	6.8	.56	52.1	83	
75.3	7.1		7.4	37.1	6.6	.56	51.7	86	
73.3	7.1		7.8	36.8	6.4	.51	51.5	85	
50.7	7.2		5.7	31.3	5.8	.46	43.3	87	
35.3	7.7								29
11.2	4.5		7.5	.1	.3	.19	8.1	7	
15.8	4.9		6.3	1.2	.4	.15	8.0	22	
15.0	5.1		5.3	2.1	.6	.18	8.2	35	
14.6	5.0		5.0	1.4	.3	.15	6.8	27	
12.7	4.9		5.4	1.4	.4	.15	7.3	27	
6.6	5.3		7.6	1.0	.5	.13	9.2	18	
4.5	5.2		2.2	.3	.2	.10	2.8	21	
5.1	5.1		2.2	.7	.4	.09	3.4	35	
4.1	5.1		2.0	.5	.3	.09	2.9	31	
17.3	7.2		3.7	9.5	3.0	.18	16.4	77	
23.1	5.0		7.9	4.0	1.8	.17	13.9	43	
21.2	4.8		8.5	2.9	1.5	.14	13.0	35	
14.4	5.1		8.6	2.8	1.6	.14	13.1	35	
11.4	5.5		7.2	2.7	1.3	.13	11.3	36	
17.5	5.3		9.2	3.9	3.1	.15	16.3	44	
38.4	7.0		4.0	6.2	9.0	.23	19.4	79	
24.0	4.4	3.4	16.0	.9	1.1	.20	18.2	12	
50.1	4.5	1.0	17.0	2.3	4.6	.28	24.2	30	
58.3	4.4	.9	18.8	2.6	6.4	.33	28.1	33	
55.6	4.5	.8	15.0	2.5	7.8	.31	25.6	41	
54.0	6.7	.6	4.3	4.0	10.6	.26	19.2	78	
53.7	8.0	.7							5
50.3	7.9								3
51.6	7.8								2
46.4	7.6								3
13.9	6.4	2.6	5.2	7.6	.5	.82	14.1	63	
24.4	4.8	.4	7.5	7.1	.9	.32	15.8	53	
28.9	4.8	.5	11.1	8.1	1.8	.31	21.3	48	
13.6	5.3	.3	4.4	4.5	1.7	.15	10.8	59	
16.3	5.7		5.1	6.0	2.4	.18	13.7	63	
5.2	7.7								1
15.9	5.9	3.1	7.2	6.3	1.6	.20	15.3	53	
22.7	5.7	.5	5.3	5.7	2.2	.23	13.4	60	
25.0	4.4	.4	9.3	4.4	1.7	.26	15.7	41	
20.6	4.6	.3	8.1	4.1	2.6	.26	15.1	46	
18.1	4.6	.3	8.2	3.3	2.6	.26	14.4	43	
11.8	4.7	.1	4.8	1.9	1.8	.15	8.7	45	
4.4	5.2	.1	3.4	1.9	1.0	.08	6.4	47	
15.6	6.9	3.4	4.3	10.4	.4	.15	15.3	72	
21.7	6.7	.8	4.5	9.1	.3	.18	14.1	68	
17.6	4.8	.4	7.6	3.0	.3	.18	11.1	32	
15.2	4.8		7.2	2.4	.3	.13	10.0	28	
11.4	4.8		5.4	2.2	.2	.20	8.0	33	
13.3	5.0		5.2	3.0	.8	.10	9.1	43	
12.0	5.6		3.2	4.4	1.1	.08	8.8	64	

[3] The surface layer of this Luray soil has about 1.5 percent more clay than is the maximum for silt loam.
[4] In Stark County the Montgomery soils generally have a B horizon that is 50 to 60 percent clay.

Laboratory methods.—The data on particle-size distribution shown in table 10 were obtained by the sieve analysis and by the pipette method outlined by Steele and Bradfield (*11*), but using sodium hexametaphosphate as the dispersing agent. The silt and clay were determined by sedimentation. The reaction was determined with a glass electrode and a soil-water ratio of 1.1. The percentage of organic matter was determined by wet combustion; the procedure was a modification of the Walkley-Black method (*7*).

The exchangeable acidity (H) was measured by the method described in the USDA Circular 757 (*7*). The exchangeable calcium (Ca), magnesium (Mg), and potassium (K) were determined by extraction with a neutral solution of ammonium acetate. The potassium in the ammonium acetate solution was determined by using a flame photometer. Calcium and magnesium were determined by the EDTA method outlined by Barrows and Simpson (*4*), and the cation exchange capacity by the summation of exchangeable cations. The calcium carbonate equivalent was determined by measuring the volume of carbon dioxide emitted from soil that was treated with concentrated hydrochloric acid (*8*).

Profile of a Wooster silt loam (SK–13) in Lake Township, NE¼ of section 36 (analytical data in table 10):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine and medium, granular structure; friable; many roots; pH 6.9; abrupt, smooth boundary.

B1—8 to 15 inches, strong-brown (7.5YR 5/6) silt loam; yellowish brown (10YR 5/6) crushed; strong, fine and medium, angular blocky structure; firm; roots common; sedimentary, igneous, and metamorphic pebbles as much as 5 percent, by volume; pH 6.7; clear, wavy boundary.

B2t—15 to 22 inches, dark yellowish-brown (10YR 4/4) light clay loam; patchy black (7.5YR N 2/0) stains on platy faces; massive (structureless) in place, but breaks to weak, very thick, platy structure; firm; roots common; thin, patchy clay films on horizontal ped surfaces; pebbles 5 to 10 percent, by volume; pH 4.8; gradual, wavy boundary.

Bx—22 to 30 inches, dark yellowish-brown (10YR 4/4) heavy loam; weak, medium and coarse, subangular blocky structure; firm; roots common; thin, patchy clay films on horizontal ped surfaces; pebbles 10 percent, by volume; pH 4.8; gradual, wavy boundary.

B3—30 to 39 inches, dark yellowish-brown (10YR 4/4) sandy loam; massive (structureless) in place, but breaks to weak, coarse, subangular blocky structure; firm; roots common; 10 percent, by volume; pH 4.8; diffuse, wavy boundary.

C1—39 to 51 inches, dark yellowish-brown (10YR 4/4) loam; massive (structureless); firm; few roots; pebbles 5 to 10 percent, by volume; pH 5.0; diffuse, wavy boundary.

C2—51 to 62 inches, dark yellowish-brown (10YR 4/4) loam; massive (structureless); firm; few roots; pebbles 5 to 10 percent, by volume; pH 5.6; diffuse, wavy boundary.

General Nature of the County

This section provides general information about Stark County. It discusses climate, physiography and drainage, geology, and natural resources of the county.

Climate [5]

The climate of Stark County is continental. Data on temperature and precipitation for the county are given in table 11 and are from the records kept at the Akron-Canton Airport. Except for snow cover, the data are fairly representative of the county. Because of the influences of Lake Erie, the annual snowfall averages about 48 inches in the northern part of the county and only about 33 inches in the southern part. Precipitation varies from year to year, but it is normally abundant, and it is ordinarily well distributed through-

[5] By MARVIN E. MILLER, State climatologist, Weather Bureau, ESSA, U.S. Department of Commerce.

TABLE 11.—*Temperature and precipitation data*

[Data from Akron-Canton Airport]

Month	Average temperature				Precipitation				
	Daily maximum	Daily minimum	Monthly maximum	Monthly minimum	Average monthly total	One year in 10 will have—		Average monthly snowfall	Average number of days with 1 inch or more of snow cover
						Less than—	More than—		
	°F.	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*	*Number*
January	35.6	20.9	56	−3	2.86	1.08	5.15	10.0	3
February	36.6	20.7	58	1	2.30	.99	3.57	8.7	3
March	46.3	27.5	69	10	3.32	1.54	5.63	9.6	3
April	59.6	37.8	79	22	3.34	1.59	5.00	2.7	1
May	71.2	48.1	85	32	3.85	1.85	5.88	.2	0
June	80.6	58.2	92	43	4.26	1.72	6.38	0	0
July	83.2	61.9	92	50	3.77	1.88	6.56	0	0
August	82.0	61.0	91	47	3.11	1.41	6.12	0	0
September	75.1	52.7	89	37	2.62	1.06	5.45	0	0
October	63.3	42.5	81	29	2.48	.73	4.25	.6	([1])
November	48.6	32.9	70	15	2.25	.99	4.08	5.5	2
December	37.4	23.5	60	2	2.27	1.07	4.11	10.3	3
Year	60.0	40.6	94	−6	36.43	29.66	44.88	47.6	15

[1] Less than one-half day.

out the year. During the growing season, precipitation occurs mostly in showers and thunderstorms. Most thunderstorms occur in the period May through August. During a 10-year period, more than 1.2 inches of rain can be expected to fall each week on about 8 days in April, 11 days in May, and 12 days in June. Because most crops generally are planted from late in April through the middle of June and the fields have little plant cover, the heaviest rains delay field operations and cause considerable soil loss in some places.

Soil moisture varies during the year. It is lowest in October, but winter and early in spring is the recharge season when soil-moisture reserves are replenished, because not much of the moisture is then being used. Rainfall generally is sufficient to meet the needs of crops until July and August, when the need for moisture is greatest and its use by plants normally exceeds rainfall. The soils become progressively drier in summer and fall.

The length of the growing season varies considerably within the county. These variations are related to the terrain, which is gently rolling to hilly. The elevation ranges from 900 feet to 1,350 feet. Table 12 shows the probability of freezing temperatures on or after given dates in spring and on or before given dates in fall. The data were estimated from averages obtained from records kept at the Akron-Canton Airport, and at Canfield, Chippewa Lake, Millport, and Wooster. However, light frost can occur when the temperature of the air is above freezing or is as much as 36° F.

In this county the relative humidity is lowest in summer and highest in winter. It varies during the day and generally decreases with increasing temperatures, and it ranges from 50 to 60 percent on hot summer afternoons. The average relative humidity throughout the year is about 78 percent at 1 a.m., 82 percent at 7 a.m., 60 percent at 1 p.m., and 66 percent at 7 p.m.

In an average year, there are about 74 clear days, 103 partly cloudy days, and 188 cloudy days in Stark County. The cloud cover is 0 to 30 percent on clear days, 30 to 70 percent on partly cloudy days, and is more than 70 percent on cloudy days. Heavy fogs occur about 30 times each year and are most frequent during the warmer half of the year.

In this county the prevailing winds are from the south. The average windspeed is about 10 miles per hour, but it is slightly stronger in winter than in summer. Winds that blow at a rate of 35 to 80 miles per hour sometimes accompany thunderstorms and cause damage in some areas. Thunderstorms occur on an average of 40 days a year, and most of them occur in the period May through August. Only four tornadoes have passed over Stark County since 1900.

Physiography and Drainage

Stark County is in the Appalachian Plateau Physiographic Province. The northern two-thirds of the county lies in the glacial part of the Appalachian Plateau, and the rest of the county is in the unglaciated part (*6*).

The elevations range from a little less than 900 feet above sea level near Bolivar in the southern part of Bethlehem Township to about 1,350 feet northeast of Paris in the northern part of Paris Township.

The unglaciated part of the county appears as a maturely dissected peneplain, but the apparent peneplain was not caused by peneplanation but by nearly level, resistant strata that capped the Plateau. The topography is hilly and steep and variations in relief average about 200 feet within one-half mile.

The glaciated part of the county is undulating and rolling, and the average relief varies less than 100 feet within a mile.

Most of Stark County is in the Ohio River watershed. Lexington Township, the eastern part of Marlboro Township, and the northern part of Washington Township are drained by the Mahoning River and its tributaries, Deer Creek and Beech Creek. The northern part of Lake Township and the northwestern part of Marlboro Township are drained by Congress ditch, which flows into the Lake Erie watershed (*5*).

Most of the streams in the county roughly parallel the Tuscarawas River, which flows southward. Sandy Creek flows westward into the Tuscarawas River at Bolivar. The headwaters of Bear Run, Limestone Creek, Pleasant Valley Run, and Indian Run are on the uplands near the boundary that separates the unglaciated part of the county and the Wisconsin glacial till area. The headwaters of Sugar Creek, Nimishillen Creek, Little Sandy Creek, Black Run, and

TABLE 12.—*Probabilities of last freezing temperatures in spring and first in fall*

[Based on data at Akron-Canton Airport, Canfield, Chippewa Lake, Millport, and Wooster]

Probability	Dates for given probability at temperature of—			
	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower
Spring:				
1 year in 10 later than	April 18	May 1	May 15	May 29
2 years in 10 later than	April 14	April 26	May 10	May 24
5 years in 10 later than	April 2	April 15	April 28	May 14
Fall:				
1 year in 10 earlier than	October 24	October 9	September 28	September 18
2 years in 10 earlier than	October 29	October 15	October 2	September 23
5 years in 10 earlier than	November 11	October 31	October 13	October 5

Hugle Run, however, are in the glaciated part of the county. Little Sandy Creek, Black Run, and Hugle Run have cut narrow gorges through the highlands; they flow onto and cross the unglaciated part of the county and empty into Sandy Creek. The most notable gorge is along Nimishillen Creek in an area between North Industry and Howenstein.

Although the county is moderately well drained, there are numerous swampy areas. Some of these areas are as much as 700 acres in size.

Geology

The bedrock underlying Stark County consists mainly of sandstone, siltstone, shale, coal, and limestone, all of which formed from sediments laid down during the Pennsylvanian period (*5*). The oldest rocks are the Sharon conglomerate and sandstone of the Pottsville formation that occur in the western part of the county. The remaining members of the Pottsville formation and all of the members of the overlying Allegheny formation and the younger Lower Mahoning member of the Conemaugh formation underlie the eastern part of the county.

Before glaciation, the topography of all of the area that is now Stark County was the same as that in Sandy and Pike Townships and the eastern part of Bethlehem Township, which are in the unglaciated part of the county. However, this area was invaded by a succession of glaciers, and glacial erosion and deposition modified the topography in direct relationship to the intensity of glaciation. The county was invaded by several glaciers of both the Illinoian and the Wisconsin age. The glaciers transported material from the Lake Simcoe area of Canada and from other areas to the north. Most of the drift laid down by the Illinoian glaciers, however, was either swept away or buried by the advance of the Wisconsin glaciers (*5*). Today, only a few hilltops and ridges are thinly covered by till deposited by the Illinoian glaciers. These areas are 1 or 2 miles wide and are south of the boundary that separates the glaciated and unglaciated parts of the county. The Illinoian till and the Wisconsin till are similar and, in these areas, the soils from the same series are mapped on both.

The various advances made by Wisconsin ice sheets were divided into two lobes; the Killbuck lobe covered the entire western half of the county, and the Grand River lobe covered most of the glaciated area in the eastern part. Because the advances within the two lobes did not take place simultaneously, the zone of overlap and outwash is terminated as an interlobate area that extends from Canton northward toward Uniontown.

Natural Resources

Soil, water, and soft coal are among the most valuable natural resources of Stark County. Clay, shale, sand, gravel, and limestone for cement are other important natural resources in this county.

Water is adequate for most farm uses throughout the county. It is also adequate for many industrial uses in some areas.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available moisture capacity. The capacity of a soil to hold water in a form available to plants. Amount of moisture held in soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capactiy.

Bench terrace. A shelflike embankment of earth that has a level or nearly level top and a steep or nearly vertical downhill face, constructed along the contour of sloping land or across the slope to control runoff and erosion. The downhill face of the bench may be made of rocks or masonry, or it may be planted to vegetation.

Calcareous soil. A soil that contains enough lime or calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Channery soil. A soil that contains thin, flat fragments of sandstone, limestone, or schist, as much as 6 inches in length along the longer axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

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.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic matter and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Glacial drift. Rock material transported by glacial ice and then deposited; also includes the assorted and unassorted material deposited by streams flowing from glaciers.

Glacial outwash. Cross-bedded gravel, sand, and silt deposited by melting water as it flows from glacial ice.

Glacial till. Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

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.

Kame (geology). A short ridge, hill, or mound of stratified glacial drift deposited by glacial meltwater.

Lacustrine deposits (geology). Material deposited in lake water and exposed by lowering of the water level or elevation of the land.

Leaching, soil. The removal of soluble materials from soils or other material by percolating water.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Natural soil drainage. Refers to moisture conditions 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.

Imperfectly or somewhat poorly drained soils are wet for significant periods but not all the time, and in Podzolic soils commonly have mottling 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.

Parent material. The disintegrated and partly weathered rock from which soil has formed.

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.

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

Relief. The elevations or inequalities of a land surface, considered collectively.

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 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.

Soil separates. Mineral particles, less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *Very coarse sand* (2.0 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter) *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

Soil variant. A soil having properties sufficiently different from those other known soils to suggest establishing a new soil series, but a soil of such limited known area that creation of a new series is not believed to be justified.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in a 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 horizonal), *columnar* (prism 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, silt 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 difficulty to till.

Topsoil. A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Weathering, soil. All physical and chemical changes produced in rocks at or near the earth's surface by atmospheric agents. These changes result in more or less complete disintegration and decomposition of the rock.

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group
			Symbol	Page	Symbol
WuC2	Wooster silt loam, 6 to 12 percent slopes, moderately eroded	143	IIIe-1	13	1o1
WuD2	Wooster silt loam, 12 to 18 percent slopes, moderately eroded	143	IVe-1	16	1o1
WuE2	Wooster silt loam, 18 to 25 percent slopes, moderately eroded	143	VIe-1	18	1r1
WuF2	Wooster silt loam, 25 to 50 percent slopes, moderately eroded	143	VIe-1	18	1r1
WvD	Wooster-Urban land complex, steep	143	----------	--	1o1

1/ On north- and east-facing slopes.

2/ On south- and west-facing slopes.