Soil Survey
MAHONING COUNTY
Ohio

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

Issued October 1971

Major fieldwork for this soil survey was done in the period 1958–64. Soil names and descriptions were approved in 1966. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1965. This survey was made cooperatively by the Soil Conservation Service, the Division of Lands and Soil, Ohio Department of Natural Resources, and the Ohio Agricultural Research and Development Center. It is part of the technical assistance furnished to the Mahoning Soil and Water Conservation District.

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

HOW TO USE THIS SURVEY

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

Locating Soils

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

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

Finding and Using Information

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

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

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

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

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

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

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

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

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

Cover picture: A field of Chili loam from which hay has been cut. Wooster silt loam is in the field in the background.

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SOIL SURVEY OF MAHONING COUNTY, OHIO

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

MAHONING COUNTY, in the northeastern part of Ohio (fig. 1), has a total land area of about 419 square miles, or 268,160 acres. Youngstown is the county seat and the largest city.

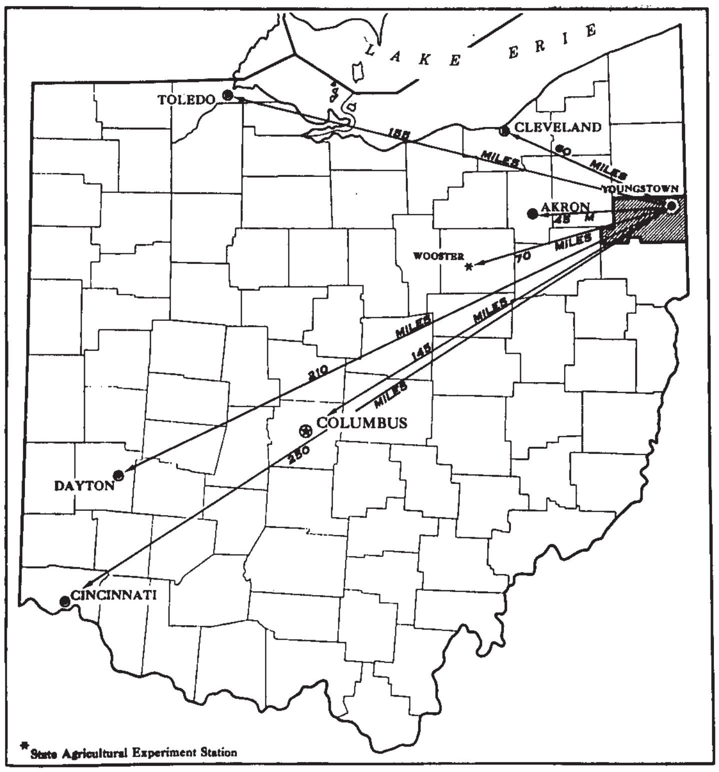

Figure 1.—**Location of Mahoning County in Ohio.**

The county is within the large industrial complex that includes part of Pennsylvania. It had a population of about 315,000 in 1965. Industrial workers make up a large part of the total population. Many of these workers are employed in the manufacture of steel and other basic metal products. Others mine coal, limestone, or clay. Approximately a million tons of coal, another million tons of limestone, and 60,000 tons of clay are mined each year.

About 105,354 acres was in farms in 1964, according to the U.S. Census of Agriculture. About 62,658 acres was cropland, 23,581 acres was pastureland, and 15,427 acres was woodland. A smaller acreage was idle or used for houses and lots. Dairying and the raising of livestock are important sources of farm income, but poultry and poultry products and grain crops add substantial amounts. Corn, hay, wheat, and oats are the principal crops. The county normally receives enough rainfall for the commonly grown crops, but drought sometimes slightly reduces crop yields in dry years. As a result of emphasis on industrial and residential development, diversion of land from farming to nonfarm uses, especially to use for housing developments and strip mining, is increasing.

Well-drained, loamy soils that are well suited to farming are predominant in the eastern part of the county. Poorly drained, clayey soils are predominant in the western part. The soils are mainly gently sloping, but they are sloping to steep in some places.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Mahoning 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. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

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

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Loudonville and Mahoning, 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 go with their behavior in the natural, untouched landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

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

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

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

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

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed and occur in areas so small in size that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it, for example, Chili-Urban land complex, rolling.

In some places two or more similar soils are mapped as a single unit, called an undifferentiated soil group, if the differences between the soils are too small to justify separate mapping. An example in this county is Chili and Conotton gravelly soils, 18 to 25 percent slopes. Also on most soil maps, areas are shown that are so rocky, so shallow, or so frequently worked by wind and water that they cannot be classified by soil series. These areas are shown on the map like other mapping units, but are given descriptive names, such as Gravel pits or Made land, and are called land types.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are 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.

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

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Mahoning 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 not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, or other characteristics that affect management.

Nine soil associations are in Mahoning County. These are described in the following pages.

1. Canfield-Ravenna-Wooster Association

Mainly gently sloping, somewhat poorly drained to well-drained soils that have a fragipan in the subsoil; on uplands

This association is in the southeastern part of the county in areas that are generally at a higher elevation than other parts of the county. It consists of loamy, deep, predominantly gently sloping soils that are underlain by loamy glacial till. The association occupies about 22 percent of the county.

Moderately well drained Canfield soils make up about 48 percent of the acreage; somewhat poorly drained Ravenna soils, in depressions, make up about 19 percent; and well drained Wooster soils make up about 10 percent. All of these soils have a friable surface layer, but they have in their subsoil a firm, dense layer, or fragipan, that slows the movement of water.

Small areas of Cardington and Bennington soils make up about 6 percent of the acreage, and areas of Fitchville, Chili, Chagrin, Lobdell, and other soils make up another 17 percent. The Cardington and Bennington soils are similar to the Canfield, Ravenna, and Wooster soils, except that they lack the dense layer in their subsoil that is typical of those soils.

The dominant soils of this association are easily tilled, have a moderately deep or deep root zone, and have favorable available moisture capacity. They are well suited to general farm crops, truck crops, and fruit trees (fig. 2).

The dominant soils have few limitations to use for building sites. They have limitations to use as fields for disposing of effluent from septic tanks.

2. Rittman-Wadsworth-Frenchtown Association

Mainly gently sloping, moderately well drained to poorly drained soils that have a fragipan in the subsoil; on uplands

This association is in areas that occur in a strip, roughly 1 to 5 miles wide, that extends in a northeast-southwest direction from Sebring to Coitsville. The soils are mainly gently sloping. They have a clay loam or loam subsoil containing a firm, dense layer that limits the movement of water. The underlying material is clay loam glacial till. This association occupies about 13 percent of the county.

Moderately well drained Rittman soils make up about 44 percent of the acreage; somewhat poorly drained Wadsworth soils make up another 44 percent; and poorly drained Frenchtown soils, along shallow

***Figure 2.*—Apple orchard on a Wooster silt loam.**

drainageways and in depressions, make up about 10 percent. Small areas of Sebring, Bogart, and Canfield soils account for another 2 percent.

The root zone is moderately deep in most places, and the available moisture capacity is medium. Natural fertility is low, but the soils are productive under good management. They are used mainly for growing general farm crops and for dairy farming.

Basements in areas of Wadsworth and Frenchtown soils are likely to be wet because those soils have a high water table much of the time during winter and spring. Therefore, buildings should be placed on the Rittman soils, wherever feasible, for those soils are at a higher elevation than the adjacent Wadsworth and Frenchtown soils. Restricted internal drainage is a limitation of the major soils for disposing of effluent from septic tanks.

3. Mahoning-Ellsworth-Trumbull Association

Nearly level to gently sloping, moderately well drained to poorly drained soils that have a moderately fine or fine textured subsoil; on uplands

This association is on uplands in the western half of the county and in the north-central part. The soils are nearly level or gently sloping. They have a subsoil of silty clay loam to clay, and they are underlain by silty clay loam glacial till. This association occupies about 16 percent of the county.

Somewhat poorly drained Mahoning soils make up about 44 percent of the acreage; moderately well drained Ellsworth soils make up about 39 percent; and poorly drained Trumbull soils make up about 15 percent. Small areas of Sebring, Remsen, Geeburg, and Lorain soils account for another 2 percent.

Permeability is slow or very slow, and the available moisture capacity is medium to high. Natural fertility is medium. These soils are difficult to manage because they dry out slowly in spring. Water frequently ponds in depressions, and the water table is high during winter and spring. Use of the Mahoning and Trumbull soils is especially affected by the high water table. Both tile drains and surface drains are helpful in the poorly drained areas. This association is used mainly for dairying and growing general crops.

The Ellsworth soils have fewer limitations for use as building sites than the Mahoning and Trumbull soils. Basements in areas of Mahoning and Trumbull soils are likely to be wet. The soils are poorly suited to use as fields for disposing of effluent from septic tanks.

4. Geeburg-Remsen-Trumbull Association

Nearly level to gently sloping, moderately well drained to poorly drained soils that have a fine-textured subsoil; on uplands

This association is in the western half of the county. It is on uplands that generally are at a lower elevation than those occupied by the other associations. Sharp escarpments border the major drainageways, but the soils are mainly nearly level or gently sloping. They have a clayey subsoil and are underlain by clayey glacial till. This association occupies about 10 percent of the county.

Moderately well drained Geeburg soils make up about 40 percent of the acreage; somewhat poorly drained Remsen soils make up another 40 percent; and poorly drained Trumbull soils make up about 19 percent. In addition, small areas of Sebring, Lorain, Bogart, Mahoning, and Ellsworth soils occupy a minor acreage. The Geeburg soils are near the escarpments and are also on low hills that have convex side slopes. The Remsen and Trumbull soils are in the gently sloping, nearly level, or concave areas.

Permeability is very slow, and natural fertility is medium to low. The available moisture capacity is generally medium. Much of the water from rainfall runs off the gently sloping areas, but water frequently ponds in depressions in areas of Trumbull and Remsen soils. The soils dry out slowly in spring and are droughty in dry years. They are difficult to manage and are suitable only for general farm crops and pasture. Dairying is the most common farm enterprise. Large areas of these soils are in woodlots. Much of the acreage that was formerly farmed has been abandoned for farming and is reverting to woods.

Wetness and shrink-swell characteristics are limitations to use of these soils as building sites. Permeability limits use of the soils as fields for disposing of effluent from septic tanks.

5. Loudonville-Muskingum-Dekalb Association

Gently sloping to steep, well-drained soils that are mostly moderately deep over sandstone or siltstone; on uplands

This association is extensive along the walls of the valley of the Mahoning River and other large streams. It is also on uplands throughout most of the county where rock hills have not been deeply covered by glacial material. Sandstone or shale bedrock is at a depth of 1 to 3½ feet. The soils are well drained. They are mainly gently sloping to strongly sloping, but the association contains more steep areas than the other associations. This association occupies about 4 percent of the county.

Moderately deep Loudonville soils make up about 70 percent of the acreage; Muskingum soils, which are generally less deep than the Loudonville, make up about 15 percent; and stony Dekalb soils make up about 10 percent. Small areas of Canfield and Hornell soils occupy the rest of the acreage.

The Loudonville soils are friable but have medium to low available moisture capacity and low natural fertility. They are mostly wooded or are used for general farm crops, but some of the higher areas are used for orchards. The Muskingum soils are similar to the Loudonville but are generally shallower over bedrock. They are suited to general farm crops, but much of the acreage is in woodlots. The Dekalb soils are too stony to be well suited to general farming. They are better suited to trees than to general crops and pasture, and most of the acreage is in trees.

Depth to bedrock limits use of the soils of this association for building sites. Many of the areas provide good habitat for wildlife.

6. Bogart-Chili-Jimtown Association

Gently sloping and sloping, well-drained to somewhat poorly drained soils that have a gravelly subsoil; on stream terraces and uplands

This association is on benches above flood plains of streams and in former drainageways that carried glacial melt water. The soils are mostly loamy, and they are underlain by sand and gravel.

Moderately well drained Bogart and well drained Chili soils are dominant, but somewhat poorly drained Jimtown soils are extensive in the lower, more nearly level areas. Bogart soils make up about 35 percent of the acreage; Chili soils, about 30 percent (fig. 3); and Jimtown soils, about 20 percent. The rest of the association consists of narrow areas of Wayland soils along small streams; of minor areas of Sebring and Lorain soils in swamps; and of small, scattered areas of Canfield, Damascus, Rittman, Ellsworth, and Geeburg soils.

The major soils are mostly gently sloping and are permeable, well drained to somewhat poorly drained, deep, and friable. In this county they are among the soils most easily tilled. Some are well suited to crops, but they are variable in drainage and slope. Also, they are dissected by streams, and as a result, some areas are not large enough for use of modern farming equipment. The soils are mostly well suited to truck crops, as well as to general farm crops. The Bogart and Chili soils are inclined to be droughty and are suitable for irrigation. The Jimtown soils have a seasonal high water table.

The major soils have few limitations, other than slope, to use for building sites. Using them as a field for disposing of effluent from septic tanks is hazardous, however, because of the risk of contaminating the water in nearby wells. Soils of this association are generally good sources of sand and gravel. They were used as a site for a large part of the city of Youngstown.

7. Sebring-Fitchville Association

Nearly level to gently sloping, poorly drained and somewhat poorly drained soils that have a moderately fine textured subsoil; on former glacial lakebeds.

Figure 3.—Chili soils on a terrace overlooking the valley of Mill Creek. Sebring and Wayland soils are in the valley near the creek.

This association is in small, widely scattered depressions and swamps that were formerly glacial lakes filled by mud and water from melting glaciers. The areas are mostly at the heads of drainage basins in the uplands, but some are in the valleys of the larger streams. This association occupies about 9 percent of the county.

Poorly drained Sebring soils make up about 48 percent of the acreage; somewhat poorly drained Fitchville soils make up about 19 percent; and dark-colored Lorain and Luray soils and grayish, poorly drained Canadice soils each make up about 10 percent. The rest of the association consists mostly of Wayland soils along small streams, and of small areas of Bogart soils on hummocks in the swamps.

Poor drainage makes the Sebring and Canadice soils poorly suited to grain crops. Because these soils are in depressional areas and have a moderately fine texture, they are difficult to drain. Fitchville soils are at a slightly higher elevation than the Sebring and Canadice and are farmed where they occur in large, easily accessible areas. The Lorain and Luray soils are very poorly drained; intensive drainage practices are needed where they are farmed.

A large part of this association is idle or in woods or pasture. Trees grow rapidly on these soils. Pin oak reaches timber size in 40 to 60 years, and ash, red maple, and elm grow nearly as well. This association is also well suited to use as a habitat for kinds of wildlife that inhabit swamps.

The major soils of this association should be avoided as sites for buildings or highways. They are unstable and have a high water table most of the time. Areas of these soils contain good sites for lakes.

8. Wayland-Orrville Association

Nearly level, poorly drained and somewhat poorly drained soils on flood plains

This association is on bottom lands along the larger streams in the county. The largest area is on wide flood plains along Mill Creek. The association occupies about 7 percent of the county.

Poorly drained Wayland soils make up about 45 percent of the acreage; somewhat poorly drained Orrville soils make up about 15 percent; very poorly drained Papakating soils and moderately well drained Lobdell soils make up about 10 percent each; well drained Chagrin soils make up about 5 percent; and very poorly drained Kerston and Carlisle mucks together make up about 5 percent. Also, about 10 percent of the association, in the valley of the Mahoning River at Youngstown, consists of areas of Made land.

This association is used mostly for pasture, but a large acreage is in trees. The soils are subject to flooding. The Chagrin and Lobdell soils are well suited to truck crops and general farm crops. They commonly occur in areas where Wayland soils are dominant, however, and the areas of Chagrin and Lobdell soils are generally not extensive enough for a large field. This association is well suited to kinds of wildlife that inhabit areas near water.

Flooding is a severe hazard. It limits use of the major soils for building sites.

9. Strip Mine Spoils Association

Spoil piles of rock and glacial till

This association consists of spoil material that was excavated during surface mining for coal and clay. It also consists of the pit left after mining of the last cut of coal or clay was finished, and of the high wall, or rock escarpment, above the pit. Small areas of unmined land are between the areas of spoil material. About 40 percent of the spoil material is excavated glacial till, and about 60 percent is shale, siltstone, and sandstone.

Slightly more than half of this association has been graded to gentle slopes and has been planted to forest trees or meadow mixtures of grasses and legumes, as required by Ohio law. The rest, in pits, steep areas, and high walls, is practically bare. Areas of glacial till spoils that have been treated have a thin cover of grass or tree seedlings, but the areas of shale, siltstone, and sandstone spoils have only a patchy cover of plants. In many areas the surface has material exposed that is toxic to plants.

Many parts of this association are suitable for industrial sites, building sites, airports, and similar uses. The spoil material is loose and can be easily formed to fit building needs. Where landscaping and a cover of plants are needed, a dressing of topsoil can be added. The toxic material should not be covered by concrete, for it expands when oxidized.

In many places water is impounded in the pits. This water has potential for recreational uses, supports some wildlife, and can be used as an emergency source of water. In a few places, however, the water is contaminated by acids from mines.

Use and Management of the Soils

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

Management for Crops and Pasture

Field crops commonly grown in Mahoning County are corn and wheat, oats, and other small grains. Plants commonly grown for pasture and hay are alfalfa, Ladino clover, red clover, timothy, orchardgrass, and bromegrass. Specialty crops include tomatoes, sweet corn, strawberries, cucumbers, cabbage, and other crops adapted to the climate. Orchard fruits are apples, peaches, pears, and cherries. In the following paragraphs, general practices for managing the soils where these crops are grown are discussed. Also discussed is the system of capability classification. In addition, management of individual groups of soils, the capability units, is described and estimated yields of the main crops are given.

General Practices of management [1]

The soils of Mahoning County vary in their suitability for specific crops, and they require widely different management. Some basic, or general, management practices are needed on practically all of the soils. The following paragraphs discuss the basic practices of maintaining fertility, utilizing crop residue, improving drainage, and controlling erosion. Management of specified groups of soils is discussed in the subsection "Management by Capability Units."

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

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

Drainage.—In this county wetness is a hazard in about 54 percent of the acreage suitable for cultivated crops. Wetness limits use of the soils, to some extent, in about 45 percent of the total acreage in the county. Crops grow well, however, on somewhat poorly drained, poorly drained, and very poorly drained soils where excess water has been removed by use of tile drains or surface drains, by land smoothing, or by a combination of these practices. Few or no practices are needed for improving drainage on the moderately well drained soils.

Controlling erosion.—Erosion is a hazard on the gently sloping to very steep soils. About 46 percent of the acreage of soils suitable for cultivation is susceptible to erosion. Practices of erosion control commonly used in this county are contour stripcropping; tilling on the contour; keeping tillage to a minimum; constructing terraces, waterways, and diversions; utilizing crop residue; and planting close-growing crops.

Capability groups of soils

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

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

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

Class I. Soils have few limitations that restrict their use. (None in Mahoning County.)

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

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

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

Class V. Soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover. (None in Mahoning County.)

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

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

Class VIII. Soils have very severe limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes. (None in Mahoning County.)

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

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

[1] GLEN E. BERNATH, State resource conservationist, and RICHARD L. GOOGINS, assistant State soil scientist, assisted in preparing this subsection.

their use largely to pasture, range, woodland, wildlife, or recreation.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding Arabic numerals to the subclass symbols, for example, IIIe–1. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraphs; and the Arabic numeral specifically identifies the capability unit.

Management by capability units

The soils in Mahoning County have been placed in 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. In the following pages, each capability unit is described and management of the soils in each unit is discussed. The mention of the soil series in the description of each capability unit does not mean that all the soils of the series mapped in this county are in the unit. To determine the soils in a capability unit, refer to the "Guide to Mapping Units" at the back of this survey.

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

The descriptions of capability units also point out soil features that limit use of the soils for crops or pasture. Only general suggestions 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 is urged to contact the nearest office of the Soil Conservation Service or the Ohio Agricultural Extension Service.

CAPABILITY UNIT IIe–1

This capability unit consists of light-colored, well drained or moderately well drained Bogart, till substratum, Cardington, Glenford, and Wooster soils that are gently sloping. These soils are on uplands and stream terraces. The Glenford soil is underlain by thick layers of silty material deposited by water, and the other soils are underlain by compact glacial till. The Glenford and Wooster soils have a deep root zone and high available moisture capacity. The Bogart and Cardington soils are moderately deep over compact till. As a result, their root zone is only moderately deep and their available moisture capacity is medium or low. Water moves through all of the soils, except the Wooster, at a moderately slow rate. It moves through the substratum of the Wooster soil at a moderate rate.

A hazard of erosion is the major limitation to use of these soils for crops. The surface layer is also subject to crusting if these soils are cultivated. A crust is less likely to form on the Bogart soil than on the other soils because the Bogart soil is less silty than the others.

Soils of this unit are suited to all the field crops, hay crops, and pasture plants commonly grown in the county. Under improved management they can be used for cultivated crops year after year. Cultivated crops can be grown frequently where management is only average if the control of erosion is emphasized. The soils are suited to specialty crops commonly grown in the county, but very intensive management is required if specialty crops are grown commercially.

CAPABILITY UNIT IIe–2

This capability unit consists of light-colored, well drained or moderately well drained Bogart and Chili soils. These soils are on stream terraces throughout the county. They are underlain by a sandy and gravelly substratum that is within 20 to 40 inches of the surface in most places. Depth to the substratum determines the depth of the effective root zone. Within the root zone the available moisture capacity is mostly medium, but it is low where sand and gravel are near the surface. Permeability is moderately rapid. In the Bogart soil, the water table is high in winter and early in spring, but generally it does not remain high for a long period in spring. All of these soils warm up and dry out quickly in spring.

A hazard of erosion is the major limitation to use of these soils for crops. The surface layer is not subject to crusting, and all of the soils can be worked within a few hours after a heavy rain. In some places the soils tend to be droughty in summer, especially where they are thin over sand and gravel.

Soils of this unit are suited to all the field crops, hay crops, and pasture plants commonly grown in the county. They are well suited to early maturing crops and to specialty crops. Specialty crops and crops that mature in summer can be grown frequently or even year after year if improved management is used.

These soils are well suited to irrigation. Where specialty crops are grown commercially, irrigation should be considered.

These soils provide excellent early pasture, but the growth of the pasture plants is generally slower in summer than in spring because of the reduced available moisture. Erosion is not generally a hazard in pastures or hayfields if an adequate cover of plants is maintained.

CAPABILITY UNIT IIe–3

In this capability unit are gently sloping, medium-textured Loudonville and Muskingum soils that are well drained. These soils are mostly moderately deep over sandstone and shale. They occupy scattered areas on uplands, where the layer of glacial till is thin or absent. The root zone is moderately deep, and the available moisture capacity is medium or low, depending on the thickness of the soil material over bedrock. These soils are moderately permeable, dry out early in spring, and are easy to till. Fragments of sandstone and shale in the Muskingum soil cause excessive wear on implement points.

A hazard of erosion is the principal limitation to use of these soils for crops. Because the content of organic matter is generally low, a crust tends to form if the soils are cultivated. Crusting is not a serious problem, but drought is a serious hazard in dry years.

Soils of this unit are suited to the field crops, hay crops, and pasture plants commonly grown in the county. They are also suited to the commonly grown truck crops or specialty crops. The Muskingum soil is mostly in trees. Because of the hazard of drought, the soils are generally better suited to early maturing crops than to crops that mature in summer. Cultivated crops can be grown frequently or even year after year if erosion is controlled.

These soils are well suited to irrigation. Where specialty crops are grown commercially, irrigation should be considered.

Large applications of lime and a suitable fertilizer are needed for pastures, to maintain a cover of plants adequate for controlling erosion. The carrying capacity of pastures is generally low late in summer.

CAPABILITY UNIT IIe-4

Only Rittman silt loam, 2 to 6 percent slopes, on uplands, is in this capability unit. It is a light-colored, moderately well drained soil that has a dense, compact layer, or fragipan, in the lower part of the subsoil. Because of the fragipan, permeability is slow, the root zone is only moderately deep, and the available moisture capacity is medium. This soil contains a perched high water table during winter and spring. The most significant movement of water within the soil is lateral movement along the top of the pan.

A hazard of erosion is the principal limitation to use of this soil for crops. When the soil material above the pan is saturated, the volume of runoff and the hazard of erosion are increased. This soil dries slowly after wet periods and in spring. Because the surface layer is low in content of organic matter, it is susceptible to crusting.

This soil is suited to the field crops, hay crops, and pasture plants commonly grown in the county, but it is not well suited to specialty crops. Cultivated crops can be grown frequently or even year after year if improved management is used. Where management is only average, control of erosion and maintenance of good soil structure should be emphasized.

Erosion is not a hazard or is only a slight hazard in areas used for pasture or hay if an adequate cover of plants is maintained.

CAPABILITY UNIT IIe-5

Only Canfield silt loam, 2 to 6 percent slopes, on uplands, is in this capability unit. This soil is light colored and moderately well drained. It has a distinct, compact fragipan in the lower part of the subsoil. Because of this fragipan and the underlying compact glacial till, permeability is restricted, the root zone is only moderately deep, and the available moisture capacity of the root zone is medium. This soil contains a temporary perched high water table during winter and spring. It dries readily in spring but a little more slowly than nearby soils that are well drained. A significant lateral movement of water takes place along the top of the pan during winter and early in spring.

A hazard of erosion is the principal limitation to use of this soil for crops. When the soil material above the pan is saturated, the volume of runoff and the hazard of erosion are increased. The surface layer is susceptible to crusting.

This soil is suited to the field crops, hay crops, and pasture plants commonly grown in the county, and it is also suited to commonly grown specialty crops. Cultivated crops can be grown frequently or even year after year if improved management is used. Where management is only average, practices that help to control erosion and that maintain good soil structure should be emphasized. In areas used for pasture or hay, erosion is not a hazard or is only a slight hazard if an adequate cover of plants is maintained.

CAPABILITY UNIT IIw-1

This capability unit consists of dark-colored, very poorly drained Luray, Marengo, and Olmsted soils. These soils are on uplands or stream terraces, where they are nearly level or depressional. They have a seasonal high water table for long periods in winter and spring, and they stay wet until late in spring unless they are artifically drained. The root zone is deep, except where its depth is restricted by the seasonal high water table. Available moisture capacity is high. Permeability is moderately slow in all the soils but the Olmsted, in which it is moderate.

Soil wetness is the major limitation to use of these soils for crops. If the soils are pastured or worked when wet, they become compacted and subsequently they become cloddy. The content of organic matter is high. Therefore, these soils are not susceptible or are only slightly susceptible to crusting. They have good structure throughout, and they can be easily drained by installing tile drains.

Undrained areas of these soils are generally too wet for cultivation and are not well suited to pasture. Areas that are adequately drained are suited to all of the commonly grown field crops and to many specialty crops. Under improved management they can be used year after year for cultivated crops. Areas that are adequately drained are also well suited to pasture or hay crops. They are especially well suited to grasses and legumes that can tolerate some wetness. Where drainage is adequate, these soils are among the most productive in the county.

CAPABILITY UNIT IIw-2

This capability unit consists of light-colored, somewhat poorly drained Bennington, Fitchville, and Jimtown soils that are nearly level or gently sloping. These soils are on uplands or stream terraces, generally in the southern and eastern parts of the county.

The Bennington soils and the Jimtown, till substratum, soils are underlain by compact glacial till. Other Jimtown soils are moderately deep over coarse sand and gravel. The Fitchville soils have formed in a thick layer of silty material deposited by water in old glacial lakebeds. All of these soils have a seasonal high water table in winter and spring. The soils underlain by till or by sand and gravel have a moderately deep root zone and have medium available moisture capacity within the root zone. The Fitchville soils have a deep root zone, except where the depth of the root zone is limited by the seasonal high water table. They have high available moisture capacity. All of the soils have moderately slow permeability, except the Jimtown soils over sand and gravel. These soils have moderate permeability.

Soil wetness is the major limitation to use of these soils for crops, but erosion is also a hazard in the gently sloping areas. Unless artificial drainage is provided, the soils dry out slowly in spring. They are subject to surface crusting, and they tend to become compact and cloddy if pastured or worked when wet.

Undrained areas are too wet during winter and spring for many crops, and large areas of these soils are in trees. The undrained areas are suited to crops that mature in summer, but planting is generally delayed until late in spring. Areas that are drained are suited to the field crops, hay crops, and pasture plants commonly grown in the county. They can be cultivated frequently or even year after year if improved management is used. Practices that improve drainage and that control erosion should be emphasized in the gently sloping areas. Where these soils are used for pasture or hay, and where an adequate cover of plants is maintained, erosion is not a hazard or is only a slight hazard.

CAPABILITY UNIT IIw-3

The only soil in this capability unit is Orrville silt loam, a somewhat poorly drained soil on flood plains. This soil has a seasonal high water table and is subject to flooding. Flooding takes place mostly in winter and spring, but occasionally it occurs in summer. Damage to crops is generally slight. In summer, after the water table has receded, this soil has a deep root zone. It has moderate permeability and high available moisture capacity.

Soil wetness and susceptibility to flooding are the major limitations to use of this soil for crops. Some deposition or siltation takes place during flooding. Undrained areas are subject to ponding, and they dry out slowly in spring. Outlets for tile drains are difficult to find in some areas of this soil that are not high enough above stream level for an outlet to function satisfactorily.

This soil is suited to field crops commonly grown in the county. Because of the hazard of flooding, however, it is better suited to crops that mature in summer than to those that mature in spring. Crops that require cultivation can be grown year after year if improved management is used.

This soil is suited to pasture and hay crops. Only those varieties of grasses and legumes that are tolerant of soil wetness and some flooding, however, should be seeded.

CAPABILITY UNIT IIw-4

In this capability unit are light-colored, loamy Chagrin and Lobdell soils that are well drained or moderately well drained. These soils are nearly level. They are on the flood plains of streams, where seasonal flooding is a hazard. The root zone is deep in most places, and the available moisture capacity within the root zone is high. Water moves at a moderate rate through these soils.

Seasonal flooding is the major limitation to use of these soils for crops. The soils dry out and warm up early in spring. They are not susceptible or are only slightly susceptible to crusting, even though the content of organic matter is generally medium to low.

Soils of this unit are suited to the field crops commonly grown in the county, and they are also well suited to hay or pasture plants. Cultivated crops can be grown frequently or even year after year if improved management is used. Because of the hazard of flooding, the soils are better suited to crops that mature in summer than to those that remain on the soils over winter or that mature in spring.

In pastures and hayfields where the soils are not protected from flooding, plants that can tolerate wetness and seasonal flooding should be grown.

CAPABILITY UNIT IIw-5

This capability unit consists of light-colored, somewhat poorly drained Ravenna soils that are on uplands and are nearly level or gently sloping. These soils contain a compact fragipan that limits the thickness of the root zone and the movement of water. They have a seasonal high water table and have medium available moisture capacity.

Seasonal wetness is the major limitation to use of these soils for crops. In addition, the gently sloping Ravenna soil is susceptible to erosion. The soils are susceptible to surface crusting. In places some ponding of short duration occurs in the nearly level areas. Because of the limited available moisture capacity, plants growing on these soils are affected by drought during long dry periods.

Soils of this unit are suited to the field crops and hay or pasture plants commonly grown in the county. Under improved management they can be cultivated year after year. If less than improved management is used, control of erosion should be emphasized on the gently sloping Ravenna soil. These soils dry out slowly in spring. Therefore, areas that are not artifically drained are better suited to crops that mature in summer than to those that mature in spring. Plants that can tolerate seasonal wetness should be grown for pasture or hay.

CAPABILITY UNIT IIIe-1

In this capability unit are light-colored, sloping Bogart, till substratum, Cardington, Glenford, and Wooster soils that are moderately eroded and are well drained or moderately well drained. All except the Glenford soil are underlain by compact glacial till.

The Glenford soil has formed in thick layers of silty material deposited by water. The Glenford, Cardington, and Wooster soils have a deep root zone and high or medium available moisture capacity. The Bogart soil is moderately deep over compact till. It has a moderately deep root zone and medium available moisture capacity. Permeability of all the soils is moderately slow, and runoff is rapid.

A severe hazard of further erosion is the major limitation to use of these soils for crops. The surface layer in cultivated areas is susceptible to crusting. The surface layer of the Bogart soil is less susceptible to crusting than that of the other soils, however, because the Bogart soil is less silty than the other soils.

Soils of this unit are suited to all of the field crops, hay crops, and pasture plants commonly grown in the county. Under improved management they can be cultivated frequently. If less than improved management is used, excessive erosion is likely to result. These soils are suited to the commonly grown specialty crops, but very intensive management is generally required if specialty crops are grown commercially. An adequate cover of plants must be maintained in pastures or hayfields if erosion is to be controlled.

CAPABILITY UNIT IIIe-2

In this capability unit are light-colored, sloping Rittman soils that are moderately well drained. One of these soils is moderately eroded.

These soils have a dense, compact layer, or fragipan, in the subsoil. As a result, they are slowly permeable, have a moderately deep root zone, and have medium available moisture capacity. They also have a perched high water table during winter and spring. The most significant movement of water is lateral movement along the top of the pan. Runoff is rapid, and the volume of runoff and the hazard of erosion are increased when the soil material above the fragipan is saturated. These soils dry out slowly in spring and after wet periods. Because their surface layer is low in content of organic matter, the soils are susceptible to crusting.

For the soils of this unit, a severe hazard of further erosion is the principal limitation to use for crops. The soils are suited to the field crops, hay crops, and pasture plants commonly grown in the county. They can be cultivated frequently if improved management is used. If less than improved management is used, erosion is likely to be excessive unless practices that control erosion are emphasized. Where these soils are used for pasture or hay, an adequate cover of plants should be maintained to control erosion.

CAPABILITY UNIT IIIe-3

This capability unit consists of Loudonville and Muskingum soils that are sloping, moderately eroded, and well drained. These soils are moderately deep over sandstone or shale, but they are more nearly shallow than deep. Depth of the root zone is limited by depth to the underlying sandstone or shale. The Muskingum soil contains many fragments of sandstone, and these coarse fragments cause excessive wear on the points of implements. The Loudonville and Muskingum soils have medium to low available moisture capacity and moderate permeability. They dry out early in spring and are easy to till. Drought is a serious hazard in dry years.

A severe hazard of further erosion is the principal limitation to use of these soils for crops. The soils are suited to the field crops, hay crops, and pasture plants commonly grown in the county. They are generally better suited to deep-rooted crops and to early maturing crops, however, than to crops that mature in summer. The Loudonville soil is mostly in orchards and general farm crops. The Muskingum soil is mostly in trees.

CAPABILITY UNIT IIIe-4

This capability unit consists of light-colored, well drained or moderately well drained, sloping Bogart and Chili soils on stream terraces and in hummocky areas of the uplands. These soils have a gravelly and sandy substratum, generally at a moderate depth. The root zone is only moderately deep because the substratum restricts the growth of roots. The available moisture capacity is medium to low, and permeability is moderately rapid. The Bogart soil has a seasonal high water table during winter and spring, but the water table generally does not remain high for long periods in spring. All of the soils warm up and dry out quickly in spring.

A severe hazard of erosion is the major limitation to use of these soils for crops. The areas that are shallowest over gravelly and sandy material tend to be droughty in summer. All of the soils can be worked within a few hours after a heavy rain. They are well suited to irrigation, but control of erosion is necessary.

Soils of this unit are suited to all of the field crops, hay crops, and pasture plants commonly grown in this county. They are well suited to early maturing crops and specialty crops. Under improved management they can be used frequently for cultivated crops. Where the management is only average, erosion control practices should be emphasized.

Early pastures on these soils provide a good supply of forage, but the growth of pasture plants is retarded in summer because of the reduced amount of available moisture. An adequate cover of plants is needed in the pastures and hayfields to protect the soils from erosion.

CAPABILITY UNIT IIIe-5

Light-colored, moderately well drained Ellsworth and Geeburg soils that are gently sloping are in this capability unit. These soils are in the northwestern part of the county. They have a clayey subsoil, are slowly permeable, and are saturated with water during wet periods. Because of their compact subsoil, they have a root zone that is only moderately deep. The available moisture capacity within the root zone is medium.

A severe hazard of erosion is the principal limitation to use of these soils for crops. Because of the gentle slopes and slow permeability, runoff is rapid. The soils dry out slowly in spring. They can be satisfactorily tilled only with a narrow range of moisture content, and they become hard and cloddy if tilled when wet. A crust tends to form on the surface.

These soils are suited to the field crops, hay crops, and pasture plants commonly grown in the county. Improved management is needed to overcome soil limitations, however, if crops that require cultivation are grown frequently. Where corn is grown on the Geeburg soils, the crop commonly fails in very dry years. The soils are poorly suited to the commonly grown specialty crops. Erosion is not a hazard or is only a slight hazard in pastures and hayfields where an adequate cover of plants is maintained.

CAPABILITY UNIT IIIe-6

In this capability unit are soils of the Canfield series. These soils are light colored and moderately well drained, and they have a distinct fragipan in the lower part of the subsoil. As a result of this pan and the underlying compact glacial till, permeability is restricted and the root zone is only moderately deep. Within the root zone, the available moisture capacity is medium. In winter these soils contain a perched water table that remains high for a short time in spring. In spring the soils dry readily, but they dry a little more slowly than nearby well-drained soils.

A severe hazard of erosion is the principal limitation to use of these soils for crops. When the soil layers above the fragipan are saturated, the volume of runoff is increased. The surface layer is susceptible to crusting.

These soils are suited to the field crops, hay crops, pasture plants, and specialty crops commonly grown in the county. Under improved management they can be used frequently for cultivated crops. Where management is only average, control of erosion should be emphasized. Erosion is not a hazard or is only a slight hazard if an adequate cover of plants is maintained in pastures and hayfields.

CAPABILITY UNIT IIIw-1

In this capability unit are dark-colored Papakating soils that are very poorly drained. These soils are barely above stream level and are subject to flooding. Where they are adequately drained, they have a moderately deep or deep root zone and high available moisture capacity. Permeability is moderately slow.

Soil wetness and a hazard of flooding are the principal limitations to use of these soils for crops. In some places it is difficult to find outlets for tile drains. These soils are not especially susceptible to surface crusting. They can be satisfactorily worked only within a rather narrow range of moisture content.

Undrained areas of these soils can be used for wetland pasture or trees, but they generally are too wet for crops that require cultivation. Under improved management areas that are adequately drained can be used year after year for cultivated crops. Normally, the adequately drained areas are excellent for pasture, especially during dry periods. These soils are generally too wet for grazing early in spring.

CAPABILITY UNIT IIIw-2

This capability unit consists of light-colored, poorly drained Condit, Damascus, and Sebring soils that are nearly level or depressional. The water table is high during winter and spring. Where these soils are artificially drained, they have a moderately deep root zone and high available moisture capacity. Permeability is moderate to slow.

Seasonal wetness and difficulty of establishing drainage are the major limitations to use of these soils for crops. The Damascus soils are the least difficult to drain by installing tile. The structure of the surface layer is generally unstable, and the soils are highly susceptible to crusting. They can be satisfactorily worked only within a narrow range of moisture content.

Undrained areas of these soils are normally too wet for cultivation, and they are generally used for wetland pasture or as woodland. Areas that are adequately drained are suited to field crops commonly grown in the county. They are also suited to pasture and hay crops if plants that can tolerate some soil wetness are grown. Under improved management these soils can be used frequently for cultivated crops. Where less than improved management is used, the soil structure is likely to deteriorate and these soils become less suitable for crops.

CAPABILITY UNIT IIIw-3

The only soil in this capability unit is Wayland silt loam. This soil is light colored and poorly drained. It is on low-lying bottom lands that are subject to flooding, and it has a high water table during winter and spring. In areas that have not been drained, the root zone is shallow, but it is moderately deep in areas that have been drained. The available moisture capacity is high, and permeability is moderately slow.

Flooding and seasonal wetness are the major limitations to use of this soil for crops. Flooding normally occurs in winter and spring, but damaging floods occur occasionally in summer. In many places establishing outlets for tile drains is difficult because this soil is barely above stream level. A crust tends to form on the surface if this soil is cultivated.

Where this soil is adequately drained, it is suited to field crops commonly grown in the county. Under improved management crops that require cultivation can be grown frequently. Because of seasonal wetness, this soil is generally better suited to crops that mature in summer than to those that mature early in spring. Undrained areas are used mostly for wetland pasture or as woodland.

If this soil is drained, it is suited to pasture and hay plants that can tolerate soil wetness and some flooding. Where improved management is used, good pasture is produced, especially during dry periods. In some areas siltation caused by flooding is a problem.

CAPABILITY UNIT IIIw-4

In this capability unit are Carlisle and Kerston soils in stream valleys or in depressional areas on uplands. These soils consist of 40 inches or more of peat or muck over a nearly impermeable layer of silty or clayey material. They are waterlogged unless they are artificially drained. Where these soils are drained, the muck is permeable and has high available moisture capacity. The root zone is generally moderately deep in areas that are drained.

Excessive water is the major limitation to use of these soils for crops. These soils not only contain excess water, but they are also subject to flooding where they are on flood plains. Where these soils are drained, they are subject to subsidence as a result of oxidation of the organic material. The muck is highly susceptible to blowing when the surface layer is dry. Controlling weeds is a concern in cultivated areas, and frost is a hazard.

Unless these soils are drained, they are unsuitable for cultivated crops or pasture. Where the soils are drained, they are well suited to a large number of the commonly grown field crops and specialty crops. Under improved management they can be used year after year for cultivated crops. Under intensive management these soils are the best suited to crops of any in the county. Where management is only average, however, excessive losses from blowing or subsidence are likely to occur, or these soils become wet.

CAPABILITY UNIT IIIw-5

Light-colored, somewhat poorly drained, nearly level or gently sloping Hornell, Mahoning, and Remsen soils are in this capability unit. These soils are wet during winter and spring. They have a dense, clayey subsoil that makes them slowly permeable and limits the penetration of roots. Their root zone is moderately deep, and they have medium available moisture capacity within the root zone.

Seasonal wetness is the major limitation to use of these soils for crops. The soils can be satisfactorily worked only within a narrow range of moisture content, and the surface layer is generally in poor tilth. These soils are highly susceptible to surface crusting, and they are likely to become cloddy if worked when wet. Tillage is commonly delayed in spring because of excess moisture. During especially dry summers, drought is a hazard to crops. These are among the soils of the county that have the lowest supply of plant nutrients and that are the most strongly acid.

Unless these soils are artifically drained, they are poorly suited to cultivation. Areas that are drained are suited to field crops commonly grown in the county. Under improved management they can be used frequently for cultivated crops. Erosion is generally excessive in the gently sloping areas, and soil structure

Figure 4.—Alfalfa on a Remsen silt loam. The stand is spotty because this soil is wet and is not well suited to alfalfa.

deteriorates in all areas where cultivated crops are grown frequently and only average management is used. In dry years crops that mature in summer are likely to be damaged by drought.

These soils are suited to hay and pasture plants that can tolerate seasonal wetness. Because the clayey subsoil restricts the development of roots, and frost action is likely to cause heaving, the soils are poorly suited to alfalfa and other deep-rooted crops (fig. 4). Soil compaction results if these soils are grazed when wet.

CAPABILITY UNIT IIIw-6

Lorain silty clay loam, which is dark colored and very poorly drained, is the only soil in this capability unit. It has formed in deep silty and clayey material deposited by water. This soil is in depressional areas on terraces or uplands. It has a high water table during winter and until late in spring. Permeability is slow or very slow. The root zone is moderately deep in areas that are artificially drained.

A high water table is the major limitation to use of this soil for crops. Soil wetness is a continuing problem, even in areas that are artificially drained. This soil can be satisfactorily tilled only within a narrow range of moisture content. It generally is not susceptible to surface crusting, but it is likely to become compacted if it is worked or pastured when wet.

Areas that are not artificially drained are generally swampy and are too wet for field crops or good pasture. Where adequate drainage is provided, however, this soil is suited to the field crops commonly grown in the county. Row crops can be grown year after year if intensive management is used. Where management is only average, practices that help to maintain the supply of organic matter should be emphasized to insure against loss of favorable soil structure.

Areas that are drained are suitable for pasture and hay plants that can tolerate soil wetness. During dry periods they are especially productive of forage.

CAPABILITY UNIT IIIw-7

This capability unit consists of light-colored, somewhat poorly drained, nearly level or gently sloping Wadsworth soils on uplands. These soils have a distinct, dense, compact layer, or fragipan, in the subsoil, and this layer restricts the penetration of roots. As a result, the root zone is only moderately deep or shallow. Within the root zone, the available moisture capacity is medium or low. Water moves slowly through these soils. In wet periods the soils contain a perched high water table.

The major limitation to use of these soils for crops is the seasonal high water table. In addition, tilth deteriorates rapidly if the soils are excessively tilled. Erosion is a moderate hazard on the gently sloping soil. Both soils dry slowly in spring unless they are artificially drained.

The soils of this unit are suited to the field crops commonly grown in the county. Under improved management they can be used frequently for cultivated crops, but special care is needed to keep them in good tilth. Maintenance of good soil tilth should also be emphasized where only average management is used.

These soils are suited to hay and pasture plants that can tolerate soil wetness. They are poorly suited to alfalfa and other legumes that have a taproot, because the taproot cannot develop properly and frost heaving is likely to cause damage.

Grazing in spring when the soils are wet is likely to cause soil compaction and to result in reduced yields in the pastures.

CAPABILITY UNIT IIIw-8

In this capability unit are nearly level, light-colored, poorly drained Frenchtown and Sebring soils. The Frenchtown soil contains a moderately deep to shallow compact layer, or fragipan. The Sebring soil is underlain by compact glacial till at a moderate depth, and it also contains a fragipan in some places. Both of these soils have a moderately deep to shallow root zone, medium to low available moisture capacity, and slow or very slow permeability. They are among the soils of this county that have the lowest natural fertility and that are the most strongly acid.

The major limitation to use of these soils for crops is seasonal wetness of long duration. These soils can be satisfactorily tilled only within a narrow range of moisture content. The rather unstable structure of the surface soil tends to deteriorate if the soils are frequently cultivated. Row crops are commonly damaged by drought during dry periods.

Areas of these soils that are drained are suited to the field crops commonly grown in the county. Under improved management cultivated crops can be grown frequently, but special care is needed to maintain good soil structure. Undrained areas are much less suitable for crops than areas that are drained.

These soils are suited to pasture and hay plants that can tolerate seasonal wetness. They are poorly suited to alfalfa and other legumes that have a taproot. Drainage generally improves the soils for pasture. Pasturing these soils when wet is likely to cause soil compaction. It is also likely to result in reduced yields of forage.

CAPABILITY UNIT IVe-1

Light-colored, well-drained Chili and Wooster soils that are moderately steep are in this capability unit. The Chili soil contains sand and gravel. It has moderately rapid permeability, a moderately deep root zone, and medium available moisture capacity. The Wooster soil has formed in loamy glacial till. It has moderate permeability, a deep root zone, and high available moisture capacity.

Use of these Chili and Wooster soils for crops is limited by a very severe hazard of erosion. Runoff is rapid on these sloping soils. The Wooster soil is already moderately eroded.

Soils of this unit are suited to the field crops commonly grown in the county. Crops that require cultivation should be grown only occasionally, however, because control of erosion is difficult in cultivated fields. Only improved management should be used if cultivated crops are grown.

These soils are well suited to the commonly grown hay and pasture plants. An adequate cover of plants must be maintained in the pastures to protect the soils from erosion.

CAPABILITY UNIT IVe–2

This capability unit consists of light-colored, well-drained Loudonville and Muskingum soils that are moderately steep or steep. These soils are mostly moderately deep over sandstone or shale. They have a moderately deep root zone, low available moisture capacity, and moderate or moderately rapid permeability.

Soils of this unit are moderately eroded. Runoff is rapid, and the hazard of further erosion is very severe if cultivated crops are grown. During dry periods crops grown on these soils may be damaged by drought.

These soils are not well suited to row crops. A row crop may be grown occasionally if a pasture is to be reseeded, but control of erosion is difficult. The soils are suited to the pasture and hay plants commonly grown in the county, but as a rule, these plants do not grow well late in summer, because the supply of moisture is generally low. Maintaining an adequate cover of plants in the pastures is necessary to protect the soils from erosion.

CAPABILITY UNIT IVe–3

This capability unit is composed of sloping, moderately well drained Ellsworth and Geeburg soils that have formed in clay loam or clay glacial till. These soils have a clayey subsoil. As a result, permeability is slow or very slow, and these soils are saturated with water during winter and spring. The clayey subsoil also restricts the growth of roots. The root zone is only moderately deep. Within the root zone, the available moisture capacity is medium.

Some areas of these soils are already moderately eroded, and the hazard of further erosion is very severe. The soils can be satisfactorily tilled only within a narrow range of moisture content. They become cloddy if tilled when wet, and they are subject to compaction if they are tilled or pastured when wet.

Soils of this unit are poorly suited to row crops, but row crops can be grown occasionally if a pasture or hayfield is to be reseeded. The soils are well suited to most of the commonly grown pasture and hay plants. They are only moderately well suited to alfalfa and other legumes that have a taproot, because of the limited depth to which the taproot can penetrate, and because of the danger of frost heaving. An adequate cover of plants is needed to control erosion in the pastures. Large areas of the Geeburg soils are idle.

CAPABILITY UNIT IVe–4

Rittman silt loam, 12 to 18 percent slopes, moderately eroded, is the only soil in this capability unit. This soil is light colored and moderately well drained, and it has a distinct fragipan in the subsoil. Because of this dense, compact fragipan, permeability is slow, the root zone is only moderately deep, and the available moisture capacity is medium. A seasonal high water table is perched above the pan, and a significant lateral movement of water takes place along the top of the pan. Some seep spots are on the lower slopes where the pan is close to the surface.

This soil is already moderately eroded, and the hazard of further erosion is very severe if cultivated crops are grown. Runoff is rapid, and the volume of runoff increases when the soil material above the fragipan is saturated.

This soil is poorly suited to row crops, but it can be used occasionally for a row crop if a pasture or hayfield is to be reseeded. This soil is well suited to most pasture and hay plants commonly grown in the county. It is only moderately well suited to alfalfa and other legumes that have a taproot, however, because development of the taproot is restricted by the fragipan. An adequate cover of plants is needed in pastures and hayfields to control erosion.

CAPABILITY UNIT IVw–1

In this capability unit are nearly level or gently sloping, poorly drained Canadice and Trumbull soils. These soils have a clayey subsoil and are very slowly permeable. Their root zone is moderately deep to shallow in areas that are drained, and it is shallow in areas that are not artificially drained. The available moisture capacity is medium to high. These soils are saturated with water during winter and spring.

Wetness is a very severe hazard to crops because these soils are normally difficult to drain. Even where the soils are artificially drained, they can be satisfactorily tilled only within a narrow range of moisture content. The surface layer generally is in poor tilth. Maintaining good soil structure is important.

These soils are suited to many of the commonly grown field crops, but they are not well suited to row crops. Under improved management, however, cultivated crops can be grown. The soils are well suited to pasture and hay plants that can tolerate soil wetness, but they are poorly suited to alfalfa. Soil compaction results if these soils are pastured when wet.

CAPABILITY UNIT VIe–1

This capability unit consists of sloping to steep, light-colored Ellsworth and Geeburg soils that are moderately well drained. These soils have a clayey subsoil. They have medium available moisture capacity, slow or very slow permeability, and a moderately deep root zone.

A very severe hazard of erosion makes these soils very poorly suited to cultivation. The soils can be used for pasture or hay if an adequate cover of plants is maintained to provide protection from erosion. They are only moderately well suited to alfalfa and other legumes that have a taproot, but they are suited to other grasses and legumes commonly grown for hay or pasture. To prevent soil compaction, grazing should be limited in spring, when the soils are wet.

CAPABILITY UNIT VIe–2

In this capability unit are light-colored, steep or very steep Chili, Conotton, Dekalb, Muskingum, and Wooster soils that are well drained. These soils have medium to low available moisture capacity, a shallow to deep root zone, and moderate to rapid permeability.

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Most areas of these soils are already moderately eroded, and a hazard of further erosion is the greatest limitation to their use. Where the slopes are steeper than 25 percent, there is a severe hazard to use of heavy equipment.

The hazard of further erosion is too serious for these soils to be suitable for cultivated crops. The soils are suitable for pasture if a dense cover of plants is maintained to provide protection from erosion. The Dekalb soil is mostly in trees.

CAPABILITY UNIT VIe-2

This capability unit consists of one gently sloping or sloping Dekalb soil and of gently sloping to moderately steep Strip mine spoils. The Dekalb soil is very stony. Strip mine spoils consist of glacial till and of excavated siltstone, shale, and sandstone. They contain many fragments of rock, but enough fine-textured soil material to support plants is between the rocks. The largest rocks have been removed during grading operations. Some areas of Strip mine spoils consisting of shale and sandstone contain material that is toxic to plants. Mostly, the Dekalb soil has moderately rapid permeability, a moderately deep root zone, and low available moisture capacity. Permeability ranges from slow to rapid in the areas of Strip mine spoils, and the available moisture capacity is mostly medium. The root zone varies in depth.

The large number of stones and susceptibility to erosion are limitations to use of the Dekalb soil. Unfavorable characteristics of the soil material are the major limitation to use of Strip mine spoils. These land types are droughty in dry periods, and erosion is a hazard in the sloping areas. Generally, these areas are too rough for the use of equipment needed for harvesting hay.

Soils of this unit are not used for general farm crops. The Dekalb soil is used largely for trees, and some areas of Strip mine spoils have been graded and planted to grass or trees. An adequate cover of plants is needed to help to control erosion where Strip mine spoils are used for pasture.

CAPABILITY UNIT VIIe-1

This capability unit consists of very steep, well-drained Chili, Conotton, and Dekalb soils that are moderately deep to shallow over gravelly and sandy material or bedrock. These soils have moderately rapid or rapid permeability and low or very low available moisture capacity.

The very steep slopes and a very severe hazard of erosion are the major limitations to use of these soils for crops. The soils are mainly in trees, but small areas are in pasture. Where these soils are used for pasture, an adequate cover of plants is needed to control erosion. The carrying capacity of pastures is generally low.

CAPABILITY UNIT VIIe-2

This capability unit consists of moderately well drained, steep or very steep Ellsworth and Geeburg soils that have a clayey subsoil. These soils have very slow permeability, and much of the water from precipitation is lost through the very rapid runoff. The root zone is moderately deep to shallow. The available moisture capacity is medium to low.

Some areas of these soils are already moderately or severely eroded, and the risk of further erosion is very severe. For the most part, slopes are so steep that the use of equipment needed for farming or for planting and harvesting trees is hazardous.

These soils are suitable for native pasture, but only a limited amount of forage is generally obtained. An adequate cover of plants is needed at all times to protect these soils from erosion. The soils are well suited to trees and are chiefly used as woodland.

CAPABILITY UNIT VIIs-1

This capability unit consists of steep areas of Strip mine spoils that are not suitable for farming but that can be used for trees. Numerous stones are on and within the spoils, and the available moisture capacity is very low.

The principal limitation to use of Strip mine spoils is the condition of the soil material. In addition to adverse soil characteristics, erosion is a severe hazard. Areas that are bare contribute much silt and other erosional material to adjacent areas or streams.

These steep Strip mine spoils are suited to some kinds of trees. Black locust is an example of a tree that can be grown.

Estimated yields

Table 1 shows, for most soils in the county, the estimated average acre yields of the principal crops. The yields are averages of those expected over a period of several years under two levels of management. Soils in complex mapping units with Urban land in the Canfield, Chili, Ellsworth, Fitchville, Jimtown, Loudonville, Mahoning, Remsen, Rittman, Sebring, Trumbull, and Wadsworth series are not shown in table 1, because they generally are in nonfarm uses and are not in cultivation. Also excluded from table 1 are the land types Gravel pits, Made land, and Quarries.

In table 1 yields in columns A are obtained under the prevailing, or average, management used by most of the farmers in the county. Those in columns B are obtained under improved management. Even higher yields than those shown in columns B can be obtained by good farm operators if suitable practices are applied intensively and the best information now available is used in managing the soils. Improved management consists of the following practices but does not consider irrigation:

1. Practices that increase the intake of water and the available moisture capacity of the soils. Excess water is disposed of by safe and appropriate means.
2. Practices are used that help to control erosion.
3. Weeds, diseases, and insects are controlled.
4. Fertility is maintained at the highest level. Lime and fertilizer are applied according to the needs of the crop. The fertilizer contains trace elements (zinc, cobalt, manganese, copper, and the like) if these elements are needed.

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

[Yields in columns A are those obtained under the management commonly practiced; those in columns B are yields to be expected under improved management. Dashed lines indicate crop is not commonly grown]

Soil	Corn		Oats		Wheat		Hay		Permanent pasture (bluegrass)		Rotation pasture [1]	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [2]	*Cow-acre-days* [2]	*Cow-acre-days* [2]	*Cow-acre-days* [2]
Bennington silt loam, 2 to 6 percent slopes	55	85	40	74	20	36	2.0	3.5	55	140	100	175
Bogart loam, 2 to 6 percent slopes	65	105	50	74	24	45	3.0	4.0	50	134	150	200
Bogart loam, 6 to 12 percent slopes	60	95	38	58	24	39	2.7	3.5	40	125	135	175
Bogart loam, till substratum, 2 to 6 percent slopes	67	105	45	70	26	42	3.2	4.3	50	134	160	215
Bogart loam, till substratum, 6 to 12 percent slopes, moderately eroded	55	92	34	59	20	35	2.6	3.5	35	120	130	175
Canadice silty clay loam	40	70	36	60	18	28	1.5	3.0	30	100	75	150
Canfield silt loam, 2 to 6 percent slopes	65	95	60	76	26	40	3.0	4.0	50	134	150	200
Canfield silt loam, 6 to 12 percent slopes	65	92	55	71	22	38	2.6	3.8	40	125	130	190
Canfield silt loam, 6 to 12 percent slopes, moderately eroded	60	90	55	65	18	35	2.0	3.5	35	120	100	175
Cardington silt loam, 2 to 6 percent slopes	65	82	50	75	26	42	2.5	3.8	50	134	125	165
Cardington silt loam, 6 to 12 percent slopes, moderately eroded	60	80	46	72	24	38	2.5	3.5	35	120	125	175
Carlisle muck	80	120	55	80	32	40	3.7	4.7	50	135	160	235
Chagrin loam	70	100	30	74	26	42	2.5	4.5	60	150	125	225
Chili gravelly loam, 2 to 6 percent slopes	46	78	36	55	22	34	2.3	3.1	30	100	115	155
Chili gravelly loam, 6 to 12 percent slopes	45	75	30	46	20	32	1.5	3.0	20	90	75	150
Chili gravelly loam, 12 to 18 percent slopes	40	60	25	35	17	30	1.3	2.5	---	---	65	125
Chili loam, 2 to 6 percent slopes	55	90	54	74	25	37	3.0	3.5	45	128	150	175
Chili loam, 6 to 12 percent slopes	50	85	50	76	23	35	2.8	3.3	40	122	140	165
Chili and Conotton gravelly soils, 18 to 25 percent slopes	---	---	10	20	10	20	1.0	1.5	20	75	50	75
Chili and Conotton gravelly soils, 25 to 50 percent slopes	---	---	---	---	---	---	.8	1.0	20	65	40	50
Condit silt loam	40	80	36	62	16	30	1.5	3.0	30	100	75	150
Damascus loam	44	81	28	54	16	33	1.7	2.9	35	120	85	145
Damascus loam, till substratum	42	80	26	54	14	31	1.7	2.9	35	120	85	145
Dekalb very stony loam, 2 to 12 percent slopes	---	---	---	---	---	---	---	---	15	40	---	---
Dekalb very stony loam, 12 to 25 percent slopes	---	---	---	---	---	---	---	---	15	40	---	---
Dekalb very stony loam, 25 to 50 percent slopes	---	---	---	---	---	---	---	---	10	30	---	---
Ellsworth silt loam, 2 to 6 percent slopes	45	75	46	70	22	36	2.0	3.0	40	125	100	150
Ellsworth silt loam, 6 to 12 percent slopes	40	72	40	65	16	32	1.8	2.5	35	115	90	125
Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded	35	65	30	56	15	29	1.5	2.2	25	100	75	110
Ellsworth silt loam, 12 to 18 percent slopes, moderately eroded	---	---	20	30	12	25	1.2	1.9	20	90	55	95
Ellsworth silt loam, 18 to 25 percent slopes, moderately eroded	---	---	---	---	---	---	1.0	1.7	20	85	---	---
Ellsworth silt loam, 25 to 50 percent slopes	---	---	---	---	---	---	---	---	15	70	---	---
Ellsworth silty clay loam, 25 to 50 percent slopes, severely eroded	---	---	---	---	---	---	---	---	10	50	---	---
Fitchville silt loam, 0 to 2 percent slopes	55	92	45	70	20	34	2.5	4.0	55	140	125	200
Fitchville silt loam, 2 to 6 percent slopes	50	90	45	70	18	33	2.5	4.0	55	140	125	200
Fitchville silt loam, till substratum, 2 to 6 percent slopes	52	88	44	70	20	34	2.5	4.0	55	140	125	400
Frenchtown silt loam	40	70	30	55	14	29	1.5	2.5	35	120	75	125
Geeburg silt loam, 2 to 6 percent slopes	40	65	40	65	20	30	1.8	3.0	30	100	90	150
Geeburg silt loam, 2 to 6 percent slopes, moderately eroded	40	60	38	60	18	26	1.7	2.7	25	85	85	135
Geeburg silt loam, 6 to 12 percent slopes	40	56	37	62	17	28	1.6	2.6	25	85	80	130
Geeburg silt loam, 12 to 18 percent slopes	---	---	---	---	---	---	---	---	20	75	---	---
Geeburg silty clay loam, 6 to 12 percent slopes, moderately eroded	35	50	35	56	14	25	1.3	2.3	20	75	65	115
Geeburg silty clay loam, 6 to 12 percent slopes, severely eroded	---	---	---	---	---	---	---	---	10	50	---	---
Geeburg silty clay loam, 12 to 18 percent slopes, moderately eroded	---	---	---	---	---	---	---	---	15	65	---	---
Geeburg silty clay loam, 18 to 25 percent slopes, moderately eroded	---	---	---	---	---	---	---	---	10	40	50	100
Glenford silt loam, 2 to 6 percent slopes	60	95	50	76	24	40	3.0	4.0	50	134	150	200
Glenford silt loam, 6 to 12 percent slopes, moderately eroded	50	90	27	57	16	33	2.0	3.3	35	120	100	165
Hornell silt loam, 2 to 6 percent slopes	45	85	40	60	20	30	2.0	3.0	45	125	100	150
Jimtown loam, 0 to 2 percent slopes	60	95	45	70	22	38	2.3	4.0	55	140	125	200

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

Soil	Corn		Oats		Wheat		Hay		Permanent pasture (bluegrass)		Rotation pasture [1]	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [2]	*Cow-acre-days* [2]	*Cow-acre-days* [2]	*Cow-acre-days* [2]
Jimtown loam, 2 to 6 percent slopes	55	95	40	65	22	38	2.5	4.0	55	140	125	200
Jimtown loam, till substratum, 2 to 6 percent slopes	52	92	38	63	21	36	2.5	4.0	55	140	125	200
Kerston muck	80	120	55	80	32	40	3.7	4.7	50	135	160	235
Lobdell loam	70	110	50	74	26	40	2.5	4.5	60	150	125	225
Lorain silty clay loam	75	110	56	74	26	42	3.5	4.5	75	180	175	225
Loudonville loam, 2 to 6 percent slopes	65	92	55	75	24	40	3.2	4.3	48	132	160	215
Loudonville loam, 6 to 12 percent slopes, moderately eroded	60	85	46	68	22	35	3.0	4.0	20	90	150	200
Loudonville loam, 12 to 18 percent slopes, moderately eroded	40	60	20	40	17	33	2.2	3.4	20	80	110	170
Loudonville loam, 18 to 25 percent slopes, moderately eroded	32	---	14	27	14	27	1.6	2.2	15	75	80	110
Luray silt loam	70	110	50	74	22	40	3.5	4.5	80	200	175	225
Luray silty clay loam	73	110	52	76	24	40	3.5	4.8	80	200	175	240
Mahoning silt loam, 0 to 2 percent slopes	40	80	40	62	20	30	2.0	3.0	45	125	100	150
Mahoning silt loam, 2 to 6 percent slopes	40	80	40	62	20	30	2.0	3.0	45	125	100	150
Marengo silty clay loam	70	105	50	72	24	40	2.5	4.5	85	210	125	225
Muskingum channery silt loam, 2 to 6 percent slopes	60	85	45	65	24	40	2.8	3.5	25	90	140	175
Muskingum channery silt loam, 6 to 12 percent slopes, moderately eroded	45	75	34	60	20	34	2.5	3.0	15	80	125	150
Muskingum channery silt loam, 12 to 18 percent slopes, moderately eroded	31	55	18	32	18	30	1.8	2.6	15	75	90	130
Muskingum channery silt loam, 18 to 25 percent slopes, moderately eroded	---	---	12	24	12	24	1.6	2.1	15	70	80	105
Muskingum channery silt loam, 25 to 50 percent slopes, moderately eroded	---	---	---	---	---	---	---	---	10	50	---	-
Olmsted loam	80	115	55	70	30	44	3.5	4.5	85	220	175	225
Orrville silt loam	57	95	42	67	25	36	2.7	3.5	55	140	135	175
Papakating silt loam	60	110	46	65	24	40	3.0	4.5	85	210	150	225
Papakating silty clay loam	57	107	44	63	22	38	3.0	4.5	85	210	150	225
Ravenna silt loam 0 to 2 percent slopes	62	87	48	72	22	34	2.3	3.3	55	140	115	165
Ravenna silt loam, 2 to 6 percent slopes	60	85	50	72	23	35	2.2	3.2	55	140	110	160
Remsen silt loam, 0 to 2 percent slopes	35	70	33	56	16	26	1.8	2.8	40	115	90	140
Remsen silt loam, 2 to 6 percent slopes	30	65	35	58	18	28	1.8	2.8	40	115	90	140
Rittman silt loam, 2 to 6 percent slopes	55	85	50	70	22	38	2.5	3.5	45	130	125	175
Rittman silt loam, 6 to 12 percent slopes	48	75	30	55	20	36	2.1	3.1	37	122	105	155
Rittman silt loam, 6 to 12 percent slopes, moderately eroded	43	70	26	50	17	34	1.8	2.8	30	115	90	140
Rittman silt loam, 12 to 18 percent slopes, moderately eroded	35	55	20	35	16	28	1.6	2.5	20	100	80	125
Sebring silt loam	53	75	40	62	22	30	2.0	3.0	30	100	100	150
Sebring silt loam, till substratum	52	72	37	59	20	28	1.8	2.8	30	100	90	140
Strip mine spoils, shale and sandstone materials, undulating	---	---	---	---	---	---	---	---	---	---	---	---
Strip mine spoils, shale and sandstone materials, rolling	---	---	---	---	---	---	---	---	---	---	---	---
Strip mine spoils, shale and sandstone materials, steep	---	---	---	---	---	---	---	---	---	---	---	---
Strip mine spoils, loamy till materials, undulating	---	---	---	---	---	---	---	---	10	30	---	---
Strip mine spoils, loamy till materials, rolling	---	---	---	---	---	---	---	---	8	25	---	---
Strip mine spoils, loamy till materials, steep	---	---	---	---	---	---	---	---	20	50	---	---
Strip mine spoils, clayey till materials, undulating	---	---	---	---	---	---	---	---	10	30	---	---
Trumbull silt loam, 0 to 2 percent slopes	40	70	36	60	18	28	1.5	2.5	35	110	75	125
Trumbull silt loam, 2 to 6 percent slopes	40	70	36	60	18	28	1.5	2.5	35	110	75	125
Wadsworth silt loam, 0 to 2 percent slopes	45	85	46	66	20	32	2.0	3.5	50	134	100	175
Wadsworth silt loam, 2 to 6 percent slopes	47	85	48	66	20	32	2.0	3.5	50	134	100	175
Wayland silt loam	50	80	40	56	20	30	1.5	3.0	40	120	75	150
Wooster loam, 25 to 50 percent slopes, moderately eroded	---	---	---	---	---	---	---	---	20	70	---	---
Wooster silt loam, 2 to 6 percent slopes	75	100	60	78	30	46	3.5	4.5	50	134	175	225
Wooster silt loam, 6 to 12 percent slopes, moderately eroded	65	90	50	78	26	40	2.7	3.7	35	120	135	185
Wooster silt loam, 12 to 18 percent slopes, moderately eroded	48	75	25	50	20	32	1.9	3.3	25	100	95	165
Wooster silt loam, 18 to 25 percent slopes, moderately eroded	---	---	35	48	17	26	1.8	3.0	20	80	90	150

[1] Rotation pasture means pasture crops that are grown as part of a planned cropping system.

[2] Cow-acre-days is the number of days in a grazing season that 1 acre will provide grazing for one cow, steer, or horse; five hogs; or seven sheep or goats without damage to the pasture.

5. Crop varieties that are suited to the soils are selected.
6. All farming operations are done at the proper time and in the proper way.

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

The yields shown 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 guide that shows relative productivity of the soils, the response of the soils to management, and the relationship of soils to each other. The general level of crop yields may change as new methods and new crop varieties are developed, but the relationship of the soils to each other is not likely to change.

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 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.

Use of the Soils as Woodland [2]

This part of the survey describes the present woodland in Mahoning County, indicates the potential of the various soils for growing trees, and gives other facts about suitability of the soils for producing wood products, including maple sirup and Christmas trees. Most of this information is presented in table 2.

The area that is now Mahoning County was mainly in trees when the first settlers arrived. Most of the soils still have potential for woodland use, but most areas of the county have been cleared and cultivated.

[2] A. NORRIS QUAM, woodland conservationist, Soil Conservation Service, assisted in the preparation of this section.

TABLE 2.—*Potential productivity, suitable trees, and hazards by woodland suitability groups of soils*

[Dashes indicate that data are not available or that soils are not used as woodland or are not suitable for trees]

Woodland suitability group, soil series, and mapping symbol	Potential productivity based on measured woodland trees			Preferred species		Seedling mortality	Plant competition	Equipment limitations
	Species	Site index range	Growth in board feet per acre per year	To favor in natural stands	For planting			
Group 1: Bogart (BgB, BgC, BtB, BtC2). Canfield (CdB, CdC, CdC2). Cardington (CgB, CgC2). Chagrin (Ck).[1] Chili (ClB, ClC, ClD, CmB, CmC). Glenford (GfB, GfC2.). Lobdell (Lb).[1] Loudonville (LdB, LdC2, LdD2), LdE2). Wooster (WrF2, WsB, WsC2, WsD2, WsE2).	Red oak Sugar maple Tulip-poplar Black cherry	75–90 65–75 85–95 85–95	300 --- --- ---	Red oak, tulip-poplar, ash, cucumbertree, cherry, sugar maple.	White pine, Norway spruce.	Moderate on the droughty Chili gravelly loams; slight on the other soils.	Severe where grapevines and thornapples grow; slight to moderate in other areas.	Slight to moderate.
Group 2: Ellsworth (ElB, ElC, ElC2, ElD2, ElE2, ElF, EsF3). Geeburg (GbB, ~~GbB2~~, ~~GbC~~, ~~GbD~~, GeC2, GeC3, GeD2, GeE2). Hornell (HoB). Mahoning (MgA, MgB). Remsen (ReA, ReB). Rittman (RsB, RsC, RsC2, RsD2).	Red oak Red pine White pine	65–80 65–75 65–75	260 --- ---	Red oak, white oak, ash, tulip-poplar.	Red pine, white pine, Norway spruce.	Severe on the Remsen and Mahoning soils because of frost heaving; moderate on the other soils.	Moderate on the somewhat poorly drained Remsen and Mahoning soils; slight on the other soils.	Moderate.

TABLE 2.—*Potential productivity, suitable trees, and hazards by woodland suitability groups of soils*—Continued

Woodland suitability group, soil series, and mapping symbol	Potential productivity based on measured woodland trees: Species	Site index range	Growth in board feet per acre per year	Preferred species: To favor in natural stands	For planting	Seedling mortality	Plant competition	Equipment limitations
Group 3: Chili and Conotton (CnE, CnF). Muskingum (MsB, MsC2, MsD2, MsE2, MsF2).	Red oak [2] Red oak [3] White oak [2] White oak [3]	75–85 65–75 75–85 65–75	260 170 260 170	Red oak, white oak, sugar maple.	White pine	Moderate on the droughty, coarse-textured Conotton soils; slight on the other soils.	Slight	Slight on slopes of less than 20 percent; moderate on slopes of 20 to 35 percent; severe on slopes of 35 to 50 percent.
Group 4: Dekalb (DkC, DkE, DkF).	Red oak [2] Red oak [3] White oak [2] White oak [3] Tulip-poplar [4]	75–85 65–75 75–85 65–75 85–95	260 170 260 170 ---	Red oak, white oak, cucumbertree, tulip-poplar, white ash, hemlock.	White pine	Slight	Slight	Severe.
Group 5: [4] Canadice (Ca). Condit (Ct.). Damascus (Da, Dc). Frenchtown (Fr). Sebring (Sb, Se). Trumbull (TrA, TrB). Orrville (Ov).	Red oak Pin oak	75–85 85–95	300 ---	Red oak, pin oak, swamp white oak, white ash, red maple, rock elm.	Northern white-cedar, cottonwood, white ash.	Severe	Severe	Severe.
Group 6: Lorain (Lc). Luray (Ls, Ly). Marengo (Mn). Olmsted (Od). Papakating (Pa, Pc). Wayland (Wc).	Pin oak	75–85	300	Pin oak, swamp white oak, white ash, red maple, rock elm.	White ash, cottonwood, northern white-cedar.	Severe	Severe	Severe.
Group 7: [4] Bennington (BeB). Fitchville (FcA, FcB, FhB). Jimtown (JtA, JtB, JuB). Ravenna (RaA, RaB). Wadsworth (WaA, WaB).	Red oak	75–85	300	Ash, red oak, red maple, rock elm, tulip-poplar, cucumbertree, red elm.	Norway spruce, white pine.	Moderate to severe.	Moderate to severe.	Moderate to severe.
Group 8: Carlisle (Ch). Kerston (Km).	-----	-----	---	----	----	----	-----	
Group 9: Strip mine spoils (SsB, SsC, SsF, StB, StC, StF, SuB).	-----	-----	---	----	---	----	-----	

[1] The Chagrin, Orrville, Papakating, and Lobdell soils are subject to flooding.

[2] Potential productivity is for trees of this species growing on slopes that face north and east—the cool, moist exposures.

[3] Potential productivity is for trees of this species growing on slopes that face south and west—the hot, dry exposures.

[4] Windthrow is a moderate hazard to trees growing on soils of this group.

In 1958 about 20 percent of the county was classed as woodland, according to the Conservation Needs Inventory for that year. The present woodland consists of second-growth trees of many different ages. Many of the farm woodlots contain fine stands of trees. Other poorly stocked woodlots have been pastured, destructively harvested, or otherwise mismanaged in the past. Many areas that formerly were in crops or pasture are now reverting to brush. If these areas are properly managed, they eventually can become productive woodland. Strip mining and housing developments continue to expand into areas of woodland, as they have in the past.

Woodland in the eastern and southern parts of the county is mostly of the beech-maple type. Trees on the well drained and moderately well drained soils are mainly beech, sugar maple, red maple, ash, and elm. Mixed with these trees are smaller numbers of tulip-poplar, cucumber, cherry, hickory, and red and white oaks, growing singly or in small groups. Stands of black birch, yellow birch, and hemlock are in gorges and deep ravines. On bottom lands and in swamps, the stands contain a higher proportion of white elm, red maple, butternut, pin oak, and swamp white oak than stands in areas where the soils are better drained.

Woodland in the northwestern part of the county consists mostly of oaks growing on soils that have a clayey subsoil. A greater variety of trees—beech, maple, hickory, ash, and elm mixed with oak—grow on the limited areas of shallow soils and on soils that have a coarse-textured to medium-textured subsoil than on soils that have a clayey subsoil. The wet, clayey soils in swamps and the poorly drained soils on bottom lands support almost pure stands of pin and swamp white oaks (fig. 5). On the well-drained soils of bottom lands and terraces, a greater number of beeches and maples are generally mixed with the oaks than in the wet areas.

***Figure 5.*—Swamp white oak and pin oak on a poorly drained Trumbull soil.**

Woodland suitability groups

To assist owners of woodland in planning the use of their soils, the soils of Mahoning County have been placed in nine woodland suitability groups (see table 2). Each group is made up of soils that are similar in potential productivity, that are suitable for similar kinds of trees, and that require similar management.

Some mapping units were not placed in a woodland suitability group, because they are not suited to trees or their characteristics are too variable for rating. Mapping units not placed in a woodland suitability group are Gravel pits (Gp); Made land (Ma); Quarries (Qu); and areas of Urban land mapped with the Chili (CoB, CoC), Ellsworth (EuB), Fitchville (FlB), Jimtown (JwB), Loudonville (LrB, LrC), Mahoning (MhB), Remsen (RmB), Rittman (RuB), Sebring (Sg), Trumbull (Tu), and Wadsworth (WbB) soils. The woodland suitability group in which any mapping unit has been placed can be determined by referring to the "Guide to Mapping Units" at the back of this survey.

Because of the higher temperature and lower moisture content of the soils, ridgetops and the uppermost one-third of all slopes, as well as slopes that face south, southwest, and west, tend to be less suitable for trees than lower slopes that face north and east.

Table 2 gives data about potential productivity of trees generally growing on soils of woodland groups 1 through 7. The site index is a measure of potential productivity. The site index values shown in table 2 refer to the total height, in feet, that the dominant and codominant trees of the stated species, growing in a well-stocked, natural stand on a specified group of soils, will attain in 50 years. The site indexes shown were determined through measurement of trees growing in wooded tracts in this county and surrounding counties. Age and height measurements were then correlated to standard curves of site indexes available in published technical literature (*3, 5, 6, 7, 8, 12*).[3] The values for potential board-foot production are for trees in a fully stocked, mixed stand of unmanaged upland oaks and associated species at 100 years of age, Scribner rule. They were obtained from USDA Technical Bulletin 560 (*12*).

Site indexes were not indicated for woodland suitability groups 8 and 9. Woodland suitability group 8 is composed of organic soils that generally are not used as woodland or that have a low potential for the growth of trees. Woodland suitability group 9 is com-

[3] Italic numbers in parentheses refer to Literature Cited, p. 121.

posed of Strip mine spoils. Soil material in areas of Strip mine spoils is generally badly mixed, and the surface layer of the original soil is buried deep beneath other material. In many places the present surface layer is highly acid, low in fertility, and subject to high temperature in summer. Before trees are planted, the spoil material should be analyzed and the site properly prepared. Then, kinds of trees that can best survive in a difficult environment should be selected for planting. Assistance in reestablishing vegetation on areas of Strip mine spoils is available from the Soil Conservation Service and from the Ohio Department of Natural Resources, Division of Forestry and Reclamation.

For each woodland suitability group, the preferred species to favor in natural stands, and suitable trees for planting, are shown in table 2. A preferred species is one that grows naturally, is hardy and long lived, is desirable for shade and recreational use, and can eventually be harvested for wood products. In thinning operations trees of the preferred species would be favored over other trees if they are sound and of good form. Evergreens and deciduous trees suggested for planting are those that are adapted to the soils and that have been successfully grown in the county from planted stock.

The relative difficulty of reestablishing a stand of desirable hardwood trees by natural regeneration is shown for each woodland group of soils in terms of expected seedling mortality. Seedling mortality is the failure of seedlings to survive and grow after natural seeding has taken place or after seedlings have been planted. Mortality is *severe* if the soil is so wet, droughty, or otherwise unsuitable that more than 50 percent of the seedlings die, or if trees regenerate in numbers that limit stocking of desirable species to less than 50 percent. It is *moderate* if 25 to 50 percent of the seedlings die, or if trees regenerate in numbers that limit the restocking of desirable species to 50 to 75 percent. It is *slight* if not more than 25 percent of the seedlings die, or if trees regenerate in numbers that indicate natural restocking of desirable species will probably exceed 75 percent.

Plant competition refers to the degree that weeds and brush invade and compete with desirable trees after trees are harvested or an opening is made in the crown canopy. Competition is *severe* if it prevents adequate restocking, either natural or artificial, without intensive preparation of the site and without special maintenance practices, including weeding. Competition is *moderate* if it delays the establishment of seedlings and slows their growth, either in naturally occurring or planted stands, but if it does not prevent the eventual development of a normal, fully stocked stand. It is *slight* if natural regeneration and early growth are not prevented, or if unwanted plants do not interfere with the normal development of planted seedlings. Encroachment of unwanted species alters the eventual composition of the new crop of trees and may seriously reduce the future value of the stand.

Equipment limitation refers to soil characteristics that restrict or prohibit the use of equipment commonly needed for tending and harvesting wood crops. Among these characteristics are steep slopes, soil texture, stones or other obstructions, and soil wetness. The limitation is *severe* if trafficability is severely restricted by one or more unfavorable soil characteristics or if special equipment is needed. It is *moderate* if the use of ordinary equipment is restricted by one or more unfavorable soil characteristics, but to a lesser degree than where the rating is *severe*. Equipment limitation is *slight* if there is little or no restriction on the type of equipment used or the time of year that equipment can be used as the result of adverse soil characteristics.

The hazards of windthrow and erosion, and suitability for special products, are not rated in table 2. The hazard of windthrow depends on the development of tree roots and on the capacity of a soil to hold trees firmly. In this county trees are moderately susceptible to windthrow on the soils of suitability group 4, and they are slightly susceptible on the soils of the other woodland suitability groups. The hazard of erosion is *severe* in wooded areas where the slopes are steeper than 25 percent; *moderate* where slopes are 18 to 25 percent; and *slight* where slopes are less than 18 percent. Most of the soils in the woodland suitability groups are slightly susceptible to erosion. The hazard increases where openings are made in wooded areas.

Special products that can be obtained from trees grown on the soils of woodland suitability group 1 are maple sap for conversion to maple sirup and maple sugar, and Christmas trees on the soils of suitability groups 1 and 3.

Use of the Soils for Wildlife [4]

The principal kinds of wildlife in Mahoning County are cottontail rabbit, ringneck pheasant, raccoon, whitetail deer, fox squirrel, muskrat, woodchuck, and various species of waterfowl. Other species of wildlife are beaver, red fox, opossum, mourning dove, bobwhite quail, woodcock, skunk, mink, weasel, ruffed grouse, and gray squirrel. Many songbirds and small nongame animals also inhabit the county. Compared to the populations of these same animals and game birds in the rest of the State, the population of rabbit is medium; pheasant, low; gray squirrel, low to medium; fox squirrel, medium to high; deer, high; and grouse, low.

The population of game animals varies within the county, depending on the kinds of soils, topography, supply of food, and amount of cover. Some kinds of soils are frequented more extensively by a particular species of wildlife than by other kinds. For example, the predominantly well-drained soils are the habitat of ground-nesting birds. The poorly drained soils are the habitat of species of wildlife that need or can tolerate wet conditions.

The use of land for housing developments and for strip mines and other industrial purposes reduces the acreage of cropland and increases the acreage of idle land. Because many wooded tracts and areas formerly used for crops are now used for other purposes, many areas have become less favorable as a natural habitat

[4] Adapted from information supplied by KENNETH ALLEN, game management specialist, Ohio Division of Wildlife, Akron, Ohio.

for wildlife. As a result, the population of wildlife has decreased in those areas.

Game birds and game animals do not remain within the boundaries of a single soil area or soil association, but they may use adjacent areas of soils and adjacent soil associations during a single day. A game bird may nest in one area or association, feed in another, and cross several others while seeking food and cover. It was found, for example, that a tagged pheasant traveled 10 miles during a 4-hour period as it crossed the southern part of the county. In winter as many as 250 pheasants have been counted feeding in a cropped field adjacent to a swamp, and these birds returned to the swamp each night for cover. Deer often travel as far as or farther than pheasant in seeking food and cover.

The wildlife aspects of the county are discussed in the following paragraphs. For purposes of this discussion, the county is divided into two general areas—the southern and eastern parts and the northern and western parts—and it is further broken down by soil associations. For additional information about soil associations, the reader can refer to the section "General Soil Map" and can then turn to the general soil map at the back of this survey.

Southern and eastern parts of the county.—More well-drained soils are in the southern and eastern parts of the county than in other parts. These soils provide suitable habitat for rabbit and pheasant, as well as other kinds of wildlife, and the populations of rabbit and pheasant in these parts of the county are among the largest in the northeastern part of Ohio. In this general area, the Canfield, Ravenna, and Wooster soils of association 1 and the Bogart, Chili, and Jimtown soils of association 6 are well suited to crops and are used mainly for dairy farms, truck farms, and orchards. Many farm ponds are located in these associations.

The small, scattered areas of association 7, which consists mainly of Sebring and Fitchville soils, contain wooded tracts and small areas of swamp. Association 8, which consists mainly of Wayland and Orrville soils, is extensive along Mill Creek and contains streams and large swamps. It is a good habitat for species of wildlife that inhabit wetlands. This association also provides a refuge for upland game birds and game animals, and it provides good nesting sites for mallard, black duck, and bluewing teal. It also supports many duck-hunting clubs.

Association 5 is composed mainly of well-drained Loudonville, Dekalb, and Muskingum soils that provide good habitat for upland game animals and game birds. This association contains wooded areas, cropped fields, and places that are steep and rough. Association 2, consisting mostly of Rittman, Wadsworth, and Frenchtown soils, is a mixture of cropland, wooded tracts, brushy areas, and idle land.

Wooded areas within all these soil associations contain many kinds of trees, and they provide good habitat for wildlife. The main kinds of trees are beech and sugar maple and smaller amounts of ash, elm, cherry, oak, red maple, and tulip-poplar. Shrubs and herbaceous plants are abundant.

The scattered areas of Strip mine spoils, in association 9 in the eastern and southern parts of the county, have a sparse cover of planted grasses and trees, but they are largely bare. The areas provide a range for wildlife that is probably not much disturbed by man. Some pits in these areas are filled with water and are used by various species of wildlife.

The population of pheasant in the southern and eastern parts of the county ranges from 11 to 20 birds per square mile. Twenty-one colonies of beaver have been counted in these parts of the county. Specific information about the numbers of other kinds of wildlife is lacking, but it is known that the population of quail is medium and that the population of deer is low to medium. Grouse are scarce. Fox squirrels are fairly abundant, but the number of gray squirrels is small compared to the number in other counties in the northeastern part of Ohio. Raccoon and muskrat are numerous. Mallard, black duck, wood duck, and bluewing teal are numerous in the marshes along Mill Creek, and many of them nest there. Thousands of migrating waterfowl use the marshes in spring and fall as feeding and resting areas.

Northern and western parts of the county.—These areas contain a higher proportion of poorly drained soils than other parts of the county. Areas of association 3, consisting mainly of Mahoning, Ellsworth, and Trumbull soils, and areas of association 4, consisting mainly of Geeburg, Remsen, and Trumbull soils, occur in a more or less checkerboard pattern. These associations have a higher proportion of poorly drained soils than the other associations. Within these two associations, wooded areas, brushy areas, and idle areas are extensive. Crops occupy a smaller part of the acreage than in other parts of the county. The water in swamps tends to be shallow, and farm ponds are not numerous. The large areas of Trumbull, Remsen, Canadice, and Lorain soils are wet in winter and spring. Floods in spring often destroy nests on the ground, and this hazard severely limits the population of ground-nesting birds. Because these wet areas dry up in summer, wetland types of wildlife are also limited.

A few areas of the Bogart, Chili, and Jimtown soils of association 6 and of the Sebring and Fitchville soils of association 7 in the northern and western parts of the county provide favorable habitat for wildlife because they contain cropped fields and have a supply of water. Three large reservoirs that together have about 40 miles of shoreline attract large numbers of migrating waterfowl and wetland wildlife. These reservoirs are used for water supply and flood control, and as a result the level of the water fluctuates as much as 10 to 20 feet during the year. Such fluctuations reduce the value of these reservoirs as habitat for marine wildlife.

Wooded areas in the northern and western parts of the county consist mainly of white oak, but there are lesser amounts of red oak, hickory, red maple, beech, ash, elm, and cherry. Dense stands of swamp white oak and pin oak grow on the poorly drained soils. Shrubs and herbaceous plants are less abundant here than in other parts of the county.

The population of pheasant ranges from 6 to 10 birds per square mile, but quail and grouse are scarce.

The population of rabbit and gray squirrel is low to medium, and the population of fox squirrel is medium to high. About 20 colonies of beaver have been counted in this general area. Dams constructed by beaver block the surface drainage. As a result, a good habitat is provided for muskrat, mink, raccoon, and waterfowl. Deer are plentiful in this area. They are concentrated in the vicinity of the Meander Creek Reservoir, where hunting is not permitted. The deer migrate from this protected area, however, to the surrounding countryside where hunting is permitted. Each year about 30 to 35 deer are killed legally by hunters, and about the same number are killed accidentally on the highways.

FISH.—Most fishing in the county is concentrated in reservoirs, lakes, and farm ponds. As a rule, streams are low in summer, or they are polluted by effluent from septic tanks, acid material from strip mines, or sewage and industrial wastes.

Bass and bluegill are the main kinds of fish in Pine and Evans Lakes. Walleyed pike and crappie are the main kinds in the Berlin and Milton Reservoirs. These lakes and reservoirs also contain other kinds of pan fish and rough fish. The Meander Creek Reservoir is closed to public fishing.

Lakes are maintained for fishing, and some game birds and game animals are raised, by members of more than 20 hunting and fishing clubs that have headquarters in the county. The county contains many well-stocked farm ponds. Good fishing can be enjoyed in several lakes by paying a fee.

Suitability of the soils for wildlife

In table 3 the soils and land types in the county are rated according to their suitability for elements of wildlife habitat and for kinds of wildlife. Not rated in the table are the land types Gravel pits, Made land, and Quarries, and the soil complexes that contain areas of Urban land.

The natural drainage of the soils was one criterion used for obtaining the ratings given in table 3. Soils

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

[Numerals in columns have the following meaning: 1, well suited; 2, suited; 3, poorly suited; and 4, not suited. Gravel pits (Gp), Made land (Ma), and Quarries (Qu), and the soil complexes that contain Urban land (CeB, CoB, CoC, EuB, FlB, JwB, LrB, LrC, MhB, RmB, RuB, Sg, Tu, and WbB) are not included in this table, because their properties are too variable for rating]

Soils and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Woody plants: Hardwoods	Woody plants: Conifers	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland	Woodland	Wetland
Bennington (BeB)	2	2	1	2	3	3	[1]4	[1]4	1	2	[1]4
Bogart:											
(BgB, BtB)	2	1	1	1	3	3	[1]4	[1]4	1	1	[1]4
(BgC, BtC2)	2	1	1	1	3	4	4	4	1	1	4
Canadice (Ca)	3	2	2	2	2	1	1	2	2	2	1
Canfield (CdB, CdC, CdC2)	2	1	1	1	3	4	4	4	1	1	4
Cardington (CgB, CgC2)	2	1	1	1	3	4	4	4	1	1	4
Carlisle (Ch)	4	4	4	4	4	1	1	1	4	4	1
Chagrin (Ck)	2	1	1	1	3	4	4	4	1	1	4
Chili:											
(ClB, ClC, CmB, CmC)	2	1	1	2	3	4	4	4	1	2	4
(ClD, CnE, CnF)	3	2–3	2–3	2–3	3	4	4	4	2–3	3–4	4
Condit (Ct)	3	2	2	2	2	1	1	2	2	2	1
Damascus (Da, Dc)	4	3	3	1	1	1	1	2	3	1	1
Dekalb (DkC, DkE, DkF)	4	3	2	2	2	4	4	4	3	2	4
Ellsworth:											
(ElB, ElC, ElC2)	2	1	1	1	3	4	4	4	1	1	4
(ElD2, ElE2)	3	2	2	1	3	4	4	4	2	2	4
(ElF, EsF3)	4	3	2	2	3	4	4	4	3	3	4
Fitchville:											
(FcA)	2	2	1	1	3	2	2	2	1	2	2
(FcB, FhB)	2	2	1	1	3	3	[1]4	[1]4	1	2	[1]4
Frenchtown (Fr)	3	2–3	2	2	2	1	1	2	3	2	1
Geeburg:											
(GbB, GbB2, GbC, GeC2)	2	2	2	1	3	4	4	4	2	2	4
(GbD, GeC3, GeD2)	4	2	2	1	3	4	4	4	3	2	4
(GeE2)	4	2	2	1	3	4	4	4	3	2	4

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

Soils and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Woody plants: Hardwoods	Woody plants: Conifers	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland	Woodland	Wetland
Glenford:											
(GfB)	2	1	1	1	3	3	4	4	1	2	4
(GfC2)	2	1	1	1	3	4	4	4	1	2	4
Hornell (HoB)	2	2	1	1	3	2	4	4	2	2	4
Jimtown:											
(JtA)	2	2	2	1	2	2	2	2	2	1	2
(JtB, JuB)	2	2	2	1	2	3	[1]4	[4]4	2	1	[1]4
Kerston (Km)	4	4	4	4	4	2	1	4	4	4	2
Lobdell (Lb)	2	1	1	1	3	3	3	3	1	1	3
Lorain (Lc)	4	3	3	1	1	1	1	1	3	1	1
Loudonville:											
(LdB, LdC2)	2	2	1	2	2	4	4	4	2	2	4
(LdD2, LdE2)	3	2	2	2	2	4	4	4	2	2	4
Luray (Ls, Ly)	4	3	2	1	1	1	1	1	3	1	1
Mahoning:											
(MgA)	2	2	1	1	3	2	2	2	1	2	2
(MgB)	2	2	1	1	3	3	[1]4	[1]4	1	2	[1]4
Marengo (Mn)	4	3	3	1	1	1	1	1	3	1	1
Muskingum:											
(MsB, MsC2)	2	2	2	2–3	2	4	4	4	2	2	4
(MsD2, MsE2)	3	2	2	2–3	2	4	4	4	2	2–3	4
(MsF2)	4	2	3	2–3	2	4	4	4	3	2–3	4
Olmsted (Od)	4	3	3	1	1	1	1	2	3	1	1
Orrville (Ov)	2	2	2	1	3	3	2	3	2	2	3
Papakating (Pa, Pc)	4	3	3	1	1	1	2	2	3	1	3
Ravenna:											
(RaA)	2	2	1	2	2	2	2	2	1	2	2
(RaB)	2	2	1	2	2	3	[1]4	[1]4	1	2	[1]4
Remsen:											
(ReA)	3	2	2	1	3	2	2	3	2	2	2
(ReB)	3	2	2	1	3	3	[1]4	[1]4	2	2	[1]4
Rittman:											
(RsB, RsC, RsC2)	2	1	1	2	3	4	4	4	1	1	4
(RsD2)	3	2	1	2	3	4	4	4	2	2	4
Sebring (Sb, Se)	3	2	2	1	2	1	1	2	2	1	1
Strip mine spoils:[2]											
(SsB, SsC)	3	3	2	2–3	3–4	4	4	4	3	3–4	4
(SsF, StF)	4	3	3	3–4	3–4	4	4	4	4	4	4
(StB, StC)	3	2	2	2–3	3–4	4	4	4	2	3	4
(SuB)	4	2	2	2–3	3–4	4	4	4	3	3–4	4
Trumbull:											
(TrA)	3	2	2	2	2	1	1	2	3	2	1
(TrB)	3	2	2	2	2	3	4	4	3	2	4
Wadsworth:											
(WaA)	2	2	2	2	2	2	2	3	2	2	2
(WaB)	2	2	2	2	2	3	[1]4	[1]4	2	2	[1]4
Wayland (Wc)	3	2	2	1	2	2	2	2	2	1	2
Wooster:											
(WrF2)	4	2	2	1	3	4	4	4	3	2	4
(WsB, WsC2)	2	1	1	1	3	4	4	4	1	1	4
(WsD2, WsE2)	3	2	1	1	3	4	4	4	2	2	4

[1] Rating is 3 where slopes are 2 to 3 percent.
[2] Because the soil material in Strip mine spoils is variable, only general ratings are given. Onsite inspection is necessary to determine the correct ratings.

that are artificially drained have different ratings than those given in this table. The information given in table 3 is useful in planning the development of wildlife habitat on private or public lands. Additional information about managing wildlife areas can be obtained by requesting it from the local office of the Soil Conservation Service or the Division of Wildlife, Ohio Department of Natural Resources.

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

The following lists important plants or describes each of the elements of wildlife habitat given in table 3 (*1*):

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

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

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

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

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

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

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

Excavated ponds. These are excavations that hold enough water of suitable quality to support fish or wildlife. The ponds should have an average depth of at least 8 feet in at least one-fourth of the area.

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

Openland wildlife. This class consists of birds and mammals that normally make their homes in cultivated fields, pastures, meadows, lawns, and areas overgrown with grasses, herbs, and shrubby plants. Examples are quail, pheasant,

TABLE 4.—*Engineering*

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

Soil name and location	Parent material	Ohio report No.	Depth from surface	Mechanical analyses[1] Percentage passing sieve— 2-inch	¾-inch	No. 4 (4.7 mm.)
			In.			
Bogart:						
Sec. 13, T. 18 N., R 5 W. Smith Township. (Typical profile) (MH-32)	Sandy and gravelly outwash and kames.	79918	7–14	100	93	85
		79919	19–26	-------	100	89
		79920	55–63	-------	100	89
Canfield:						
Near junction of Ohio Turnpike and Tippicanoe Road. Canfield Township. (Typical profile) (MH-3)	Loam glacial till.	79896	0–6	-------	100	-------
		79897	14–21	-------	100	94
		79898	30–36	-------	-------	90
Lot 11, T. 2 N., R. 1 W. Coitsville Township. (Coarser textured than typical profile (MH-26)	Loam glacial till.	43743	1–11	-------	100	99
		43744	11–20	-------	100	91
		43745	41–50	100	99	91
		43746	70–84	100	97	91
Sec. 8, T. 9 N., R. 1 W. Springfield Township. (Finer textured than typical profile) (MH-W54)	Loam glacial till.	81160	2–11	-------	-------	-------
		81161	18–22	100	91	90
		81162	28–35	-------	100	93
		81163	57–67	-------	100	96
Damascus:						
Near junction of Ohio Route No. 625 and Sawmill Run. Boardman Township. (Typical profile) (MH-W42)	Sandy and gravelly outwash and kames.	81147	1–5	-------	100	97
		81148	18–28	-------	100	94
		81149	50–60	100	97	86

meadowlark, cottontail rabbit, red fox, and woodchuck.

Woodland wildlife. This class consists of birds and mammals that normally make their homes in areas wooded with hardwood trees and shrubs, coniferous trees and shrubs, or mixtures of these plants. Examples are ruffed grouse, gray squirrel, raccoon, whitetail deer, woodcock, and miscellaneous songbirds.

Wetland wildlife. This class consists of birds and mammals that normally make their homes in ponds, marshes, swamps, and other wet areas. Examples are muskrat, beaver, and duck, geese, rail, heron, and other waterfowl.

Engineering Uses of Soils [5]

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, the foundations of buildings, facilities for storage of water, 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 characteristics, grain size, plasticity, and pH. Depth to the water table, depth to bedrock, and topography are also important.

Information in this survey can be used to—

1. Make soil and land use studies that will aid in selecting and developing light industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils that will help in planning agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, and cables and assist in planning detailed investigations of the selected locations.
4. Locate probable sources of gravel and other material used in 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.
6. Estimate the suitability of soil units for cross-country movement of vehicles and construction equipment.
7. Supplement information obtained from other published maps and reports and aerial photographs for the purpose of making maps and reports that can be readily used by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

With the use of the soil map for identification of soil areas, the engineering interpretations reported in tables 4, 5, and 6 can be useful for many purposes. It should be emphasized, however, that these interpretations do not eliminate the need for sampling and testing at the site of specific engineering works, particu-

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

test data

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

Mechanical analyses [1]—Con.				Classification			Liquid limit	Plasticity index	Moisture density [5]	
Percentage passing sieve—Con.			Percentage smaller than 0.005 mm.							
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)		Unified [2]	AASHO [3]	Ohio [4]			Optimum moisture	Maximum dry density
							Pct.		*Pct.*	*Lb. per cu. ft.*
78	74	60	26	ML-CL	A-4(5)	A-4a	26	4	18	107
77	63	50	21	SM-SC	A-4(3)	A-4a	26	4	12	122
73	49	35	18	SC	A-2-4(0)	A-2-4	25	8	12	122
100	95	79	33	ML	A-4(8)	A-4a	[6] NP	NP	16	112
87	81	63	29	ML-CL	A-4(5)	A-4a	28	8	15	115
85	79	62	26	ML-CL	A-4(5)	A-4a	26	5	13	119
97	93	80	25	ML	A-4(8)	A-4b	NP	NP	24	95
85	80	63	26	ML-CL	A-4(6)	A-4a	26	4	15	115
88	82	63	30	ML-CL	A-4(6)	A-4a	25	6	14	117
88	83	63	25	ML-CL	A-4(6)	A-4a	23	4	13	119
100	97	86	28	ML	A-4(8)	A-4b	34	6	23	97
88	84	72	28	ML	A-4(7)	A-4a	25	2	17	110
86	78	60	23	ML-CL	A-4(5)	A-4a	28	8	15	115
88	80	59	20	ML-CL	A-4(5)	A-4a	22	5	15	115
93	88	56	15	ML	A-4(4)	A-4a	NP	NP	16	112
91	87	64	29	CL	A-4(6)	A-4a	28	9	17	110
78	65	51	18	ML-CL	A-4(3)	A-4a	25	6	11	124

TABLE 4.—*Engineering*

Soil name and location	Parent material	Ohio report No.	Depth from surface	Mechanical analyses[1] — Percentage passing sieve— 2-inch	¾-inch	No. 4 (4.7 mm.)
			In.			
Damascus—Con.						
Sec. 32, T. 18 N., R. 5 W. Smith Township. (Coarser textured than typical profile) (MH-38)	Sandy and gravelly outwash and kames.	81129	1–9	-------	100	99
		81130	18–24	-------	100	85
		81131	35–43	-------	100	77
Near junction of Hitchcock Road and Sawmill Run. Boardman Township. (Finer textured than typical profile) (MH-W61)	Sandy and gravelly outwash and kames.	81174	2–11	-------	-------	-------
		81175	18–27	-------	100	98
		81176	60–70	100	91	85
Ellsworth:						
Near junction of Ohio Route No. 18 and Lipkey Road. Jackson Township. (Typical profile) (MH-34)	Silty clay loam glacial till.	79907	0–8	-------	-------	-------
		79908	16–25	-------	-------	-------
		79909	72–80	100	94	92
		79910	80–90	-------	-------	-------
Fitchville:						
Near junction of Western Reserve Road and Mill Creek. Boardman Township. (Typical profile) (MH-44)	Silty lacustrine material.	81150	2–7	-------	-------	-------
		81151	25–37	-------	-------	-------
		81152	62–72	-------	-------	-------
Sec. 13, T. 16 N., R. 3 W. Green Township. (Coarser textured than typical profile) (MH-W56)	Silty lacustrine material.	81165	3–13	-------	-------	-------
		81166	16–21	-------	-------	-------
		81167	30–40	-------	100	95
Near junction of Western Reserve Road and Mill Creek. Boardman Township. (Finer textured than typical profile) (MH-3H)	Silty lacustrine material.	79900	0–8	-------	-------	-------
		79901	18–26	-------	-------	-------
		79902	43–48	-------	-------	-------
Frenchtown:						
Sec. 6, T. 13 N., R. 2 W. Beaver Township. (Typical profile) (MH-31)	Clay loam or loam glacial till.	79914	0–10	-------	100	94
		79915	10–19	-------	-------	-------
		79916	19–46	100	84	71
		79917	92–113	-------	100	96
Lorain:						
Sec. 8, T. 18 N., R. 5 W. Smith Township. (Typical profile) (MH-W40)	Clayey lacustrine material.	81138	1–10	-------	-------	-------
		81139	15–25	-------	-------	-------
		81140	40–50	-------	-------	-------
Near junction of Western Reserve Road and U.S. Highway No. 62. Canfield Township. (Coarser textured than typical profile) (MH-40)	Clayey lacustrine material.	81135	0–7	-------	-------	-------
		81136	16–26	-------	-------	-------
		81137	50–60	-------	-------	-------
Near junction of Cook Road and Leffingwell Road. Berlin Township. (Finer textured than typical profile) (MH-W58)	Clayey lacustrine material.	81171	5–15	-------	-------	-------
		81172	22–27	-------	-------	-------
		81173	65–72	-------	-------	-------
Mahoning:						
Near junction of Turner Road and New Road. Austintown Township. (Typical profile) (MH-30)	Silty clay loam glacial till.	43747	0–8	-------	100	99
		43748	11–29	-------	100	98
		43749	43–69	100	98	92
Near junction of Ohio Route No. 46 and Radio Road. Austintown Township. (Coarser textured than typical profile) (MH-W33)	Silty clay loam glacial till.	79921	1–6	-------	-------	-------
		79922	11–26	-------	-------	-------
		79923	52–60	-------	-------	-------
Remsen:						
Near junction of Ohio Route No. 46 and Radio Road. Austintown Township. (Typical profile) (MH-1H)	Clay or silty clay glacial till.	79890	2–6	-------	-------	-------
		79891	9–16	-------	-------	-------
		79892	50–60	-------	-------	-------
Sec. 21, T. 18 N., R. 5 W. Smith Township. (Coarser textured than typical profile) (MH-W44)	Clay or silty clay glacial till.	81153	2–6	-------	-------	-------
		81154	20–30	-------	-------	-------
		81155	50–60	-------	-------	-------

test data—Con.

Mechanical analyses [1]—Con.				Classification			Liquid limit	Plasticity index	Moisture density [5]	
Percentage passing sieve—con.			Percentage smaller than 0.005 mm.	Unified [2]	AASHO [3]	Ohio [4]			Optimum moisture	Maximum dry density
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)					Pct.		Pct.	Lb. per cu. ft.
92	86	57	22	ML	A-4(5)	A-4a	NP	NP	17	110
74	59	29	15	SM	A-2-4(0)	A-2-4	NP	NP	12	122
62	40	24	9	SM	A-1-b(0)	A-1-b	NP	NP	13	119
100	97	88	41	ML-CL	A-6(8)	A-6a	35	11	22	100
94	87	71	38	CL	A-6(7)	A-6a	30	11	15	115
79	72	56	19	ML-CL	A-4(4)	A-4a	23	4	13	120
100	95	85	35	ML	A-4(8)	A-4b	NP	NP	18	107
100	98	92	33	CL	A-7-6(12)	A-7-6	42	19	19	105
85	83	76	31	ML-CL	A-6(8)	A-6a	33	11	17	110
-------	100	84	14	ML	A-4(8)	A-4b	NP	NP	18	107
100	98	87	37	ML-CL	A-4(8)	A-4b	32	8	20	102
100	99	77	34	CL	A-6(8)	A-6a	29	11	14	117
100	99	60	20	ML-CL	A-4(5)	A-4a	22	5	14	117
100	96	87	30	ML	A-4(8)	A-4b	37	8	24	95
100	96	87	27	ML-CL	A-4(8)	A-4b	32	9	18	107
89	83	65	25	ML-CL	A-4(6)	A-4a	26	7	15	115
100	99	97	42	ML	A-4(8)	A-4b	NP	NP	24	95
-------	100	99	45	CL	A-6(10)	A-6b	38	16	18	107
-------	100	98	48	CL	A-6(9)	A-6a	34	13	15	115
89	86	77	-----	ML	A-4(8)	A-4b	38	10	23	97
100	97	86	40	ML-CL	A-4(8)	A-4a	29	6	18	107
63	58	45	23	SM-SC	A-4(2)	A-4a	29	7	15	115
89	82	62	24	ML-CL	A-4(5)	A-4a	23	4	12	122
100	95	90	63	MH or OH	A-7-5(15)	A-7-5	79	17	42	69
-------	100	99	77	MH-CH	A-7-5(20)	A-7-5	102	61	32	83
100	99	93	54	CL	A-7-6(13)	A-7-6	43	22	18	107
100	99	97	55	MH	A-7-5(18)	A-7-5	67	25	32	85
100	99	99	52	CH	A-7-6(20)	A-7-6	61	36	20	102
-------	100	99	49	ML-CL	A-6(10)	A-6a	37	14	16	112
100	94	88	31	MH-CH	A-7-5(20)	A-7-5	88	49	49	64
100	99	98	60	CH	A-7-6(20)	A-7-6	65	41	23	97
-------	100	99	53	CL	A-7-6(13)	A-7-6	45	20	18	107
96	91	81	31	ML	A-4(8)	A-4b	NP	NP	20	102
97	95	87	44	ML-CL	A-7-6(11)	A-7-6	41	17	19	105
91	88	80	50	CL	A-6(10)	A-6-b	37	16	16	112
100	96	88	37	ML-CL	A-4(8)	A-4b	29	4	22	100
100	97	87	52	ML-CL	A-6(8)	A-6a	36	11	22	100
100	95	89	53	ML-CL	A-6(8)	A-6a	36	11	16	112
100	96	86	42	ML-CL	A-4(8)	A-4a	27	7	18	107
100	98	92	59	CL	A-7-6(13)	A-7-6	45	21	20	102
100	98	93	60	CL	A-7-6(13)	A-7-6	44	20	18	107
100	97	89	42	ML-CL	A-6(8)	A-6a	37	11	23	97
100	99	94	48	CL	A-7-6(14)	A-7-6	46	23	19	105
100	98	95	73	ML-CL	A-7-6(14)	A-7-6	49	21	19	105

TABLE 4.—*Engineering*

Soil name and location	Parent material	Ohio report No.	Depth from surface	Mechanical analysis[1] Percentage passing sieve—		
				2-inch	¾-inch	No. 4 (4.7 mm.)
			In.			
Remsen—Con.						
Sec. 29, T. 18 N., R. 5 W. Smith Township. (Finer textured than typical profile) (MH–39)	Clay or silty clay glacial till.	81132	1–10	-------	100	97
		81133	13–23	-------	-------	100
		81134	65–72	-------	100	94
Rittman:						
Near junction of U.S. Highway No. 224 and Duck Creek Road. Berlin Township. (Typical profile) (MH–2H)	Clay loam glacial till.	79893	0–7	-------	-------	-------
		79894	20–28	-------	-------	-------
		79895	60–70	-------	-------	-------
Sebring:						
Sec. 9, T. 17 N., R. 4 W. Goshen Township. (Typical profile) (MH–41)	Silt loam or loam lacustrine material.	81141	1–10	-------	-------	-------
		81142	16–24	-------	-------	-------
		81143	50–59	-------	-------	-------
Sec. 13, T. 16 N., R. 3 W. Green Township. (Coarser textured than typical profile) (MH–W57)	Silt loam or loam lacustrine material.	81168	3–13	-------	-------	-------
		81169	16–28	-------	-------	-------
		81170	30–40	-------	-------	-------
Sec. 6, T. 16 N., R. 3 W. Green Township. (Finer textured than typical profile) (MH–W14)	Silt loam or loam lacustrine material.	79903	3–8	-------	-------	-------
		79904	16–25	-------	-------	-------
		79905	29–37	-------	-------	-------
		79906	50–60	100	93	81
Wadsworth:						
Near junction of Shields Road and Raccoon Road. Canfield Township. (Typical profile) (MH–W50)	Clay loam glacial till.	81156	3–6	-------	-------	-------
		81157	13–20	-------	100	95
		81158	26–34	100	93	85
		81159	50–60	-------	100	95
Sec. 2, T. 17 N., R. 4 W. Goshen Township. (Typical profile) (MH–35)	Clay loam glacial till.	79911	2–10	-------	-------	-------
		79912	24–35	-------	-------	-------
		79913	41–50	-------	100	89
Near junction of U.S. Highway No. 224 and Weaver Road. Berlin Township. (Finer textured than typical profile) (MH–W41)	Clay loam glacial till.	81144	2–7	-------	100	95
		81145	20–26	-------	100	97
		81146	48–56	-------	100	97

[1] According to AASHO Designation T 88-57 (*2*). Results by this procedure frequently 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 is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soils.

[2] Based on the Unified Soil Classification System, Tech. Memo. No. 3-357, v. 1, Corps of Engineers (*19*). SCS and the Bureau

test data—Con.

Mechanical analyses [1]—Con.				Classification			Liquid limit	Plasticity index	Moisture density [5]	
Percentage passing sieve—Con.			Percentage smaller than 0.005 mm.	Unified [2]	AASHO [3]	Ohio [4]			Optimum moisture	Maximum dry density
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)								
									Pct.	*Lb. per cu. ft.*
90	83	66	36	ML	A-4(6)	A-4a	36	7	21	100
97	95	91	60	ML-CL	A-6(9)	A-6a	40	13	18	107
83	82	80	46	ML-CL	A-6(10)	A-6b	40	16	16	112
100	96	82	36	ML	A-4(8)	A-4a	37	7	19	105
100	97	86	28	CL	A-6(8)	A-6a	31	11	16	112
100	94	77	40	ML-CL	A-4(8)	A-4a	30	6	12	122
-------	100	97	42	ML	A-4(8)	A-4b	36	9	22	100
100	99	93	46	CL	A-6(11)	A-6b	39	18	19	105
-------	100	98	47	ML-CL	A-4(8)	A-4b	28	7	18	107
100	99	93	32	ML	A-4(8)	A-4b	30	4	20	102
100	99	96	31	CL	A-6(11)	A-6b	39	17	21	100
100	98	92	23	CL	A-6(12)	A-6b	39	19	18	107
100	99	90	31	ML-CL	A-6(9)	A-6a	39	12	24	95
100	99	96	46	CL	A-6(9)	A-6a	33	13	17	110
100	99	86	37	CL	A-6(10)	A-6a	33	15	17	110
73	70	60	26	CL	A-6(6)	A-6a	31	12	15	115
100	95	85	30	ML-CL	A-4(8)	A-4b	30	5	20	102
89	85	72	37	ML-CL	A-6(8)	A-6a	35	12	17	110
80	74	59	28	CL	A-6(5)	A-6a	29	11	16	112
88	82	65	28	CL	A-4(6)	A-4a	28	10	13	117
100	98	89	33	ML	A-4(8)	A-4b	NP	NP	24	95
100	96	84	55	ML-CL	A-6(9)	A-6a	34	12	18	107
81	76	62	30	ML-CL	A-4(5)	A-4a	27	7	13	119
92	88	76	20	ML	A-6(8)	A-4b	NP	NP	23	97
89	84	69	34	CL	A-4(8)	A-6a	30	12	15	115
89	84	69	30	CL	A-6(7)	A-6a	29	11	13	119

of Public Roads have agreed to consider that all soils having plasticity indexes within two points of the A-line are to be given a borderline classification. An example of borderline classification obtained by this use is ML-CL. Unified classifications given in this column were not determined by the Ohio Department of Highways but were determined from the data in this table.

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

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

[5] Based on AASHO Designation T 99-57, Methods A and C (*2*).

[6] Nonplastic.

TABLE 5—*Estimated properties*

[Absence of data indicates estimate was not made. Mapping units Gravel pits (Gp), Made land (Ma), Quarries (Qu), and Strip

Soil series and map symbols	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Coarse fraction greater than 3 inches	Percentage passing sieve— No. 4 (4.7 mm.)	Percentage passing sieve— No. 10 (2.0 mm.)	Percentage passing sieve— No. 200 (0.074 mm.)	Classification: USDA texture
	Ft.	*Ft.*	*In.*	*Pct.*				
Bennington (BeB)	½–1½	6+	0–12		95–100	85–100	70–95	Silt loam
			12–38		95–100	85–100	70–85	Silty clay loam
			38–50	5	90–100	80–95	60–80	Silty clay loam
Bogart:								
(BgB, BgC)	1½–3	6+	0–14		80–90	60–75	30–70	Loam to gravelly loam
			14–26	5	55–90	50–80	25–55	Gravelly clay loam to gravelly loam.
			26–68	5	50–75	30–50	5–25	Gravelly loam
(BtB, BtC2)	1½–3	6+	0–14		70–90	80–90	30–70	Loam to gravelly loam
			14–26	5	55–85	45–75	25–65	Gravelly clay loam to gravelly loam.
			26–60	5	90–100	80–95	60–80	Silty clay loam to loam
Canadice (Ca)	0–½	6+	0–7		100	95–100	80–95	Silty clay loam
			7–37		100	95–100	80–95	Silty clay
			37–66		100	95–100	80–95	Clay
Canfield (CdB, CdC, CdC2, CeB).	1½–3	6+	0–11		80–95	80–95	60–85	Silt loam
			11–20		85–95	80–95	50–75	Silt loam to loam
			20–50		80–95	80–95	60–70	Loam
			50–70	5	80–95	70–95	50–65	Loam
Cardington (CgB, CgC2)	1½–3	6+	0–14		95–100	85–100	70–95	Silt loam
			14–27		95–100	85–100	70–85	Silty clay loam to silt loam.
			27–66	5	90–100	80–95	60–80	Loam
Carlisle (Ch)	0–½	6+	0–60					
			60+		100	100	85–95	Silty clay loam
Chagrin (Ck)	3+	6+	0–18		95–100	90–100	60–75	Loam
			18–27		95–100	90–100	40–60	Fine sandy loam
			27–42		90–100	85–95	25–50	Loamy fine sand
Chili (ClB, ClC, ClD, CmB, CmC, CnE, CnF, CoB, CoC).	3+	6+	0–12	5	80–90	70–85	45–70	Loam
			12–26	5	55–85	50–60	25–55	Gravelly loam
			26–60	5	20–75	20–50	5–25	Gravelly sandy loam and gravelly loamy sand.
Condit (Ct)	0–½	6+	0–9		95–100	85–100	70–95	Silt loam
			9–28		95–100	85–100	70–85	Silty clay loam
			28–40	5	90–100	80–95	60–80	Silty clay loam to loam
Conotton (Mapped only in undifferentiated units with the Chili soils.)	5+	6+	0–6	10	55–75	50–75	15–30	Gravelly loam
			6–29	10	20–75	20–30	5–25	Gravelly sandy loam
			29–67	10	20–75	20–60	5–25	Gravelly loamy sand; variable lenses of sand and gravel.
Damascus:								
(Da)	0–½	6+	0–9		90–100	90–100	60–85	Loam
			9–41	20	70–100	60–90	35–70	Loam to gravelly loam

of soils

mine spoils (SsB, SsC, SsF, StB, StC, and Sub) are omitted from this table because their properties are too variable for estimating]

Classification—Con.						Corrosion potential	
Unified	AASHO	Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Steel	Concrete
		In. per hr.	*In. per in. of soil depth*	*pH*			
ML–CL, ML	A–4, A–6	0.63–2.0	0.19–0.23	5.0–6.0	Low		Moderate.
CL	A–6	0.2–0.63	0.17–0.19	5.1–7.3	Moderate	Moderate	Moderate.
CL, ML–CL	A–6	0.2–0.63	[1] 0.06–0.10	([2])	Moderate	Low	Low.
ML or SM	A–4 or A–2	2.0–6.3	0.10–0.17	5.1–6.0	Low		Moderate.
GM or ML, SM or SC	A–2 or A–4	2.0–6.3	0.10–0.14	5.1–6.0	Low	Low	Moderate.
GW–GM, GM, SW–SM, SM, or SC	A–1 or A–2	>6.3	0.05–0.09	6.1–7.3	Low	Low	Moderate.
ML, SM	A–2, A–4	2.0–6.3	0.10–0.17	5.1–6.0	Low		Moderate.
GM, ML	A–2, A–4	2.0–6.3	0.10–0.14	5.1–6.0	Low	Low	Moderate.
ML, CL	A–4, A–6	0.2–0.63	0.08–0.12	([2])	Low	Low	Moderate.
ML, ML–CL	A–6, A–4	0.2–0.63	0.17–0.21	5.6–6.0	Moderate to high.		Moderate.
ML–CL, CH	A–7	<0.063	0.12–0.16	5.6–7.8	High	High	Moderate.
ML–CL or CH	A–7	<0.063	0.12–0.15	([2])	High to moderate.	High	Low.
ML	A–4	0.63–2.0	0.18–0.22	4.5–5.0	Low		High.
ML–CL, CL	A–4	0.63–2.0	0.15–0.20	4.5–5.0	Low	Moderate	High.
ML–CL, ML	A–4	0.2–0.63	[1] 0.08–0.10	4.5–6.0	Low	Moderate	Moderate.
ML–CL	A–4	0.2–0.63	[1] 0.08–0.10	6.1–6.5	Low	Low	Moderate.
ML–CL, ML	A–6 or A–4	0.63–2.0	0.19–0.23	5.1–6.0	Low		Moderate.
CL, ML	A–7 or A–6	0.2–0.63	0.16–0.18	5.1–6.0	Moderate	High	Moderate.
CL	A–6	0.2–0.63	[1] 0.06–0.10	([3])	Moderate	Moderate to high.	Low.
Pt		2.0–6.3	0.22–0.26	6.1–7.3	Variable	High	Low.
CL, CH	A–6, A–7	<0.2	0.16–0.20	([2])	Moderate	High	Low.
ML, CL	A–6 or A–4	0.63–2.0	0.14–0.18	5.1–6.0	Low		Moderate.
ML, SM	A–4	0.63–2.0	0.12–0.16	5.6–6.0	Low	Low	Moderate.
SM	A–2 or A–4	2.0–6.3	0.06–0.08	5.6–6.5	Low	Low	Moderate.
ML, SM	A–4	2.0–6.3	0.10–0.18	4.5–5.5	Low		High.
GM or ML	A–2 or A–4	2.0–6.3	0.10–0.14	4.5–5.5	Low	Low	High.
GW–GM, GM, SW–SM or SM	A–1 or A–2	>12.0	0.02–0.04	5.6–6.5	Low	Low	High.
ML, CL	A–6 or A–4	0.63–2.0	0.19–0.23	6.1–6.5	Low		Moderate.
CL, CH	A–7 or A–6	<0.2	0.16–0.18	5.6–6.0	Moderate	High	Moderate.
CL	A–6 or A–7	<0.2	0.13–0.17	([2])	Moderate	High	Low.
GM, SM	A–2	2.0–6.3	0.08–0.12	5.6–6.0	Low		Moderate.
GW–GM, GM, SW–SM, SM	A–1 or A–2	>12.0	0.02–0.04	5.6–6.0	Low	Low	Moderate.
GW–GM, GM, SW–SM, SM	A–1 or A–2	>12.0	0.02–0.04	5.6–7.3	Low	Low	Moderate to low.
ML, ML–CL	A–4, A–6	0.63–2.0	0.13–0.16	5.6–6.0	Low		Moderate.
SM, CL or ML	A–2 or A–4, A–6	2.0–6.3	0.10–0.14	5.6–6.5	Low	High	Moderate.

TABLE 5—*Estimated properties*

Soil series and map symbols	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Coarse fraction greater than 3 inches	Percentage passing sieve— No. 4 (4.7 mm.)	Percentage passing sieve— No. 10 (2.0 mm.)	Percentage passing sieve— No. 200 (0.074 mm.)	Classification: USDA texture
	Ft.	*Ft.*	*In.*	*Pct.*				
Damascus—Con. (Da)—Con.			41–50	5	30–80	25–70	10–35	Mixed layers of sand and gravel.
(Dc) (The properties of this soil differ from those of Da below a depth of 30 inches.)	0–½	6+	30–60		90–100	80–85	60–80	Silty clay loam to loam
Dekalb (DkC, DkE, DkF)	3+	1½–4	0–24	30–40	50–85	45–80	20–50	Very stony loam
			24–30					Sandstone bedrock.
Ellsworth (ElB, ElC, ElC2, ElD2, ElE2, ElF, EsF3, EuB).	1½–3	6+	0–8		90–100	90–100	70–90	Silt loam
			8–37		90–100	85–100	80–90	Silty clay loam
			37–60		85–100	80–95	80–90	Silty clay loam
Fitchville: (FcA, FcB, FlB)	½–1½	6+	0–25		95–100	90–100	85–100	Silt loam
			25–37		95–100	90–100	70–100	Silty clay loam
			37–72		95–100	90–100	65–95	Silt loam to loam
(FhB) (The properties of this soil differ from those of FcA, FcB, and FlB below a depth of 37 inches.)	½–1½	6+	37–60		90–100	80–95	60–80	Silty clay loam to loam
Frenchtown (Fr)	0–½	6+	0–10		95–100	90–100	70–90	Silt loam
			10–19		90–100	85–100	60–90	Silt loam to loam
			19–46		90–100	85–100	45–75	Loam
			46–132		85–95	75–95	55–75	Loam
Geeburg (GbB, GbB2, GbC, GbD, GeC2, GeC3, GeD2, GeE2).	1½–3	6+	0–9		95–100	90–100	70–90	Silt loam
			9–22		90–100	90–100	80–90	Silty clay loam to clay
			22–54		90–100	90–100	85–100	Silty clay or clay
			54–70		90–100	55–75	50–65	Gravelly silt loam
Glenford (GfB, GfC2)	1½–3	6+	0–11		95–100	90–100	70–90	Silt loam
			11–40		95–100	90–100	80–90	Silty clay loam and silt loam.
			40–70		95–100	90–100	65–90	Stratified silty clay loam, silt loam, and very fine sandy loam.
Hornell (HoB)	½–1½	1½–3½	0–10		90–100	90–100	70–90	Silt loam
			10–29		85–100	80–95	65–90	Silty clay loam and clay
			29–35					Highly weathered shale.
Jimtown: (JtA, JtB, JwB)	½–1½	6+	0–9		85–95	70–80	40–70	Loam
			9–30	5	55–85	40–60	25–55	Gravelly loam to gravelly sand.
			30–60	5	20–80	20–60	10–35	Stratified loamy sand, fine sandy loam, and gravelly sandy loam.
(JuB) (This soil differs from JtA, JtB, and JwB in texture and thickness of the substratum.)	½–1½	6+	30–60	5	90–100	80–95	60–80	Silty clay loam to loam

of soils—Con.

Classification—Con.		Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
Unified	AASHO					Steel	Concrete
		In. per hr.	*In. per in. of soil depth*	*pH*			
GW-GM, GM, SW-SM, SM	A-1 or A-2	>6.3	0.05–0.09	6.5–7.8	Low	High	Low.
ML, CL	A-4, A-6	0.2–0.63	0.08–0.12	([4])	Low	High	Low.
GM, SM	A-2, A-4	2.0–6.3	0.08–0.12	4.5–5.5	Low	Low	High.
ML	A-4	0.63–2.0	0.18–0.22	4.5–5.0	Low		Moderate.
CL, CH	A-6 or A-7	0.063–0.2	0.16–0.19	4.5–6.5	Moderate	High	Moderate.
CL, ML-CL	A-6	0.063–0.2	0.16–0.19	([2])	Moderate	High	Low.
ML	A-4	0.63–2.0	0.19–0.23	4.5–5.3	Low		Moderate.
CL, ML-CL	A-6	0.2–0.63	0.17–0.20	5.6–6.0	Moderate	High	Moderate.
ML-CL, CL	A-6 or A-4	0.2–0.63	0.18–0.21	6.1–7.3	Low	High	Low.
ML, CL	A-4, A-6	0.2–0.63	0.08–0.12	([4])	Low	High	Low.
ML, ML-CL	A-4	0.63–2.0	0.19–0.23	4.5–5.0	Low		High.
ML, CL	A-6 or A-4	0.2–0.63	0.17–0.20	4.5–5.0	Low	High	High.
SM, ML	A-6 or A-4	0.063–0.20	[1] 0.08–0.10	4.5–5.5	Low	High	High.
ML, CL	A-4 or A-6	0.20–0.63	[1] 0.08–0.10	([3])	Low	High	High to moderate.
ML, ML-CL	A-4, A-6	0.63–2.0	0.19–0.23	4.5–5.0	Low		Moderate to high.
CL, CH	A-6, A-7	<0.063	0.17–0.20	5.1–6.0	High	High	Moderate.
ML-CL, CH	A-7	<0.063	0.10–0.13	5.1–7.3	High	High	Moderate.
ML, CL	A-4, A-6	<0.063	0.08–0.10	([2])	Low	High	Low.
ML, ML-CL	A-4	0.63–2.0	0.19–0.23	4.5–5.0	Low		High.
CL, ML-CL	A-6	0.2–0.63	0.17–0.20	5.1–6.0	Moderate	Moderate	Moderate.
ML, CL	A-6 or A-4	0.2–2.0	0.18–0.21	6.1–7.3	Low	Moderate	Low.
ML, CH,	A-4	0.2–0.63	0.19–0.23	5.1–6.0	Low		Moderate.
CL	A-6 or A-7	0.063–0.2	0.15–0.18	4.6–5.5	Moderate	High	High to moderate.
ML, SM	A-4	0.63–2.0	0.13–0.16	4.5–5.0	Low		High.
GM, SM, or ML	A-2 or A-4	0.63–2.0	0.10–0.14	4.5–5.0	Low	Moderate	High.
GW-GM, GM, SW-SM, SM	A-1 or A-2	>6.3	0.05–0.09	6.1–7.3	Low	Moderate	Low.
ML, CL	A-4, A-6	0.2–0.63	0.08–0.12	([4])	Low	High	Low.

TABLE 5—*Estimated properties*

Soil series and map symbols	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Coarse fraction greater than 3 inches	Percentage passing sieve— No. 4 (4.7 mm.)	Percentage passing sieve— No. 10 (2.0 mm.)	Percentage passing sieve— No. 200 (0.074 mm.)	Classification: USDA texture
	Ft.	*Ft.*	*In.*	*Pct.*				
Kerston (Km)	0–½	6+	0–55	4	(5)	(5)	(5)	
Lobdell (Lb)	2–3	6+	0–15		95–100	90–100	65–80	Silt loam
			15–42		95–100	90–100	40–70	Loam to sandy loam
Lorain (Lc)	0–½	6+	0–7		100	100	80–100	Silty clay loam
			7–32		100	100	80–100	Silty clay or clay
			32–60		100	100	80–100	Clay
Loudonville (LdB, LdC2, LdD2, LdE2, LrB, LrC).	3+	2½–3½	0–11	10–15	80–95	80–90	60–80	Loam
			11–34	15–20	70–90	65–85	40–75	Loam to channery loam.
			34+					Sandstone or shale bedrock.
Luray (Ls, Ly)	0–½	6+	0–11		95–100	90–100	80–95	Silty clay loam
			11–45		90–100	90–100	80–95	Silty clay loam
			45–72		90–100	90–100	70–90	Silt loam
Mahoning (MgA, MgB, MhB)	½–1½	6+	0–11		90–100	90–100	70–90	Silt loam
			11–32		90–100	85–100	70–90	Silty clay loam
			32–74		85–100	80–95	65–90	Silty clay loam
Marengo (Mn)	0–½	6+	0–13		95–100	90–100	85–95	Silty clay loam
			13–43		90–100	90–100	65–80	Loam
			43–60		85–95	75–95	65–85	Loam
Muskingum (MsB, MsC2, MsD2, MsE2, MsF2).	3+	1½–3	0–7	20–40	70–95	70–90	40–80	Channery silt loam
			7–23	20–40	60–90	30–60	25–55	Channery silt loam to loam.
			23+					Sandstone bedrock.
Olmsted (Od)	0–½	6+	0–7		80–90	75–90	65–85	Loam
			7–23	5	75–90	65–90	35–70	Loam to gravelly loam
			23–33	5	55–85	45–75	25–65	Gravelly sandy loam
			33–39	5	20–75	20–60	5–25	Very gravelly sandy loam
			39–55		100	100	35–100	Sand and silt
Orrville (Ov)	½–1½	6+	0–10		95–100	90–100	65–90	Silt loam and loam
			10–21		95–100	90–100	40–70	Loam to sandy loam
			21–60		90–100	85–95	25–55	Sandy loam
Papakating (Pa, Pc)	0–½	6+	0–7		95–100	90–100	80–95	Silty clay loam
			7–21		95–100	90–100	65–90	Silt loam
			21–48		80–100	50–70	40–70	Silt loam to silty clay
Ravenna (RaA, RaB)	½–1½	6+	0–11		85–100	80–95	70–85	Silt loam
			11–21		90–100	80–100	50–90	Loam
			21–35		90–100	80–90	50–85	Loam
			35–64		80–90	75–85	45–60	Loam
Remsen (ReA, ReB, RmB)	½–1½	6+	0–10		95–100	90–100	70–90	Silt loam
			10–72		100	85–100	80–95	Clay
Rittman (RsB, RsC, RsC2, RsD2, RuB).	1½–3	6+	0–7		95–100	90–100	70–95	Silt loam
			7–20		90–100	85–100	70–90	Silt loam to clay loam
			20–37		90–100	80–100	65–90	Clay loam

of soils—Con.

Classification—Con.		Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
Unified	AASHO					Steel	Concrete
		In. per hr.	*In. per in. of soil depth*	*pH*			
Pt, OL, CL	--------	0.063–0.2	0.20–0.25	5.6–7.3	High	High	Moderate to low.
ML, CL	A–6 or A–4	0.63–2.0	0.19–0.23	5.1–6.0	Low		Moderate.
ML, CL, SM	A–6 or A–4	0.63–2.0	0.12–0.17	5.6–6.5	Low	Moderate	Moderate.
MH–CH, MH	A–7	0.2–0.63	0.16–0.20	6.1–6.5	High		Low to moderate.
CH	A–7	0.063–0.2	0.15–0.18	5.1–6.5	High	High	Moderate.
CL or CH	A–7, A–6	<0.063	0.16–0.18	6.1–7.8	High to moderate.	High	Low.
ML	A–4	0.63–2.0	0.15–0.20	5.1–5.5	Low		Moderate.
ML, CL, GM, SM	A–4, A–6	0.63–2.0	0.12–0.16	5.1–5.5	Low	Low	Moderate.
CL	A–6, A–7	0.2-0.63	0.20–0.23	6.1–6.5	Low		Low.
CL, CH	A–6, A–7	0.2-0.63	0.14–0.17	5.6–7.3	Moderate	High	Low.
ML–CL, CL	A–4 or A–6	0.2-0.63	0.15–0.18	6.6–7.8	Low	High	Low.
ML, ML–CL	A–4 or A–6	0.2–0.63	0.19–0.23	4.5–5.5	Low		High.
CL, ML–CL	A–7 or A–6	0.063-0.2	0.15–0.18	4.5–5.5	Moderate	High	High.
CL, ML–CL	A–6	<0.063	0.15–0.18	([4])	Moderate	High	Low.
CL, CH or MH	A–6 or A–7	0.63-2.0	0.20–0.24	6.1–6.5	Moderate		Low.
CL, ML–CL	A–6	0.2–0.63	0.18–0.22	6.1–7.3	Moderate	High	Low.
CL, ML–CL	A–6	0.2–0.63	0.16–0.20	([2])	Low to moderate.	High	Low.
ML, SM or GM	A–4	0.63–6.3	0.16–0.20	5.0–5.5	Low		Moderate.
ML, SM or GM	A–4, A–2	2.0–6.3	0.08–0.12	5.0–6.0	Low	Low	Moderate.
ML	A–4	0.63–2.0	0.13–0.16	6.6–7.3	Low		Low.
ML, SM	A–4, A–2	0.63–2.0	0.15–0.18	6.1–7.3	Low	High	Low.
GM or ML	A–2 or A–4	2.0–6.3	0.10–0.14	6.6–7.3	Low	High	Low.
GW–GM, GM, SW–SM, SM	A–1 or A–2	>6.3	0.05–0.09	7.4–7.8	Low	High	Low.
SM, ML	A–2, A–4	--------	--------	7.4–7.8	Low	High	Low.
ML, CL	A–4	0.63–2.0	0.18–0.22	5.1–6.0	Low		Moderate.
ML, SM	A–4 or A–6	0.63–2.0	0.15–0.19	5.1–6.0	Low	High	Moderate.
SM, ML	A–2 or A–4	2.0–6.3	0.15–0.19	6.1–7.3	Low	High	Low.
CL, ML–CL	A–6	0.63–2.0	0.16–0.25	6.1–6.5	Moderate		Low.
ML	A–4 or A–6	0.63–2.0	0.16–0.25	5.6–6.5	Low	High	Moderate.
ML, ML–CL, SM	A–4, A–6	0.2–0.63	0.08–0.15	6.6–7.3	Moderate	High	Low.
ML, ML–CL	A–4	0.63–2.0	0.19–0.23	4.5–5.0	Low		High.
ML, CL	A–4, A–6	0.63–2.0	0.16–0.19	4.5–5.0	Low	Moderate	High.
ML, CL	A–4, A–6	0.2–0.63	[1] 0.08–0.12	4.5–5.0	Low	Moderate	High.
ML, SM	A–4	0.2–0.63	[1] 0.08–0.12	5.1–6.5	Low	Moderate	High.
ML, ML–CL	A–4, A–6	0.2–0.63	0.18–0.22	4.5–5.0	Moderate		High.
CL, ML–CL	A–7, A–6	<0.063	0.14–0.17	4.5–5.0	High	High	High.
ML	A–4	0.63–2.0	0.18–0.22	4.5–5.5	Low		High.
CL	A–6	0.063–0.2	0.17–0.21	4.5–5.5	Moderate	Moderate	High.
CL, ML–CL	A–6, A–4	0.063–0.2	[1] 0.06–0.10	4.4–5.5	Low	Moderate	High to moderate.

TABLE 5.—*Estimated properties*

Soil series and map symbols	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Coarse fraction greater than 3 inches	Percentage passing sieve— No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	Classification: USDA texture
	Ft.	*Ft.*	*In.*	*Pct.*				
Ritman—Con.			37–70	--------	85–100	80–100	65–80	Clay loam
Sebring:								
(Sb, Sg)	0–½	6+	0–10	--------	100	100	90–100	Silt loam
			10–36	--------	100	100	85–100	Silty clay loam
			36–60	--------	90–100	80–100	65–95	Silt loam
(Se) (The properties of this soil differ from those of Sb and Sg below a depth of 30 inches.)	--------	--------	30–60	--------	90–100	80–95	60–80	Loam
Trumbull (TrA, TrB, Tu)	0–½	6+	0–8	--------	95–100	90–100	70–95	Silt loam
			8–26	--------	90–100	90–100	70–95	Silty clay loam to silty clay.
			26–60	--------	95–100	90–100	70–95	Silty clay loam
Wadsworth (WaA, WaB, WbB)	½–1½	6+	0–10	--------	90–100	90–100	70–95	Silt loam
			10–16	--------	90–100	85–100	60–90	Silt loam
			16–35	--------	85–100	80–100	60–90	Clay loam
			35–60	--------	85–100	80–90	55–75	Clay loam
Wayland (Wc)	0–½	6+	0–17	--------	95–100	90–100	70–90	Silt loam
			17–60	--------	95–100	90–100	80–95	Silt loam
Wooster (WrF2, WsB, WsC2, WsD2, WsE2).	4+	6+	0–9	--------	80–100	80–95	60–85	Silt loam
			9–23	5	75–95	70–95	50–75	Silt loam to loam
			23–36	5	75–95	70–95	45–70	Loam
			36–108	5	75–95	70–95	45–70	Loam

[1] At this depth the available moisture is low for most plants because of a fragipan or a layer of dense, compact till. These layers also limit the penetration of plant roots.

[2] Reaction ranges from 7.4 to 8.0 (calcareous).

TABLE 6.—*Engineering interpretations*

[Gravel pits (Gp), Made land (Ma), and Quarries (Qu) are omitted

Soil series and mapping symbols	Suitability for winter grading	Suscepti-bility to frost action	Suitability as a source of— Topsoil	Sand and gravel	Road fill: Solum	Road fill: Sub-stratum	Soil features affecting— Highway location
Bennington (BeB)	Poor	High	Fair	Not suitable	Poor	Fair	Seasonal high water table in winter and spring; moderately slow permeability.
Bogart (BgB, BgC, BtB, BtC2).	Fair to good.	Moderate to low.	Good	Good below a depth of 2 to 3 feet in BgB and BgC; BtB and BtC2 are not suitable.	Good	Good	Seasonal high water table; easy to work.

of soils—Con.

Classification—Con.		Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Corrosion potential	
Unified	AASHO					Steel	Concrete
		In. per hr.	*In. per in. of soil depth*	*pH*			
CL, ML	A-4	0.063-0.2	[1] 0.06-0.10	([5])	Low	Low	Moderate to low.
ML, ML-CL	A-4, A-6	0.63-2.0	0.19-0.23	5.1-6.0	Low		Moderate.
CL	A-6, A-7	0.2-0.63	0.17-0.20	5.1-6.0	Moderate	High	Moderate.
CL, ML-CL	A-6 or A-4	0.2-0.63	0.18-0.21	6.6-7.8	Low	High	Low.
ML, CL	A-4	0.2-0.63	0.08-0.12	([4])	Low	High	Low.
ML-CL, ML	A-4 or A-6	0.063-0.2	0.15-0.18	4.5-5.5	Low		High.
CL, CH	A-7	<0.063	0.15-0.18	4.5-6.0	Moderate to high.	High	Moderate.
CL, ML-CL	A-6, A-7	<0.063	0.15-0.18	5.1-7.8	Moderate to high.	High	Moderate to low.
ML, ML-CL	A-4	0.63-2.0	0.18-0.22	4.5-5.0	Low		Moderate.
CL, ML-CL	A-6	0.2-0.63	0.17-0.21	5.1-5.5	Moderate	High	Moderate.
CL, ML-CL	A-6	0.063-0.2	[1] 0.06-0.10	5.1-7.3	Moderate	High	Moderate.
CL, ML-CL	A-6, A-4	0.2-0.63	[1] 0.06-0.10	([3])	Moderate	High	Low.
CL, ML	A-4 or A-6	0.63-2.0	0.17-0.23	5.5-6.5	Low	High	Moderate.
CL, ML	A-4 or A-6	0.2-0.63	0.17-0.20	6.1-7.3	Low	High	Low.
ML	A-4	0.63-2.0	0.19-0.23	5.1-6.0	Low		Moderate.
ML, CL	A-4	0.63-2.0	0.16-0.19	5.1-6.0	Low	Low	Moderate.
ML, SM	A-4	0.63-2.0	0.16-0.19	4.5-5.0	Low	Low	Moderate.
ML, SM	A-4	0.63-2.0	0.14-0.18	4.5-6.5	Low	Low	Low.

[3] Reaction ranges from 5.6 to 8.0 (calcareous) with increasing depth.

[4] Reaction ranges from 6.6 to 8.0 (calcareous).

[5] Variable.

of the soils

because their properties are too variable for interpretation]

Soil features affecting—Con.					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Reservoir area	Dikes, levees, and embankments				
Seasonal high water table; slow seepage rate.	Fair to good stability; fair to good compaction: slow permeability where compacted; good resistance to piping; slow seepage rate.	Moderately slow permeability; seasonal high water table.	Medium available moisture capacity; medium water intake rate; somewhat poor drainage.	Somewhat poor drainage; many slopes are short.	Gentle slopes; erodible; rapid runoff; somewhat poor drainage.
Sandy and gravelly soil material; rapid seepage rate.	Fair stability; fair to good compaction; moderate to rapid permeability where compacted; poor resistance to piping; rapid seepage rate.	Seasonal high water table; moderately rapid permeability; ditch walls are unstable; obtaining outlets can be difficult.	Low available moisture capacity; rapid water intake rate.	Generally not needed; slow runoff; short slopes.	Mostly gentle slopes; small amount of runoff; droughty.

TABLE 6.—*Engineering interpretations*

Soil series and mapping symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of— Topsoil	Sand and gravel	Road fill: Solum	Road fill: Substratum	Soil features affecting— Highway location
Canadice (Ca)	Poor	Moderate to high.	Fair to poor	Not suitable	Poor	Poor	Seasonal high water table; plastic, clayey material.
Canfield (CdB, CdC, CdC2, CeB).	Poor	Moderate	Good	Not suitable	Fair to good.	Fair to good.	Some frost heaving; seasonal high water table.
Cardington (CgB, CgC2).	Poor	High	Fair	Not suitable	Fair	Fair	Perched water table during wet periods; high susceptibility to frost heaving.
Carlisle (Ch)	Poor	High	Fair to good if mixed with mineral soil material; poor if used alone.	Not suitable; organic soil.	Poor; organic soil.	Poor; soft, clayey material.	Deep organic soil; high water table; soft and unstable.
Chagrin (Ck)	Fair	Moderate	Good	Generally not suitable; locally fair for sand or gravel below a depth of 3 to 5 feet.	Fair	Fair	Subject to flooding; moderate susceptibility to frost heaving.
Chili (ClB, ClC, ClD, CmB, CmC, CnE, CnF, CoB, CoC).	Good	Low	Fair in CmB and CmC, poor in other Chili soils.	Fair in upper 3 to 4 feet; good below a depth of 4 feet.	Good	Good	CnE and CnF are steep; soil material in cut slopes is droughty.
Condit (Ct)	Poor	High	Poor	Not suitable	Poor	Fair	High water table most of the year; clayey subsoil; slow permeability; high susceptibility to frost heaving.
Conotton (Mapped only in undifferentiated units with Chili soils.)	Good	Low	Poor	Good; well-graded sand and gravel.	Good	Good	Steep; soil material in cut slopes is droughty; good drainage.
Damascus (Da, Dc)	Poor	High	Fair	Fair to poor in upper 3 feet of Da, good below a depth of 3 feet; sand and gravel are well graded; Dc not suitable.	Fair	Good; Dc is fair.	High water table much of the year; high susceptibility to frost heaving; easily excavated where drained; receives seepage from higher areas.

of the soils—Con.

Soil features affecting—Con.					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Reservoir area	Dikes, levees, and embankments				
Seasonal high water table; very slow seepage rate.	Clayey material; very slow permeability where compacted; poor compaction properties; high shrink-swell potential.	Very slow permeability; seasonal high water table.	Seasonal high water table; slow water intake rate; poor drainage.	Not needed; nearly level.	Clayey below surface layer and difficult to work; poor drainage.
Moderate seepage rate.	Fair stability and compaction; moderate seepage rate; slight piping hazard.	Moderately good drainage; fragipan; moderately slow permeability.	Medium available moisture capacity; medium water intake rate; fragipan.	Fragipan causes slight wetness and seepage.	Sloping soils; erodible; some seepage from side slopes.
Slow to moderate seepage rate.	Fair to good stability; fair to good resistance to piping; slow permeability where compacted.	Moderately well drained; moderately slow permeability; seasonal high water table.	Medium available moisture capacity; medium water intake rate.	Slopes are short and irregular in places.	Sloping soil; erodible; fair fertility; rapid runoff; fairly easily worked.
High water table; rapid seepage rate; organic material.	Unstable organic material; rapid seepage rate.	High water table; organic soil; very unstable; subject to subsidence.	Organic soil; very high available moisture capacity and water intake rate; very poor drainage; subject to blowing if drained.	Not constructed on this soil.	Not needed.
Subject to overflow; moderate seepage rate; has sandy seams.	Fair to poor stability and fair to good compaction; moderate permeability where compacted; low resistance to piping; sandy seams.	Not needed; good drainage.	High available moisture capacity; medium water intake rate; subject to flooding.	Generally not needed.	Generally not needed.
Rapid seepage rate; permeable sand and gravel.	Good stability; moderate to rapid seepage rate; subject to piping; sandy and gravelly material; droughty in embankments.	Not needed; good drainage.	Medium to low available moisture capacity; rapid water intake rate.	Generally not needed; sandy soil; slow runoff; short slopes.	Gentle slopes; small amount of runoff; droughty; difficult to hold grade.
High water table most of the year; slow to moderate seepage rate.	Fair to good stability and compaction; slow permeability where compacted; good resistance to piping; slow seepage rate.	Slow permeability; seasonal high water table; nearly level; poor drainage; obtaining suitable outlets can be difficult.	High available moisture capacity; slow water intake rate; poor drainage.	Not needed	Poor drainage; fairly easy to work.
Rapid seepage rate; permeable sand and gravel.	Good stability; rapid seepage rate; subject to piping; very sandy and gravelly.	Not needed; good drainage.	Low available moisture capacity; high water intake rate; good drainage.	Coarse sandy and gravelly soil material where slopes are steep; droughty; erodible; cover of plants difficult to establish.	Coarse sandy and gravelly soil material where slopes are steep; droughty; erodible; cover of plants difficult to establish.
Rapid seepage rate; high water table.	Good stability; rapid seepage and piping rates; moderate permeability where compacted.	Moderately rapid permeability; high water table; ditchbanks tend to collapse; difficult to hold grade.	Medium to low available moisture capacity; rapid water intake rate; poor drainage; high water table.	Generally not needed; difficult to hold grade; nearly level; berms susceptible to seepage.	Poor drainage; easy to work; difficult to hold grade; sandy and gravelly soil material; cover of plants difficult to establish.

TABLE 6.—*Engineering interpretations*

Soil series and mapping symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of— Topsoil	Sand and gravel	Road fill: Solum	Road fill: Substratum	Soil features affecting— Highway location
Dekalb (DkC, DkE, DkF).	Good	Low	Not suitable	Not suitable	Good	Not suitable.	1½ to 4 feet to bedrock; very stony; some steep slopes.
Ellsworth (ElB, ElC, ElC2, ElD2, ElE2, ElF, EsF3, EuB).	Fair	Moderate	Fair	Not suitable	Fair	Fair	Perched water table during wet periods; subject to seepage; some steep slopes; moderate susceptibility to frost heaving.
Fitchville (FcA, FcB, FhB, FlB).	Poor	High	Good	Not suitable	Poor	Poor [1]	High water table during winter and spring; high susceptibility to frost heaving; erodible and unstable; flows when wet.
Frenchtown (Fr)	Poor	High	Good to fair	Not suitable	Poor	Fair	Seasonal high water table; subject to seepage along fragipan; high susceptibility to frost heaving.
Geeburg (GbB, GbB2, GbC, GbD, GeC2. GeC3, GeD2, GeE2).	Poor	Moderate	Fair	Not suitable	Poor	Poor	Perched water table during wet periods; plastic clay difficult to work; some steep slopes.
Glenford (GfB, GfC2)	Poor	High	Fair	Not suitable	Poor	Poor	Perched water table during wet periods; erodible; unstable; flows when wet; high susceptibility to frost heaving.
Hornell (HoB)	Poor	Moderate	Fair	Not suitable	Poor	Poor	Seasonal high water table; difficult to work; limited depth to bedrock; high susceptibility to frost heaving.
Jimtown (JtA, JtB, JuB, JwB).	Poor	Moderate	Good	Fair in upper 3 feet; good below a depth of 3 feet; JuB is not suitable.	Fair	Good [1]	Seasonal high water table; easy to work; moderate susceptibility to frost heaving.
Kerston (Km)	Poor	High	Good if mixed with mineral soil; poor if used alone.	Not suitable; organic soil.	Poor; organic soil.	Poor; organic soil.	Organic soil; high water table; soft and unstable; subject to subsidence if drained.

of the soils—Con.

Soil features affecting—Con.					
Farm ponds					
Reservoir area	Dikes, levees, and embankments	Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Permeable sandstone at a limited depth; steep slopes.	Very stony; permeable; low piping resistance.	Not needed; good drainage.	Rapid intake rate; low available moisture capacity; susceptible to erosion.	Bedrock at a depth of 1½ to 4 feet; some steep slopes.	Bedrock at a limited depth; steep slopes; droughty.
Slow seepage rate; seasonal high water table.	Fair to good stability; fair to good compaction; slow permeability; slow seepage and piping rates.	Moderately good drainage; seasonal high water table; slow permeability.	Medium available moisture capacity; slow water intake rate.	Slow permeability; clayey soil material is difficult to work; cover of plants difficult to establish; some slopes exceed 12 percent.	Sloping soils; erodible; rapid runoff; clayey soil material is difficult to work.
Seasonal high water table; slow seepage rate in substratum.	Fair to poor stability; fair compaction; slow permeability where compacted; erodes readily on slopes; fair resistance to piping.	Moderately slow permeability; seasonal high water table; ditchbanks not very stable.	High available moisture capacity; medium water intake rate; somewhat poor drainage.	Somewhat poor drainage; erodible; unstable; loses grade in places where layers of sandy material occur.	Somewhat poor drainage; short, gentle slopes; very erodible; fairly easy to work.
Seasonal high water table; slow seepage rate.	Fair to good stability; good compaction; slow permeability where compacted; good resistance to piping.	Slow permeability; seasonal high water table; fragipan.	Medium available moisture capacity; slow water intake rate; poor drainage; fragipan; seasonal high water table.	Nearly level; subject to seepage on top of fragipan.	Poor drainage; fairly easy to work; subject to seepage.
Very slow seepage rate.	Fair stability; fair to poor compaction; very slow permeability where compacted; high compressibility; high shrink-swell potential.	Moderately good drainage; very slow permeability.	Medium available moisture capacity; very slow water intake rate; subject to drought late in summer.	Very slow permeability; very clayey soil material difficult to work; cover of plants difficult to establish; some slopes exceed 12 percent.	Very clayey soil material difficult to work; rapid runoff; erodible.
Moderate seepage rate.	Poor stability; fair to good compaction; slow permeability where compacted; poor resistance to piping; erodible.	Moderately good drainage; moderately slow permeability.	High available moisture capacity; medium water intake rate.	Somewhat unstable; erodible; can lose grade where layers of sandy material occur.	Highly erodible; easy to work; most slopes are short.
Seasonal high water table; fractured shale bedrock below a depth of 20 to 42 inches.	Fair stability and compaction; limited amount of material available.	Slow permeability seasonal high water table; shale bedrock at a depth of 20 to 42 inches.	Medium to low available moisture capacity; slow water intake rate; somewhat poor drainage.	Somewhat poor drainage; rapid runoff; clayey soil material underlain by shale bedrock at a depth of 20 to 42 inches.	Clayey soil material difficult to work; cover of plants difficult to establish; shale bedrock at a depth of 20 to 42 inches.
Sandy and gravelly; rapid seepage rate.	Fair stability; fair compaction; moderate permeability where compacted; poor resistance to piping; rapid seepage rate.	Moderately rapid permeability; seasonal high water table; ditchbanks tend to collapse.	Medium to low available moisture capacity; rapid water intake rate; somewhat poor drainage.	Somewhat poor drainage; slow runoff; difficult to hold grade; berms susceptible to seepage.	Somewhat poor drainage; easy to work; tendency to lose grade; erodible.
High water table; rapid seepage rate.	Unstable organic material; rapid seepage rate; low resistance to piping.	High water table; unstable organic material; subject to subsidence if drained.	Organic soil; very high available moisture capacity and water intake rate; poor drainage; subject to blowing if drained.	Not needed -------	Not needed.

TABLE 6.—*Engineering interpretations*

Soil series and mapping symbols	Suitability for winter grading	Suscepti-bility to frost action	Suitability as a source of—				Soil features affecting—
			Topsoil	Sand and gravel	Road fill		Highway location
					Solum	Sub-stratum	
Lobdell (Lb)	Poor	Moderate	Good	Generally not suitable; locally fair below a depth of 3 to 5 feet.	Fair	Fair	Subject to periodic flooding; moderate susceptibility to frost heaving.
Lorain (Lc)	Poor	Moderate	Fair	Not suitable	Poor	Poor	High water table; plastic, clayey soil material; difficult to work; high shrink-swell potential.
Loudonville (LdB, LdC2, LdD2, LdE2, LrB, LrC)	Fair	Moderate	Good to fair	Not suitable	Fair	Poor	Upper 2 to 3 feet of material is easy to work; shattered bedrock below a depth of 2½ to 3½ feet.
Luray (Ls, Ly)	Poor	High	Good	Not suitable	Poor	Poor	High water table most of the year; erodible; unstable; flows when wet; high susceptibility to frost heaving.
Mahoning (MgA, MgB, MhB).	Poor	High	Fair	Not suitable	Poor	Fair	Seasonal high water table; difficult to work; subject to seepage; susceptible to frost heaving.
Marengo (Mn)	Poor	High	Good	Not suitable	Poor	Poor	High water table in nearly level areas or depressions; subject to seepage; high susceptibility to frost heaving.
Muskingum (MsB, MsC2, MsD2, MsE2, MsF2).	Fair	Low	Poor	Not suitable	Fair	Poor	Siltstone or shale bedrock at a depth of 1½ to 3 feet; channery soil material hinders grading; some steep slopes.
Olmsted (Od)	Poor	High	Good	Fair in upper 3 to 4 feet of soil material; good below a depth of 4 feet; some layers are silty and clayey.	Fair	Good	High water table most of year; fairly easy to work; high susceptibility to frost heaving.

of the soils—Con.

Soil features affecting—Con.					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Reservoir area	Dikes, levees, and embankments				
Subject to overflow; moderate seepage rate; sandy seams.	Fair stability and compaction; moderate permeability where compacted; poor resistance to piping; sandy seams.	Moderately good drainage; moderate permeability; subject to flooding; ditchbanks tend to collapse.	High available moisture capacity; medium water intake rate; subject to flooding.	Generally not needed.	Generally not needed.
High water table; very slow seepage rate.	Clayey soil material; very slow permeability where compacted; poor compaction properties; high shrink-swell potential.	High water table; very slow permeability; outlets lacking in some areas.	High available moisture capacity; medium to slow water intake rate; very poor drainage.	Not needed -------	Clayey soil material difficult to work; poor drainage.
Fractured shale and sandstone bedrock allows a high rate of seepage in places; depth to bedrock is 30 to 42 inches.	Fair stability and compaction; moderate permeability where compacted; coarse fragments make up 60 percent of volume at a depth of 2 to 3 feet; shale and sandstone are below a depth of 30 to 42 inches.	Not needed; good drainage.	Moderately deep to sandstone bedrock; medium to low available moisture capacity; medium water intake rate.	Moderately deep to shale and sandstone bedrock; some slopes exceed 12 percent.	Slopes are erodible; low in fertility; sandstone and shale bedrock at a depth of 30 to 42 inches.
High water table; slow seepage rate.	Poor stability; fair compaction; slow permeability where compacted; fair resistance to piping; erodible.	Moderately slow permeability; high water table.	High available moisture capacity; medium water intake rate; poor drainage.	Generally not needed.	Very poor drainage; high water table; material is easy to work; erodible.
Seasonal high water table; slow seepage rate.	Fair stability and compaction; slow seepage rate.	Very slow permeability; seasonal high water table.	High available moisture capacity; slow water intake rate; somewhat poor drainage.	Somewhat poor drainage; clayey subsoil; slopes are mostly short.	Gentle slopes; erodible; clayey material difficult to work; somewhat poor drainage.
High water table; slow seepage rate.	Fair stability and compaction; slow seepage rate; moderate shrink-swell potential.	Moderately slow permeability; high water table.	High available moisture capacity; medium water intake rate; very poor drainage.	Generally not needed.	Generally not needed in nearly level areas or depressions; very poor drainage.
High seepage rate; fractured bedrock is within 36 inches of the surface.	Moderate to rapid permeability where compacted; low resistance to piping; fair to poor stability and compaction; borrow material is limited in quantity.	Not needed; good drainage.	Low available moisture capacity; medium to rapid water intake rate; bedrock is at a depth of 1½ to 3 feet.	Gently sloping to steep; erodible; low in fertility; bedrock is at a depth of 1½ to 3 feet.	Gently sloping to steep; droughty; erodible; bedrock is at a depth of 1½ to 3 feet.
High water table; underlying soil material is sandy and gravelly; rapid seepage rate.	Fair stability; fair to good compaction; moderate permeability where compacted; low resistance to piping; rapid seepage rate.	Moderately rapid permeability below a depth of 12 inches; high water table; ditchbanks tend to collapse.	Medium to high available moisture capacity; rapid water intake rate; very poor drainage.	Difficult to hold grade in sandy and gravelly soil material; nearly level.	Very poor drainage; high fertility; difficult to hold grade in sandy and gravelly soil material; nearly level.

TABLE 6.—*Engineering interpretations*

Soil series and mapping symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of— Topsoil	Sand and gravel	Road fill: Solum	Road fill: Substratum	Soil features affecting— Highway location
Orrville (Ov)	Poor	High	Fair to good	Generally not suitable; locally fair for sand at a depth of 2 to 4 feet.	Poor	Fair	Subject to flooding; high water table during winter and spring; high susceptibility to frost heaving.
Papakating (Pa, Pc)	Poor	High	Fair to good	Not suitable	Poor	Poor	Subject to flooding; high water table most of year; high susceptibility to frost heaving.
Ravenna (RaA, RaB)	Poor	High	Fair	Not suitable	Fair	Fair	High water table during winter and spring; easy to work; subject to seepage; high susceptibility to frost heaving.
Remsen (ReA, ReB, RmB).	Poor	Moderate	Fair	Not suitable	Poor	Poor	Seasonal high water table during winter and spring; plastic clay; difficult to work.
Rittman (RsB, RsC, RsC2, RsD2, RuB).	Poor	Moderate	Fair	Not suitable	Fair	Fair	Some frost heaving; seasonal high water table; subject to seepage in cuts.
Sebring (Sb, Se, Sg)	Poor	High	Fair	Not suitable	Poor	Poor	High water table most of year; erodible; unstable; can flow when wet; high susceptibility to frost heaving.
Strip mine spoils: (SsB, SsC, SsF)	Good	Low	Not suitable	Not suitable	Good	Good	Easy to work; good stability; some steep slopes.
(StB, StC, StF)	Poor	Moderate	Not suitable	Not suitable	Good	Good	Fairly easy to work; susceptible to frost action; steep in places.
(SuB)	Poor	High	Poor	Not suitable	Poor	Poor	Plastic clay; difficult to work.

of the soils—Con.

Soil features affecting—Con.					
Farm ponds					
Reservoir area	Dikes, levees, and embankments	Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Subject to stream overflow; moderate seepage rate in some strata of sandy soil material.	Poor stability; fair compaction; slow permeability where compacted; fair resistance to piping; contains strata of sand in places.	Moderate permeability; seasonal high water table; subject to flooding; outlets may be difficult to obtain.	High available moisture capacity; medium water intake rate; subject to flooding; somewhat poor drainage.	Not needed	Generally not needed.
Subject to stream overflow; moderate seepage rate in some seams of sandy soil material.	Poor stability; fair compaction; slow permeability where compacted; fair resistance to piping; contains strata of sand in places.	Moderate permeability; high water table; subject to flooding; outlets difficult to obtain; ditchbanks tend to collapse.	High available moisture capacity; medium water intake rate; subject to flooding; poor drainage.	Not needed	Generally not needed.
Seasonal high water table; moderate seepage rate in some places.	Fair stability; fair compaction; slow permeability where compacted; moderate resistance to piping.	Moderately slow permeability; seasonal high water table; fragipan.	Medium available moisture capacity; medium to slow water intake rate; somewhat poor drainage.	Somewhat poor drainage; short slopes; easy to work.	Short slopes; erodible; somewhat poor drainage; easy to work.
Seasonal high water table; very slow seepage rate.	Fair stability; fair to poor compaction; very slow permeability where compacted; high compressibility; high resistance to piping; clayey soil material has high volume change.	Very slow permeability; seasonal high water table.	Medium available moisture capacity; very slow water intake rate; somewhat poor drainage; subject to drought late in summer.	Somewhat poor drainage; gentle slopes; very clayey soil material; difficult to work; cover of plants difficult to establish.	Gentle slopes; clayey soil material; difficult to work; somewhat poor drainage; erodible.
Slow seepage rate	Good stability and compaction; slow seepage rate; good resistance to piping.	Moderately good drainage; slow permeability; fragipan.	Medium available moisture capacity; medium to slow water intake rate; strong fragipan.	Fragipan causes some wetness; easy to work.	Sloping soils; erodible; rapid runoff; easy to work.
High water table; in places substratum contains thin layers of permeable sandy material.	Fair to poor stability and compaction; slow permeability where compacted; poor resistance to piping; erodible.	Moderately slow permeability; high water table; ditchbanks tend to collapse.	High available moisture capacity; medium water intake rate; poor drainage.	Not needed	Poor drainage; easy to work; grade difficult to maintain where there are layers of sandy material.
Rapid seepage rate	Good stability; rapid permeability where compacted; piping hazard severe; large stones.	Not needed; good drainage.	Low available moisture capacity; generally not irrigated.	Easy to work; cover of plants difficult to establish; iron sulfide present.	Easy to work; cover of plants difficult to establish; iron sulfide present.
Moderate seepage rate.	Fair to good stability and compaction; slow permeability where compacted; good resistance to piping.	Not needed; good drainage.	Erodible on long slopes; generally not irrigated.	Easy to work; cover of plants difficult to establish.	Easy to work; cover of plants difficult to establish.
Slow seepage rate	Fair stability; fair to poor compaction; slow permeability where volume change; resists piping. compacted; high	Clayey soil material; difficult to work; generally not drained.	Generally not irrigated.	Clayey soil material; difficult to work; cover of plants difficult to establish.	Clayey soil material; difficult to work; cover of plants difficult to establish.

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TABLE 6.—*Engineering interpretations*

Soil series and mapping symbols	Suitability for winter grading	Suscepti-bility to frost action	Suitability as a source of—				Soil features affecting—
			Topsoil	Sand and gravel	Road fill		Highway location
					Solum	Sub-stratum	
Trumbull (TrA, TrB, Tu)	Poor	Moderate	Poor to fair	Not suitable	Poor	Poor	Seasonal high water table; plastic, clayey soil material that is difficult to work.
Wadsworth (WaA, WaB, WbB).	Poor	High	Fair	Not suitable	Fair	Fair	High water table during winter and spring; fairly easy to work; subject to seepage along fragipan; high susceptibility to frost heaving.
Wayland (Wc)	Poor	High	Fair to good	Not suitable	Poor	Poor	Subject to flooding; high water table most of the year; high susceptibility to frost heaving.
Wooster (WrF2, WsB, WsC2, WsD2, WsE2).	Poor	Moderate	Good	Not suitable	Good	Good	Moderate susceptibility to frost heaving; fairly easy to work; some steep slopes.

[1] The substratum of mapping unit FhB in the Fitchville series and the substratum of mapping unit JuB in the Jimtown series are fair for road fill.

larly where heavy loads are to be supported and where the excavations are deeper than the depths of layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

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

Engineering classification systems

Many highway engineers classify soil material according to the system adopted by the American Association of State Highway Officials (*2*). In this system soil materials are classified into seven principal groups. These groups range from A–1, which is soil of high bearing capacity, to A–7, which consists of clay soil having low strength when wet.

Some engineers prefer to use the Unified soil classification system (*19*). In this system soil materials are identified as coarse grained (eight classes); fine grained (six classes); and highly organic (one class). An approximate classification of the soils can be made in the field. Both the AASHO and Unified classifications of Mahoning County soils that were tested are given in table 4.

Soil test data

Samples from 27 soil profiles representing 12 soil series in Mahoning County were tested according to standard procedures to help evaluate the soils for engineering purposes. Results of these tests are shown in table 4. The engineering classifications in this table are based on data obtained by mechanical analyses and by tests to determine liquid limits and plastic limits.

The mechanical analyses were made by combined sieve and hydrometer methods. Percentages of clay obtained by the hydrometer method are not suitable for naming textural classes of soils.

Tests for 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. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition. Some silty and

of the soils—Con.

Soil features affecting—Con.					
Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways
Reservoir area	Dikes, levees, and embankments				
Seasonal high water table; slow seepage rate.	Clayey soil material; very slow permeability where compacted.	Very slow permeability; seasonal high water table.	Medium to high available moisture capacity; slow water intake rate; poor drainage.	High water table; clayey material.	Clayey subsoil difficult to work; poor drainage.
Slow seepage rate; seasonal high water table.	Fair stability; fair compaction; slow permeability where compacted; good resistance to piping.	Slow permeability; seasonal high water table; fragipan.	Medium available moisture capacity; medium water intake rate; somewhat poor drainage; fragipan.	Short slopes; slow permeability; somewhat poor drainage.	Short slopes; rapid runoff; somewhat poor drainage; easy to work.
Subject to stream overflow; seasonal high water table; moderate to slow seepage rate; contains layers of sandy material.	Fair stability; fair compaction; slow permeability where compacted; fair resistance to piping; contains layers of sandy material.	Moderately slow permeability; seasonal high water table; subject to flooding; outlets difficult to obtain.	High available moisture capacity; medium water intake rate; poor drainage; subject to flooding.	Not needed	Generally not needed.
Moderate seepage rate.	Good stability and compaction; moderate seepage rate; piping hazard.	Not needed	High available moisture capacity; medium water intake rate.	Good drainage; easy to work.	Sloping soils; erodible; easy to work; cover of plants easy to establish.

some sandy soils are nonplastic; that is, they will not become plastic at any moisture content.

Table 4 also gives the results of moisture-density tests for the tested soils. If a soil material is compacted at successively higher moisture content, assuming that the compactive effort remains constant, the density of a compacted material will increase until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed "maximum dry density." Moisture-density data are important in earthwork, for as a rule, 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 shows some estimated soil properties that are important in engineering, and it gives estimated AASHO and Unified classifications for the soils. The textural terms used to describe the soil material in the main horizons are those used by the U.S. Department of Agriculture. The data in table 5 are based on the results of soil tests shown in table 4, on information in other parts of this survey, and on experience with the same kinds of soils in other counties. Additional information about the soils can be found in the section "Descriptions of the Soils." Some information about geology is also given in the section "Formation and Classification of Soils" and in the section "Additional Facts About the County."

In table 5 depth to a seasonal high water table refers to the shallowest depth to which the water table rises in winter and early in spring. This water table may be a perched one or an ordinary ground-water table. If precipitation is less than normal during the wettest part of the year, the water table and the soil material that is saturated are farther from the surface than when precipitation is normal. Soil conditions immediately after heavy precipitation are not considered. In all the soils, especially those in sloping areas and on uplands, depth to the water table generally is greater late in spring, in summer, and in fall than the depths shown in table 5.

Most of the soils in the county are deeper than 5 feet to bedrock. The Dekalb, Hornell, Loudonville, and Muskingum soils, however, are less than 5 feet deep over bedrock.

Permeability reflects the ability of the soil to transmit water and air. In table 5, permeability, estimated in inches of water percolation per hour, is based on the texture and structure of the soil, on the results of servations of drainage. For a given soil, percolation selected permeability and infiltration tests, and on obthrough the surface layer varies considerably because of differences in past land use and management, and because of differences in the initial moisture content of the soil.

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. For medium-textured and fine-textured soils, the estimated values listed are based on the difference in percentage of moisture retained at 1/3 and 15 atmospheres of tension. The estimated values for sandy soils are based on the difference between 1/10 and 15 atmospheres of tension. For compact glacial till, the estimated values shown in table 5 are lower than normal for a given texture; the increased bulk density greatly reduces the penetration of roots, and, therefore, not all of the stored moisture is available to plants.

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

Shrink-well potential is an indication of the change in volume of the soil material expected when the moisture content changes. Soils that have a high shrink-swell potential are normally undesirable for some engineering uses, because their bearing capacity is generally lessened when their volume is increased by swelling when wet.

Corrosion potential is important because it indicates the effect that soluble salts in a soil have on the corrosion of utility pipelines. In table 5 estimates are for steel and concrete pipes.

Engineering interpretations of soils

In table 6 the soils of the county are rated according to their suitability for winter grading, susceptibility to frost action, and suitability as a source of topsoil, sand and gravel, and road fill. In addition, table 6 lists soil features that affect suitability of the soils for the location of highways and for engineering structures and practices. Following are explanations of the data in table 6.

Because of wetness, plasticity, or susceptibility to frost action, many of the soils in the county are poorly suited or very poorly suited to winter grading during part of the winter.

The soils that are the most susceptible to damaging frost action are those that are silty and that are wet most of the time in winter.

The thickness, texture, and natural fertility of the surface soil determine suitability of a soil as a source of topsoil.

The amount, quality, and accessibility of granular (coarse-grained) material are the most important features that affect suitability of a soil as a source of sand and gravel. Well-graded coarse-grained material or a mixture of clay and coarse-grained material is suitable as a source of road fill. Highly plastic, clayey soils, poorly graded, silty soils, and organic soils are difficult to compact and are poorly suited or are not suited to use as road fill.

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

The sealing potential of the soil material is the main factor affecting the reservoir area of a farm pond, though depth to bedrock and susceptibility to flooding are also important. Stability and permeability of the soil material affect construction and maintenance of the embankments of a farm pond. Descriptions of permeability in the column titled "Dikes, levees, and embankments" are for soil material that is compacted at optimum moisture content.

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

The rate of water intake, permeability, natural drainage, and available moisture capacity are properties of soils that affect irrigation. Slopes and susceptibility to flooding are also important.

Terraces and diversions are affected mainly by slope and susceptibility to erosion. Depth to bedrock and the height of the water table are also important.

Soil features that affect waterways are about the same as those affecting terraces and diversions. Depth to bedrock, a high water table, and other features that affect waterways are also indicated in table 6, where applicable.

Nonfarm Uses of the Soils

Mahoning County is mostly rural, but it includes the large metropolitan area of Youngstown. This county is part of the large, densely populated industrial complex in the northeastern part of Ohio and the northwestern part of Pennsylvania. Many highways, railroads, and airlines cross the county. Competition for land is increasing. Most of the county is still used as cropland, but especially near cities and towns, there is a constant mixing of farm and nonfarm uses. The farming areas are being reduced as residential, industrial, transportation, and recreational facilities are developed.

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

This part of the soil survey provides information about the properties of the soils and their effect on selected nonfarm uses of the 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 in the soil maps and in other parts of this survey.

Table 7 gives the estimated degree and kind of limitation of soils for some selected land uses. By using this information, alternative 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 ratings for some uses will no longer apply to areas that have undergone extensive cutting and filling. These ratings represent the average conditions for each kind of soil shown on the soil map. The limitation at a particular site or on a particular lot may vary in degree and kind from that listed in table 7 because of the natural variation within any one soil area. Therefore, supplementary onsite investigation should be made before using the soils for the purposes listed in table 7.

In areas that have been disturbed and the natural vegetation removed or destroyed, erosion is a serious hazard. Over a period of time, many of these areas contribute much runoff and erosional debris to lower lying streets, roads, and streams. Erosion control practices are as essential in these areas as they are in many areas used for farming.

The estimated degree of limitations of the soils for a specified land use is rated in table 7 as *slight, moderate,* or *severe.* A rating of *slight* indicates that the soil has no important limitation to the specified use. A rating of *moderate* shows that the soil has some limitations to the specified use. These limitations should be recognized, but they can be overcome or corrected. A rating of *severe* indicates that the soil has serious limitations that are difficult and costly to overcome. A rating of *severe,* however, does not mean that the soil cannot be used for the specified use.

Following are explanations of the uses rated in table 7.

The suitability of soils for disposing of effluent from septic tanks depends on permeability, depth to rock, slope, natural drainage (height of the water table), and the hazard of flooding. Use of a soil for disposing of effluent is severely limited by flooding, by very poor natural drainage, or by moderately slow to very slow permeability. See table 5 for estimates of permeability.

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

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

Sewage lagoons are shallow ponds built to dispose of sewage through oxidation. They may be needed in an area where septic tanks or a central sewage system is not feasible or practical. Among the features that control the degree of limitation are drainage, the hazard of flooding, degree of slope, depth to rock, and permeability.

In this county the major features that limit use of the soils as a location for a homesite are depth to bedrock, slope, natural drainage, hazard of flooding, and stoniness or rockiness of the soil surface. Not considered is a method for disposing of sewage. The ratings in table 7 are for houses of three stories or less that have a basement, but the ratings also apply to sites for small industrial, commercial, and institutional buildings.

Flooding is a severe hazard and is costly and damaging when it occurs. Homes constructed on naturally wet soils probably will have a wet basement unless adequate drainage is provided. Some of the wet soils in the county are the Wadsworth, Mahoning, Remsen, and Trumbull. In many areas tile drainage and open ditches have been installed for agricultural use, but excavations for homes or other structures can disrupt these systems.

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

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 can also be 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. Names of soils in Mahoning County that are suitable as a source of topsoil are listed in table 6.

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

Recreation is becoming increasingly important in Mahoning County. Potentially, all of the soils of the county are suitable for one or more kinds of recrea-

TABLE 7.—*Estimated degree and kind of*

[Gravel pits (Gp), Made land (Ma), and Quarries (Qu) generally are not

Soil series and map symbols	Disposal of sewage effluent from septic tanks	Sewage lagoons	Homesite locations for homes of 3 stories or less [1]	Lawns, landscaping, and golf fairways	Streets and parking lots
Bennington (BeB)	Severe: seasonal high water table; moderately slow permeability.	Moderate: slope	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: slope; seasonal high water table.
Bogart:					
(BgB, BtB)	Moderate: seasonal high water table; danger of polluting the ground water.	Severe: rapid permeability in substratum for BgB; moderately rapid permeability in solum for BtB; danger of polluting the ground water.	Moderate: seasonal high water table.	Slight	Moderate: seasonal high water table; slope.
(BgC, BtC2)	Moderate for BgC; severe for BtC2 because of slow permeability in substratum; seasonal high water table; danger of polluting ground water; slope.	Severe: slope; rapid permeability in substratum for BgC; rapid permeability above substratum in BtC2.	Moderate: seasonal high water table; slope.	Moderate: slope	Severe: slope
Canadice (Ca)	Severe: seasonal high water table; very slow permeability.	Slight	Severe: seasonal high water table; soft when wet.	Severe: seasonal high water table.	Severe: seasonal high water table.
Canfield:					
(CdB, CeB)	Severe: moderately slow permeability; seasonal high water table.	Moderate: slope	Moderate: seasonal high water table.	Slight	Moderate: slope; seasonal high water table.
(CdC, CdC2)	Severe: moderately slow permeability; seasonal high water table.	Severe: slope	Moderate: seasonal high water table; slope.	Moderate: slope	Severe: slope
Cardington:					
(CgB)	Severe: moderately slow permeability.	Moderate: slope	Moderate: seasonal high water table.	Slight	Moderate: slope; seasonal high water table.
(CgC2)	Severe: moderately slow permeability.	Severe: slope	Moderate: seasonal high water table; slope.	Moderate: slope	Severe: slope
Carlisle (Ch)	Severe: high water table.	Severe: organic material.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Chagrin (Ck)	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Chili:					
(ClB)	Slight: danger of polluting the ground water.	Severe: permeable soil material; danger of polluting the ground water.	Slight	Moderate: medium to low available moisture capacity.	Moderate: slope.

limitations for land use planning

suitable for the uses shown in this table and are not rated]

Recreation				Sanitary land fills	Cemeteries
Athletic fields and other areas of intensive play	Parks and extensive play areas	Campsites			
		Tents	Trailers		
Severe: seasonal high water table; moderately slow permeability.	Moderate: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table; silty clay loam subsoil.	Severe: seasonal high water table.
Moderate: seasonal high water table; slope.	Slight	Moderate: seasonal high water table.	Moderate: slope	Severe because of excessive seepage in the upper 2 to 4 feet.	Moderate for BgB; severe for BtB because of slow permeability in substratum; seasonal high water table.
Severe: slope	Moderate: slope	Moderate: seasonal high water table.	Severe: slope	Severe for BgC because of rapid permeability in substratum; severe for BtC2 because of excessive seepage in the upper 2 to 4 feet.	Moderate for BgC; severe for BtC2 because of slow permeability in substratum; slope; seasonal high water table.
Severe: seasonal high water table; very slow permeability.	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; very slow permeability; clayey soil.	Severe: seasonal high water table; very slow permeability.
Moderate: slope; seasonal high water table; moderately slow permeability.	Slight	Moderate: seasonal high water table; moderately slow permeability.	Moderate: seasonal high water table; moderately slow permeability.	Moderate: seasonal high water table.	Moderate: seasonal high water table; moderately slow permeability.
Severe: slope	Moderate: slope	Moderate: seasonal high water table; slope; moderately slow permeability.	Severe: slope	Moderate: slope; seasonal high water table.	Moderate: slope; seasonal high water table; moderately slow permeability.
Moderate: seasonal high water table; moderately slow permeability; slope.	Slight	Moderate: seasonal high water table; moderately slow permeability.	Moderate: seasonal high water table; moderately slow permeability; slope.	Moderate: seasonal high water table; moderately slow permeability; moderately clayey.	Moderate: seasonal high water table; moderately slow permeability.
Severe: slope	Moderate: slope	Moderate: seasonal high water table; slope.	Severe: slope	Moderate: slope; moderately clayey.	Moderate: seasonal high water table; moderately slow permeability; slope.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate[2]: subject to flooding.	Moderate[2]: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Moderate: slope; gravelly surface layer.	Slight	Moderate: gravelly surface layer.	Moderate: slope	Severe: rapid permeability in substratum; danger of polluting the ground water.	Slight.

TABLE 7.—*Estimated degree and kind of*

Soil series and map symbols	Disposal of sewage effluent from septic tanks	Sewage lagoons	Homesite locations for homes of 3 stories or less [1]	Lawns, landscaping, and golf fairways	Streets and parking lots
Chili—Con.					
(ClC)	Moderate: slope; danger of polluting the ground water.	Severe: slope; permeable soil material; danger of polluting the ground water.	Moderate: slope	Moderate: medium to low available moisture capacity; slope.	Severe: slope
(ClL)	Severe: slope; danger of polluting the ground water.	Severe: slope; permeable soil material.	Severe: slope	Severe: slope; low available moisture capacity.	Severe: slope
(CmB, CoB)	Slight: danger of polluting the ground water.	Severe: permeable soil material; danger of polluting the ground water.	Slight	Moderate: medium to low available moisture capacity.	Moderate: slope
(CmC, CoC)	Moderate: slope; danger of polluting the ground water.	Severe: slope; permeable soil material; danger of polluting the ground water.	Moderate: slope	Moderate: medium to low available moisture capacity; slope.	Severe: slope
Chili and Conotton (CnE, CnF)	Severe: slope; danger of polluting the ground water.	Severe: slope; rapid permeability.	Severe: slope	Severe: slope; low available moisture capacity.	Severe: slope
Condit (Ct)	Severe: seasonal high water table; slow permeability.	Slight	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Damascus:					
(Da)	Severe: seasonal high water table; danger of polluting the ground water.	Severe: rapid permeability.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
(Dc)	Severe: seasonal high water table.	Severe: rapid permeability to a depth of 20 to 40 inches.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Dekalb:					
(DkC)	Severe: limited depth to bedrock.	Severe: limited depth to bedrock; slope.	Severe: limited depth to bedrock.	Severe: low available moisture capacity; limited depth to bedrock.	Severe: limited depth to bedrock; slope.
(DkE, DkF)	Severe: limited depth to bedrock; slope.	Severe: limited depth to bedrock; slope.	Severe: limited depth to bedrock; slope.	Severe: limited depth to bedrock; slope; low available moisture capacity.	Severe: limited depth to bedrock; slope.
Ellsworth:					
(ElB, EuB)	Severe: slow permeability.	Moderate: slope	Moderate: seasonal high water table; high shrink-swell potential.	Slight	Moderate: slope; seasonal high water table.
(ElC, ElC2)	Severe: slow permeability.	Severe: slope	Moderate: seasonal high water table; slope; high shrink-swell potential.	Moderate: slope	Severe: slope
(ElD2, ElE2, ElF, EsF3).	Severe: slope; slow permeability.	Severe: slope	Severe: slope	Severe: slope	Severe: slope

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Recreation: Athletic fields and other areas of intensive play	Recreation: Parks and extensive play areas	Recreation: Campsites: Tents	Recreation: Campsites: Trailers	Sanitary land fills	Cemeteries
Severe: slope	Moderate: slope	Moderate: slope; gravelly surface layer.	Severe: slope	Severe: rapid permeability in substratum; danger of polluting the ground water.	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; danger of polluting the ground water.	Severe: slope.
Moderate: slope; gravelly surface layer.	Slight	Moderate: gravelly surface layer.	Moderate: slope	Severe: rapid permeability in substratum; danger of polluting the ground water.	Slight.
Severe: slope	Moderate: slope	Moderate: slope; gravelly surface layer.	Severe: slope	Severe: rapid permeability in substratum; danger of polluting the ground water.	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; rapid permeability; danger of polluting the ground water.	Severe: slope.
Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table.	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table.	Severe: seasonal high water table; slow permeability.
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; rapid permeability in substratum.	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: limited depth to bedrock; slope.	Moderate: limited depth to bedrock; slope.	Moderate: slope; stoniness.	Severe: slope; stoniness.	Severe: limited depth to bedrock.	Severe: limited depth to bedrock.
Severe: limited depth to bedrock; slope.	Severe: limited depth to bedrock; slope.	Severe: slope	Severe: slope	Severe: slope; limited depth to bedrock.	Severe: slope; limited depth to bedrock.
Severe: slow permeability.	Slight	Severe: slow permeability.	Severe: slow permeability.	Moderate: moderately clayey.	Severe: slow permeability.
Severe: slow permeability; slope.	Moderate: slope	Severe: slow permeability.	Severe: slow permeability; slope.	Moderate: slope; moderately clayey.	Severe: slow permeability.
Severe: slope	Severe: slope	Severe: slope; slow permeability.	Severe: slope; slow permeability.	Severe: slope	Severe: slow permeability; slope.

TABLE 7.—*Estimated degree and kind of*

Soil series and map symbols	Disposal of sewage effluent from septic tanks	Sewage lagoons	Homesite locations for homes of 3 stories or less [1]	Lawns, landscaping, and golf fairways	Streets and parking lots
Fitchville:					
(FcA)	Severe: seasonal high water table; moderately slow permeability.	Generally slight, but locally severe because of pervious layers in the substratum.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table; soft and compressible; high susceptibility to frost heaving.
(FcB, FhB, FlB)	Severe: seasonal high water table; moderately slow permeability.	Moderate: slope	Severe: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table; soft and compressible.
Frenchtown (Fr)	Severe: slow permeability.	Slight	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Geeburg:					
(GbB, GbB2)	Severe: very slow permeability.	Moderate: slope	Moderate: seasonal high water table; high shrink-swell potential.	Moderate: very slow permeability; clayey subsoil; droughty.	Moderate: seasonal high water table; slope; high shrink-swell potential.
(GbC, GeC2, GeC3).	Severe: very slow permeability.	Severe: slope	Moderate: seasonal high water table; slope; high shrink-swell potential.	Severe for GeC3 and moderate for GbC and GeC2; very slow permeability; clayey subsoil; droughty; slope.	Severe: slope
(GbD, GeD2, GeE2).	Severe: very slow permeability; slope.	Severe: slope	Severe: slope; high shrink-swell potential.	Severe: very slow permeability; slope.	Severe: slope
Glenford:					
(GfB)	Severe: moderately slow permeability.	Moderate: moderately slow to moderate permeability in substratum; slope.	Moderate: seasonal high water table; soft and compressible when wet.	Slight	Moderate: slope; seasonal high water table; soft and compressible when wet.
(GfC2)	Severe: moderately slow permeability.	Severe: slope	Moderate: seasonal high water table; slope.	Moderate: slope	Severe: slope
Hornell (HoB)	Severe: seasonal high water table; limited depth to bedrock; slow permeability.	Severe: limited depth to bedrock.	Severe: seasonal high water table; limited depth to bedrock.	Moderate: slow permeability; seasonal high water table; limited depth to bedrock.	Severe: seasonal high water table.
Jimtown:					
(JtA)	Severe: seasonal high water table.	Severe: rapid permeability.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
(JtB, JuB, JwB)	Severe: seasonal high water table.	Severe: rapid permeability.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.
Kerston (Km)	Severe: subject to flooding; high water table.	Severe: subject to flooding; organic material.	Severe: subject to flooding; organic material; high water table.	Severe: subject to flooding; high water table.	Severe: unstable organic material; high water table; subject to flooding.

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Recreation: Athletic fields and other areas of intensive play	Recreation: Parks and extensive play areas	Recreation: Campsites: Tents	Recreation: Campsites: Trailers	Sanitary land fills	Cemeteries
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: seasonal high water table; slope.	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: 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.	Severe: seasonal high water table.
Severe: very slow permeability.	Slight	Severe: very slow permeability.	Severe: very slow permeability.	Severe: clayey subsoil.	Severe: very slow permeability.
Severe: very slow permeability; slope.	Severe for GeC3 and moderate for GbC and GeC2; slope; clayey surface layer.	Severe: very slow permeability.	Severe: very slow permeability; slope.	Severe: clayey subsoil.	Severe: very slow permeability.
Severe: slope	Severe: slope	Severe: very slow permeability; slope.	Severe: very slow permeability; slope.	Severe: slope; clayey subsoil.	Severe: slope; very slow permeability.
Moderate: slope; seasonal high water table; moderately slow permeability.	Slight	Moderate: moderately slow permeability.	Moderate: slope	Slight	Moderate: seasonal high water table; moderately slow permeability.
Severe: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope; seasonal high water table; in places strata of sand at a depth of less than 6 feet.	Moderate: slope; seasonal high water table.
Severe: slow permeability; seasonal high water table.	Moderate: seasonal high water table; limited depth to bedrock.	Severe: slow permeability.	Severe: slow permeability.	Severe: slow permeability; seasonal high water table; limited depth to bedrock.	Severe: slow permeability; seasonal high water table; limited depth to bedrock.
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; rapid permeability in substratum.	Severe: seasonal high water table.
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; rapid permeability in substratum.	Severe: seasonal high water table.
Severe: unstable organic material; high water table.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.	Severe: subject to flooding; high water table.

TABLE 7.—*Estimated degree and kind of*

Soil series and map symbols	Disposal of sewage effluent from septic tanks	Sewage lagoons	Homesite locations for homes of 3 stories or less [1]	Lawns, landscaping, and golf fairways	Streets and parking lots
Lobdell (Lb)	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Lorain (Lc)	Severe: high water table; very slow permeability.	Slight	Severe: soft and unstable when wet; seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; soft and unstable when wet.
Loudonville:					
(LdB, LrB)	Severe: limited depth to bedrock; danger of polluting the ground water.	Severe: limited depth to bedrock.	Severe: limited depth to bedrock.	Moderate: limited depth to bedrock.	Severe: limited depth to bedrock.
(LdC2, LrC)	Severe: limited depth to bedrock.	Severe: limited depth to bedrock; slope.	Severe: limited depth to bedrock.	Moderate: limited depth to bedrock; slope.	Severe: limited depth to bedrock; slope.
(LdD2, LdE2)	Severe: limited depth to bedrock; slope.	Severe: limited depth to bedrock; slope.	Severe: limited depth to bedrock; slope.	Severe: limited depth to bedrock; slope; low available moisture capacity.	Severe: limited depth to bedrock; slope.
Luray (Ls, Ly)	Severe: high water table.	Moderate: moderate permeability in substratum; upper 1 foot is high in content of organic matter and should be removed.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Mahoning:					
(MgA)	Severe: very slow permeability; seasonal high water table.	Slight	Severe: seasonal high water table.	Moderate: very slow permeability; seasonal high water table.	Moderate: seasonal high water table; high susceptibility to frost heaving.
(MgB, MhB)	Severe: very slow permeability; seasonal high water table.	Moderate: slope	Severe: seasonal high water table.	Moderate: very slow permeability; seasonal high water table.	Moderate: seasonal high water table; high susceptibility to frost heaving; slope.
Marengo (Mn)	Severe: high water table.	Slight	Severe: high water table.	Severe: high water table.	Severe: high water table.
Muskingum:					
(MsB)	Severe: limited depth to bedrock.	Severe: limited depth to bedrock.	Severe: limited depth to bedrock.	Severe: limited depth to bedrock; low available moisture capacity.	Severe: limited depth to bedrock.
(MsC2)	Severe: limited depth to bedrock.	Severe: limited depth to bedrock.	Severe: limited depth to bedrock.	Severe: limited depth to bedrock; low available moisture capacity.	Severe: limited depth to bedrock; slope.
(MsD2, MsE2, MsF2).	Severe: limited depth to bedrock; slope.	Severe: limited depth to bedrock; slope.	Severe: limited depth to bedrock; slope.	Severe: slope; low available moisture capacity.	Severe: limited depth to bedrock; slope.
Olmsted (Od)	Severe: high water table.	Severe: rapidly permeable substratum.	Severe: high water table.	Severe: high water table.	Severe: high water table.

limitations for land use planning—Con.

Recreation: Athletic fields and other areas of intensive play	Recreation: Parks and extensive play areas	Recreation: Campsites: Tents	Recreation: Campsites: Trailers	Sanitary land fills	Cemeteries
Moderate [2]: subject to flooding.	Moderate [2]: subject to flooding.	Severe: subject to flooding; seasonal high water table.	Severe: subject to flooding; seasonal high water table.	Severe: subject to flooding.	Severe: subject to flooding.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: very slow permeability; seasonal high water table.	Severe: very slow permeability; seasonal high water table.	Severe: seasonal high water table.	Severe: very slow permeability; seasonal high water table.
Severe: limited depth to bedrock.	Moderate: limited depth to bedrock.	Slight	Moderate: slope	Severe: limited depth to bedrock.	Severe: limited depth to bedrock.
Severe: limited depth to bedrock; slope.	Moderate: limited depth to bedrock; slope.	Moderate: slope	Severe: slope	Severe: limited depth to bedrock.	Severe: limited depth to bedrock.
Severe: limited depth to bedrock; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: limited depth to bedrock; slope.	Severe: limited depth to bedrock; slope.
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: very slow permeability; seasonal high water table.	Moderate: seasonal high water table.	Severe: very slow permeability; seasonal high water table.	Severe: very slow permeability; seasonal high water table.	Moderate: moderately clayey.	Severe: very slow permeability; seasonal high water table.
Severe: very slow permeability; seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Moderate: moderately clayey.	Severe: very slow permeability; seasonal 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: limited depth to bedrock.	Moderate: limited depth to bedrock.	Moderate: limited depth to bedrock.	Moderate: slope	Severe: limited depth to bedrock.	Severe: limited depth to bedrock.
Severe: limited depth to bedrock; slope.	Moderate: limited depth to bedrock; slope.	Moderate: limited depth to bedrock; slope.	Severe: slope	Severe: limited depth to bedrock.	Severe: limited depth to bedrock.
Severe: limited depth to bedrock; slope.	Severe: limited depth to bedrock; slope.	Severe: slope	Severe: slope	Severe: limited depth to bedrock; slope.	Severe: limited depth to bedrock; slope.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.

TABLE 7.—*Estimated degree and kind of*

Soil series and map symbols	Disposal of sewage effluent from septic tanks	Sewage lagoons	Homesite locations for homes of 3 stories or less [1]	Lawns, landscaping, and golf fairways	Streets and parking lots
Orrville (Ov)	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table, subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.
Papakating (Pa, Pc)	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.
Ravenna:					
(RaA)	Severe: moderately slow permeability.	Moderate: moderately permeable substratum in places.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
(RaB)	Severe: moderately slow permeability.	Moderate: moderately permeable substratum in places; slope.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.
Remsen:					
(ReA)	Severe: very slow permeability.	Slight	Severe: seasonal high water table; high shrink-swell potential.	Moderate: very slow permeability; seasonal high water table.	Moderate: seasonal high water table; high shrink-swell potential.
(ReB, RmB)	Severe: very slow permeability.	Moderate: slope	Severe: seasonal high water table; high shrink-swell potential.	Moderate: very slow permeability; seasonal high water table.	Moderate: seasonal high water table; slope; high shrink-swell potential.
Rittman:					
(RsB, RuB)	Severe: slow permeability; seasonal high water table.	Moderate: slope	Moderate: seasonal high water table.	Slight	Moderate: slope; seasonal high water table.
(RsC, RsC2)	Severe: slow permeability; seasonal high water table.	Severe: slope	Moderate: seasonal high water table; slope.	Moderate: slope	Severe: slope
(RsD2)	Severe: seasonal high water table, slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Sebring (Sb, Se, Sg)	Severe: seasonal high water table; moderately slow permeability.	Slight	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Strip mine spoils:					
(SsB, StB)	Moderate: moderate permeability.	Moderate: slope; moderate permeability.	Slight	Moderate: coarse fragments.	Moderate: slope
(SsC, StC)	Moderate to severe: slope.	Severe: slope	Moderate to severe: slope.	Moderate to severe: slope.	Severe: slope
(SsF, StF)	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
(SuB)	Severe: very slow permeability.	Moderate: slope	Severe: high shrink-swell potential.	Severe: very slow permeability; clayey texture.	Severe: high shrink-swell potential.
Trumbull:					
(TrA, Tu)	Severe: very slow permeability; seasonal high water table.	Slight	Severe: seasonal high water table.	Severe: very slow permeability; seasonal high water table.	Severe: seasonal high water table.

limitations for land use planning—Con.

Recreation: Athletic fields and other areas of intensive play	Recreation: Parks and extensive play areas	Recreation: Campsites: Tents	Recreation: Campsites: Trailers	Sanitary land fills	Cemeteries
Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.
Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.
Severe: seasonal high water table; moderately slow permeability.	Moderate: 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; moderately slow permeability.	Moderate: 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; very slow permeability.	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 subsoil.	Severe: very slow permeability; seasonal high water table.
Severe: seasonal high water table; very slow permeability.	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 subsoil.	Severe: very slow permeability; seasonal high water table.
Severe: slow permeability.	Slight	Severe: slow permeability.	Severe: slow permeability.	Moderate: seasonal high water table; moderately clayey.	Severe: slow permeability.
Severe: slope; slow permeability.	Moderate: slope	Severe: slow permeability.	Severe: slow permeability; slope.	Moderate: seasonal high water table; moderately clayey; slope.	Severe: slow permeability.
Severe: slope; slow permeability.	Severe: slope	Severe: slow permeability; slope.	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.
Moderate: slope; texture.	Slight	Moderate: slope; moderate permeability.	Moderate: slope; moderate permeability.	Slight	Slight.
Severe: slope	Moderate to severe: slope.	Severe: slope	Severe: slope	Moderate to severe: slope.	Moderate to severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: very slow permeability.	Severe: clayey texture; very slow permeability.	Severe: very slow permeability.	Severe: very slow permeability.	Severe: very slow permeability.	Severe: very slow permeability.
Severe: very slow permeability; seasonal high water table.	Severe: seasonal high water table.	Severe: very slow permeability; seasonal high water table.	Severe: very slow permeability; seasonal high water table.	Severe: seasonal high water table; silty clay loam subsoil.	Severe: very slow permeability; seasonal high water table.

TABLE 7.—*Estimated degree and kind of*

Soil series and map symbols	Disposal of sewage effluent from septic tanks	Sewage lagoons	Homesite locations for homes of 3 stories or less [1]	Lawns, landscaping, and golf fairways	Streets and parking lots
Trumbull—Con.					
(TrB)	Severe: very slow permeability; seasonal high water table.	Moderate: slope	Severe: seasonal high water table.	Severe: very slow permeability; seasonal high water table.	Severe: seasonal high water table.
Wadsworth:					
(WaA)	Severe: slow permeability.	Slight	Severe: seasonal high water table.	Moderate: slow permeability; seasonal high water table.	Moderate: seasonal high water table.
(WaB, WbB)	Severe: slow permeability.	Moderate: slope	Severe: seasonal high water table.	Moderate: slow permeability; seasonal high water table.	Moderate: seasonal high water table; slope.
Wayland (Wc)	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.
Wooster:					
(WsB)	Moderate: moderate permeability.	Moderate: slope; moderate permeability in substratum.	Slight	Slight	Moderate: slope
(WsC2)	Moderate: moderate permeability; slope.	Severe: slope	Moderate: slope	Moderate: slope	Severe: slope
(WrF2, WsD2, WsE2).	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

[1] Ratings apply also to institutional, commercial, and light industrial uses.

limitations for land use planning—Con.

Recreation: Athletic fields and other areas of intensive play	Recreation: Parks and extensive play areas	Recreation: Campsites: Tents	Recreation: Campsites: Trailers	Sanitary land fills	Cemeteries
Severe: very slow permeability; seasonal high water table.	Severe: seasonal high water table.	Severe: very slow permeability; seasonal high water table.	Severe: very slow permeability; seasonal high water table.	Severe: seasonal high water table; silty clay loam subsoil.	Severe: very slow permeability; 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.	Severe: slow permeability; 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.	Severe: slow permeability; seasonal high water table.
Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.
Moderate: slope	Slight	Slight	Slight	Slight.	Moderate: 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.

[2] The rating depends on local duration and frequency of flooding.

Figure 6.—**A lake developed for recreation on a Fitchville silt loam.**

tional development (fig. 6). Soils on flood plains are excellent for some kinds of recreation because they generally occur in long, winding areas along streams adjacent to scenic hills. Locally, the flooding frequency should be evaluated before recreational facilities are constructed. Use of these same soils for homes, highways, and most other nonfarm uses is severely limited by flooding. In addition, construction in these areas might obstruct the natural flow of floodwaters. Among the kinds of recreational facilities that can be developed on flood plains are athletic fields and other intensive play areas. Such facilities are seldom in use during wet periods when flooding is likely. These are fairly small tracts used for baseball diamonds, football fields, tennis, volleyball, and badminton courts, and other sports. Because the areas must be nearly level, considerable shaping may be needed. For this reason, the limitation is moderate or severe on slopes of more than 2 percent. Also important is the texture of the surface layer. The limitation is least for soils that have a surface layer of silt loam, fine sandy loam, very fine sandy loam, loam, or sandy loam.

Considered in rating the soils for picnicking and areas used for extensive play, including hiking, nature study, and similar uses, were degree of slope, texture of the surface layer, natural drainage, stoniness, and hazard of flooding. Paths in picnic and play areas should be constructed and maintained in a way that controls gullying. Flood plains can be used for extensive play in areas that are not flooded too frequently.

Campsites for tents and trailers should be located in areas where the landscape is attractive, the trafficability is good, and the productivity for grasses and trees is medium or high. Soils in which the natural drainage is good or moderately good have less serious limitations than wetter soils. Limitations are moderate on somewhat poorly drained soils and are severe on poorly drained and very poorly drained soils. In addition, limitations are severe on muck soils, on soils along streams where flooding is a hazard, and on soils in basinlike areas that are ponded after a heavy rain. As a rule, slopes of more than 12 percent have severe limitations for use as tent campsites; the limitation for trailers is generally severe on slopes of more than 6 percent.

Soils that are firm when moist and nonsticky when wet are desirable for campsites. Among the soils most suitable for campsites are those having a surface layer of loam, silt loam, sandy loam, fine sandy loam, or very fine sandy loam.

In considering the use of soils for sanitary land fill, the depth to underlying rock is especially important. The most favorable soils for a trench type of sanitary land fill are those that are friable and that are underlain by unconsolidated material. Among the features that limit use for this purpose are shallowness to bedrock, soil texture, wetness, rapid permeability, steep slopes, and flooding. Both the soils and the site should permit year-round cutting and filling operations. Onsite investigation prior to use is necessary to assess the danger of contamination of the surface water and the ground water. A sufficient quantity of slowly permeable soil material should be available for use to help in preventing contamination of the surface water or the ground water.

For use as cemeteries, soils have only slight or moderate limitations if they are deep, are well drained or moderately well drained, and have slopes of less than 12 percent. Steeper soils have severe limitations, and so do soils that are somewhat poorly drained, poorly drained, or very poorly drained and that are affected by a seasonal high water table. If the water table is permanently lowered, limitations are only slight or moderate on some soils. The use of soils for cemeteries is severely limited by hard bedrock near the surface, but it is only slightly or moderately restricted if the underlying material is soft or rippable. At all periods of the year, ease of excavation is most favorable in the sandier soils. Shoring the sides of excavations is necessary if caving is a problem. Preserving the original surface soil is important, and liming and fertilizing are needed for maintaining sod.

Descriptions of the Soils

This section describes the soil series and mapping units in Mahoning 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. As mentioned in the section "How This Survey Was Made," not all mapping units are in a soil series. For example, Gravel pits, Made land, and Quarries are miscellaneous land types and do not belong to a soil series; nevertheless, they, and the other land types in the county, are 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

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

Soil	Acres	Percent
Bennington silt loam, 2 to 6 percent slopes	2,202	0.8
Bogart loam, 2 to 6 percent slopes	8,414	3.1
Bogart loam, 6 to 12 percent slopes	1,399	.5
Bogart loam, till substratum, 2 to 6 percent slopes	2,744	1.0
Bogart loam, till substratum, 6 to 12 percent slopes, moderately eroded	514	.2
Canadice silty clay loam	1,712	.6
Canfield silt loam. 2 to 6 percent slopes	24,088	9.0
Canfield silt loam, 6 to 12 percent slopes	690	.3
Canfield silt loam, 6 to 12 percent slopes, moderately eroded	4,112	1.5
Canfield-Urban land complex	2,211	.8
Cardington silt loam, 2 to 6 percent slopes	1,042	.4
Cardington silt loam, 6 to 12 percent slopes, moderately eroded	179	.1
Carlisle muck	578	.2
Chagrin loam	1,118	.4
Chili gravelly loam, 2 to 6 percent slopes	258	.1
Chili gravelly loam, 6 to 12 percent slopes	437	.2
Chili gravelly loam, 12 to 18 percent slopes	854	.3
Chili loam, 2 to 6 percent slopes	2,926	1.1
Chili loam, 6 to 12 percent slopes	3,853	1.4
Chili and Conotton gravelly soils, 18 to 25 percent slopes	297	.1
Chili and Conotton gravelly soils, 25 to 50 percent slopes	149	.1
Chili-Urban land complex undulating	4,111	1.5
Chili-Urban land complex, rolling	3,237	1.2
Condit silt loam	301	.1
Damascus loam	1,966	.7
Damascus loam, till substratum	557	.2
Dekalb very stony loam, 2 to 12 percent slopes	165	.1
Dekalb very stony loam, 12 to 25 percent slopes	147	.1
Dekalb very stony loam, 25 to 50 percent slopes	1,107	.4
Ellsworth silt loam, 2 to 6 percent slopes	12,137	4.5
Ellsworth silt loam, 6 to 12 percent slopes	525	.2
Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded	2,736	1.0
Ellsworth silt loam, 12 to 18 percent slopes, moderately eroded	382	.1
Ellsworth silt loam, 18 to 25 percent slopes, moderately eroded	135	.1
Ellsworth silt loam, 25 to 50 percent slopes	525	.2
Ellsworth silty clay loam, 25 to 50 percent slopes, severely eroded	201	.1
Ellsworth-Urban land complex	994	.4
Fitchville silt loam, 0 to 2 percent slopes	940	.3
Fitchville silt loam, 2 to 6 percent slopes	2,478	.9
Fitchville silt loam, till substratum, 2 to 6 percent slopes	814	.3
Fitchville-Urban land complex	324	.1
Frenchtown silt loam	5,202	1.9
Geeburg silt loam, 2 to 6 percent slopes,	5,521	2.0
Geeburg silt loam, 2 to 6 percent slopes, moderately eroded	176	.1
Geeburg silt loam, 6 to 12 percent slopes	977	.4
Geeburg silt loam, 12 to 18 percent slopes	245	.1
Geeburg silty clay loam, 6 to 12 percent slopes, moderately eroded	1,903	.7
Geeburg silty clay loam, 6 to 12 percent slopes, severely eroded	133	([1])
Geeburg silty clay loam, 12 to 18 percent slopes, moderately eroded	322	.1
Geeburg silty clay loam, 18 to 25 percent slopes, moderately eroded	443	.2
Glenford silt loam, 2 to 6 percent slopes	521	.2
Glenford silt loam, 6 to 12 percent slopes, moderately eroded	137	.1
Gravel pits	91	([1])
Hornell silt loam, 2 to 6 percent slopes	599	.2
Jimtown loam, 0 to 2 percent slopes	424	.2
Jimtown loam, 2 to 6 percent slopes	4,530	1.7
Jimtown loam, till substratum, 2 to 6 percent slopes	1,776	.7

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

Soil	Acres	Percent
Jimtown-Urban land complex	2,495	.9
Kerston muck	119	([1])
Lobdell loam	1,757	.6
Lorain silty clay loam	2,729	1.0
Loudonville loam, 2 to 6 percent slopes	3,882	1.4
Loudonville loam, 6 to 12 percent slopes, moderately eroded	2,833	1.1
Loudonville loam, 12 to 18 percent slopes, moderately eroded	528	.2
Loudonville loam, 18 to 25 percent slopes, moderately eroded	236	.1
Loudonville-Urban land complex, undulating	633	.2
Loudonville-Urban land complex, rolling	1,279	.5
Luray silt loam	706	.3
Luray silty clay loam	1,434	.5
Made land	3,391	1.3
Mahoning silt loam, 0 to 2 percent slopes	2,725	1.0
Mahoning silt loam, 2 to 6 percent slopes	17,069	6.4
Mahoning-Urban land complex	358	.1
Marengo silty clay loam	1,003	.4
Muskingum channery silt loam, 2 to 6 percent slopes	421	.2
Muskingum channery silt loam, 6 to 12 percent slopes, moderately eroded	257	.1
Muskingum channery silt loam, 12 to 18 percent slopes, moderately eroded	282	.1
Muskingum channery silt loam, 18 to 25 percent slopes, moderately eroded	363	.1
Muskingum channery silt loam, 25 to 50 percent slopes, moderately eroded	552	.2
Olmsted loam	450	.2
Orrville silt loam	3,294	1.2
Papakating silt loam	838	.3
Papakating silty clay loam	1,252	.5
Quarries	91	([1])
Ravenna silt loam, 0 to 2 percent slopes	634	.2
Ravenna silt loam, 2 to 6 percent slopes	11,911	4.4
Remsen silt loam, 0 to 2 percent slopes	1,359	.5
Remsen silt loam, 2 to 6 percent slopes	7,836	2.9
Remsen-Urban land complex	711	.3
Rittman silt loam, 2 to 6 percent slopes	7,266	2.7
Rittman silt loam, 6 to 12 percent slopes	386	.1
Rittman silt loam, 6 to 12 percent slopes, moderately eroded	2,013	.7
Rittman silt loam, 12 to 18 percent slopes, moderately eroded	182	.1
Rittman-Urban land complex	6,531	2.4
Sebring silt loam	10,095	3.8
Sebring silt loam, till substratum	858	.3
Sebring-Urban land complex	598	.2
Strip mine spoils, shale and sandstone materials, undulating	696	.3
Strip mine spoils, shale and sandstone materials, rolling	1,192	.4
Strip mine spoils, shale and sandstone materials, steep	2,205	.8
Strip mine spoils, loamy till materials, undulating	1,279	.5
Strip mine spoils, loamy till materials, rolling	729	.3
Strip mine spoils, loamy till materials, steep	460	.2
Strip mine spoils, clayey till materials, undulating	458	.2
Trumbull silt loam, 0 to 2 percent slopes	9,277	3.5
Trumbull silt loam, 2 to 6 percent slopes	963	.4
Trumbull-Urban land complex	188	.1
Wadsworth silt loam, 0 to 2 percent slopes	5553	.2
Wadsworth silt loam, 2 to 6 percent slopes	9,985	3.7
Wadsworth-Urban land complex	5,004	1.9
Wayland silt loam	8,239	2.1
Wooster loam, 25 to 50 percent slopes, moderately eroded	247	.1
Wooster silt loam, 2 to 6 percent slopes	2,068	.8
Wooster silt loam, 6 to 12 percent slopes, moderately eroded	4,241	1.6
Wooster silt loam, 12 to 18 percent slopes, moderately eroded	571	.2
Wooster silt loam, 18 to 25 percent slopes, moderately eroded	88	([1])
Turnpikes and expressways	1,047	.4
Water areas	754	.3
Total	268,160	100.0

[1] Less than 0.05 percent.

depths beyond which roots of most plants do not penetrate. Each soil series contains both a brief nontechnical and a detailed technical description of the soil profile. The nontechnical description will be useful to most readers. The detailed technical description is included for soil scientists, engineers, and others who need to make thorough and precise studies of soils.

In describing the soils, the soil scientists use Munsell notations (*17*) to indicate the color of a soil precisely. In this survey the terms "light colored" and "dark colored" refer to the color of the surface layer of soils. Soils that have a surface layer with a color value of 4 or more are light colored. Surface layer, as used here, refers to the plow layer or uppermost 8 inches of the soil. Unless otherwise indicated the color is for a moist soil.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed map. Listed at the end of each description of a mapping unit are 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 survey. The reader is urged to read both the series description and the descriptions of the individual mapping units, and then to turn to the section "Use and Management of the Soils" for details of use and management.

Many terms used in the soil descriptions and other sections are defined in the Glossary at the back of the survey and in the "Soil Survey Manual" (*17*).

Bennington Series

The Bennington series consists of soils that are light colored, somewhat poorly drained, and nearly level or gently sloping. These soils are on uplands, mostly in the southern and eastern parts of the county. They have formed in glacial till of Wisconsin age.

In a typical profile of a cultivated Bennington soil, the plow layer is dark grayish-brown silt loam about 8 inches thick. The upper part of the subsoil is mottled yellowish-brown heavy silt loam that grades to mottled dark yellowish-brown and light brownish-gray silty clay loam and silt loam at a depth of about 12 inches.

The lower part of the subsoil, between a depth of 18 and about 38 inches, is mostly dark-brown silty clay loam containing some gray mottles. The subsoil is underlain by weathered, fairly dense, limy glacial till. Pebbles of shale and sandstone are throughout the profile.

Permeability is moderately slow, both in the subsoil and in the underlying glacial till. As a result, these soils are saturated with water during wet periods and are slow to dry out and warm up in spring unless they are adequately drained. The root zone is generally restricted to the soil material above the limy, weathered glacial till, and it is moderately deep in most places. Within the root zone, the available moisture capacity is medium.

In this county the Bennington soils are used mostly for cultivated crops.

Typical profile of Bennington silt loam, 2 to 6 percent slopes, in a cultivated field in Springfield Township (NE¼ sec. 19, T. 9 N., R. 1 W.; laboratory No. MH-45):

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, very fine, angular blocky structure; friable when moist; many roots; 8 percent of horizon is pebbles, but grit is lacking; neutral (limed); abrupt, smooth boundary.

B1t—8 to 12 inches, yellowish-brown (10YR 5/4) heavy silt loam; many, medium, light olive-brown (2.5Y 5/3) mottles; moderate, medium, angular blocky structure; friable when moist; common roots; many, thin, degraded, light olive-brown (2.5Y 5/3) silt films on ped surfaces; many fine to coarse pores; 10 percent of horizon is pebbles; neutral (limed); clear, smooth boundary.

B21tg—12 to 18 inches, coarsely mottled, dark yellowish-brown (10YR 4/4) and light brownish-gray (10YR 6/2) silty clay loam to silt loam; moderate to strong, medium, angular to subangular blocky structure; friable when moist, sticky when wet; common roots; thick, continuous, grayish-brown (2.5Y 5/2) clay films on ped surfaces; many fine and medium pores; 15 percent of horizon is pebbles; grit is lacking; medium acid; gradual boundary.

B22tg—18 to 25 inches, dark-brown (10YR 4/3 to 4/4) silty clay loam; many, coarse, gray (N 5/0) mottles; weak, very coarse, prismatic structure breaking to moderate, coarse, angular blocky structure; friable when moist, slightly sticky when wet; common roots; thick, continuous, gray (N 5/0) clay films on the vertical surfaces of peds, and many, medium, gray (N 5/0) clay films on the horizontal surfaces; many fine and medium pores; 10 percent of horizon is pebbles; grit is lacking; strongly acid; gradual boundary.

B23tg—25 to 29 inches, coarsely mottled, dark-brown (10YR 4/3 to 4/4) and gray (N 5/0) silty clay loam; moderate, coarse, prismatic and weak, coarse, angular blocky structure; friable when moist; few roots; continuous, medium, gray (10YR 5/1) clay films on the vertical surfaces of peds, and many thick clay films on the horizontal surfaces; many, coarse, dark reddish-brown (5YR 3/2) stains of manganese; many fine pores; 10 percent of horizon is pebbles; neutral; gradual boundary.

B3tg—29 to 38 inches, dark-brown (10YR 4/3) silty clay loam; few, coarse, grayish-brown (10YR 5/2) mottles; weak medium structure breaking to moderate, fine, angular blocky structure; friable when moist; no roots; thin, continuous, dark grayish-brown (10YR 4/2) clay films on the horizontal and vertical surfaces of peds; common, medium, dark reddish-brown (5YR 3/2) stains of manganese; few fine pores; 10 percent of horizon is pebbles; neutral; gradual boundary.

C—38 to 50 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; many, medium, grayish-brown (2.5Y 5/2) mottles; massive; more friable than B3tg horizon; many whitish accumulations of calcium carbonate; 10 percent of horizon is pebbles; mildly alkaline.

Color of the Ap horizon in cultivated fields ranges from very dark grayish brown (10YR 3/2) to dark grayish brown (10YR 4/2). In undisturbed areas the A1 horizon is dark colored and ranges from 1 to 4 inches in thickness. The A2 horizon, where present, is dark grayish brown (10YR 4/2) to dark brown (10YR 3/3). Depth from the surface to the horizon containing grayish mottles or grayish clay films ranges from 10 to 16 inches. Color of the matrix of the B2 horizons ranges from dark yellowish brown (10YR 4/4) to dark brown (7.5YR 4/2). Typically, however, about 50 percent of some parts of those horizons is grayish because of mottling. Reaction of the upper B2 horizons ranges from medium acid to strongly acid. The B23tg horizon is medium acid to mildly calcareous. Depth to neutral or calcareous material ranges from 23 to 38 inches. The solum is 30 to 50 inches thick, and 10 to 15 percent of it, by volume, is glacial pebbles. In the C horizon, about 30 percent of the pebbles are fragments of limestone.

In Mahoning County Bennington soils generally are adjacent to areas of moderately well drained Cardington, poorly drained Condit, or very poorly drained Marengo soils. They are distinguished from the Cardington and Condit soils by the depth to and kinds of mottling, and they are lighter colored than the Marengo soils. Bennington soils have a higher content of clay in the subsoil and underlying glacial till than the Ravenna soils, and they lack the dense, compact layer, or fragipan, that is characteristic of the Wadsworth soils.

Bennington silt loam, 2 to 6 percent slopes (BeB).—This is the only Bennington soil mapped in Mahoning County. It is on uplands. The areas are of irregular shape and mostly contain less than 50 acres. The surface layer is susceptible to crusting if cultivated crops are grown. Included with this soil in mapping in some places were small areas of Condit, Frenchtown, and Sebring soils, all of which are wetter and more grayish than this soil. Also included were small areas of dark-colored, wet Marengo soils in depressions and along drainageways.

Runoff is moderate to rapid, but seasonal wetness is the major limitation to use of this soil for crops. Many areas have been artificially drained. Drainage not only improves this soil for crops, but it also makes farming more convenient. (Capability unit IIw-2; woodland suitability group 7)

Bogart Series

The Bogart series consists of light-colored, moderately well drained soils that are nearly level to sloping. These soils are in widely scattered areas throughout the county, on second bottoms, or low terraces, and in nearly level to irregular or undulating areas of the glacial till plain. They have formed in sandy and gravelly glacial material of Wisconsin age.

In a typical profile of a cultivated Bogart soil, the plow layer is dark grayish-brown loam about 7 inches thick. The uppermost layer of the subsoil is yellowish-brown gravelly loam that is underlain by brown gravelly light clay loam at a depth of about 14 inches. Dark yellowish-brown gravelly loam is at a depth of about 19 inches, and loose, loamy gravel is at a depth of about 26 inches. The underlying material, at a depth of about 31 inches, is dark-brown gravelly loam.

In most places permeability is moderately rapid in the subsoil and is rapid in the sandy and gravelly substratum. During short periods in winter and spring, however, these soils are saturated and free water is within about 1½ feet of the surface. These soils dry out and warm up quickly in spring, and they have a moderately deep or deep root zone. The available moisture capacity is medium to low. As a result, these soils are more droughty than many of the other soils in this county.

The Bogart soils are used mostly for cultivated crops, hay, and truck crops. They are well suited to irrigation, but practices that control erosion are needed.

Typical profile of a Bogart loam in a cultivated field in Smith Township (sec. 13, T. 18 N., R. 5 W.; laboratory No. MH–32):

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) loam; moderate, medium, granular structure; friable when moist; many roots; 10 percent of horizon is pebbles; neutral (field limed); abrupt, smooth boundary.

B1—7 to 14 inches, yellowish-brown (10YR 5/4) gravelly loam; weak, thick, platy structure; friable when moist; common roots; common coarse pores; 20 percent of horizon is pebbles; strongly acid; abrupt, wavy boundary.

B21t—14 to 19 inches, brown (10YR 4/3) gravelly light clay loam; many, coarse, brown (10YR 5/3) and yellowish-red (5YR 4/5) mottles; weak, coarse, angular blocky structure; firm in place, friable if disturbed; few roots; sand grains strongly bridged by brown (10YR 5/3) clay films; many medium pores; 30 percent of horizon is pebbles; strongly acid; abrupt, wavy to irregular boundary.

B22t—19 to 26 inches, dark yellowish-brown (10YR 3/4) gravelly loam; many, medium, dark grayish-brown (10YR 4/2) and dark reddish-brown (5YR 3/4) mottles; weak, medium, angular and subangular blocky structure; friable when moist; no roots; many brown (10YR 4/3) and dark reddish-brown (5YR 3/4) clay films on ped surfaces and bridging sand grains; few black (N 2/0) stains of manganese; many coarse pores; 30 percent of horizon is pebbles; medium acid; abrupt, smooth boundary.

B3t—26 to 31 inches, brown (10YR 5/3), loose, loamy gravel; many, medium, faint, grayish-brown (2.5Y 5/2) mottles; massive; many, thick, grayish-brown (2.5Y 5/2) clay bridges between sand grains, and brown (10YR 5/3) clay films on the pebbles; many coarse pores; 30 percent of horizon is pebbles; medium to slightly acid; abrupt, smooth boundary.

C—31 to 68 inches, dark-brown (10YR 3/3) gravelly loam; single grain; very friable when moist; 40 percent of horizon is pebbles; neutral reaction throughout entire horizon.

The A horizon ranges from very dark grayish brown (10YR 3/2) to brown (10YR 5/3) in color. In areas that have not been disturbed, the A1 horizon is black (N 2/0) and is 1 to 2 inches thick. The A horizon is generally loam, but it is silt loam or gravelly loam in some small areas. The overall clay content of the B2 horizons is generally between 18 and 20 percent, but it is as much as 30 percent in some thin layers. In some places the Bt horizons are expressed only by an increase in the content of fine clay and by the presence of clay films and clay bridges. Depth to grayish mottles or to grayish clay films ranges from 15 to 24 inches. Color of the matrix of the B2 horizons ranges from dark brown (7.5YR 3/4) to yellowish brown (10YR 5/4). Reaction of the B1 horizon and of the B21t horizon ranges from strongly acid to very strongly acid. Thickness of the solum ranges from 30 to 46 inches. Depth to material that is neutral or alkaline in reaction ranges from 30 to about 50 inches. Depth to the underlying sand and gravel is typically 5 feet or more.

Bogart soils are in the same drainage sequence as the well drained Chili, the somewhat poorly drained Jimtown, the poorly drained Damascus, and the very poorly drained Olmsted soils. All of these soils are similar, except for differences in natural drainage. The Bogart soils are less clayey and are more sandy than the Canfield and Glenford soils.

Bogart loam, 2 to 6 percent slopes (BgB).—This soil is in the areas of irregular shape that generally contain less than 50 acres. Included with it in mapping were small areas of well-drained Chili soils and somewhat poorly drained Jimtown soils.

This Bogart soil is easy to till because of the favorable texture of the plow layer. Runoff is slow to moderate. A hazard of erosion is the major limitation to use of this soil for crops. (Capability unit IIe–2; woodland suitability group 1)

Bogart loam, 6 to 12 percent slopes (BgC).—This soil is on terrace breaks, generally between areas of Chili, less sloping Bogart, or other soils on terraces or kames, and areas of Lobdell or other soils on flood plains. Most of the terrace breaks are short, and the areas mainly occupy less than 15 acres. Included in mapping were small areas of well-drained Chili soils and small areas where gravel is on the surface.

Runoff is moderate to rapid. A hazard of erosion is the major limitation to use of this soil for crops. (Capability unit IIIe–4; woodland suitability group 1)

Bogart loam, till substratum, 2 to 6 percent slopes, (BtB).—Unlike the typical Bogart soils, which have formed in sandy and gravelly deposits that are generally more than 60 inches thick, this soil has formed in sandy and gravelly deposits mostly less than 60 inches thick. Depth to firm underlying glacial till ranges from about 12 to 48 inches, but the till is at a depth of 20 to 42 inches in most places. Included with this soil in mapping were areas of Rittman and Canfield soils in which the layer of gravelly material is thin or is absent. Also included were small areas that are somewhat poorly drained.

The available moisture capacity is low. This Bogart soil retains moisture longer than the typical Bogart soils, however, because the underlying firm glacial till restricts the downward movement of water.

A moderate hazard of erosion is the major limitation to use of this soil for crops (Capability unit IIe–1; woodland suitability group 1)

Bogart loam, till substratum, 6 to 12 percent slopes, moderately eroded (BtC2).—This soil, unlike the typical Bogart soils, has formed in sandy and gravelly material that is less than 60 inches thick. It is underlain by firm glacial till. Included with this soil in mapping were areas of Rittman and Canfield soils in which the layer of gravelly material is thin or is absent.

Runoff is rapid. A severe hazard of erosion is the major limitation to use of this soil for crops. (Capability unit IIIe–1; woodland suitability group 1)

Canadice Series

The Canadice series consists of soils that are deep, light colored, and poorly drained. These soils have formed in clayey material deposited by water. They are in nearly level areas and depressions that were lakebeds and swamps following the Wisconsin glacial period.

In a typical profile of a Canadice soil in a wooded area, the surface layer is very dark gray silt loam about 1 inch thick over light brownish-gray silty clay loam about 6 inches thick. The subsoil is mainly silty clay and extends to a depth of about 54 inches. The subsoil is dominantly gray, but there are many yellowish-brown and some reddish-brown mottles. Gray coatings of clay cover the peds in the subsoil. The substratum consists of clay and silty clay loam that have a smooth feel when rubbed between the fingers.

Permeability is very slow, and the water table is high during wet periods. Water drains slowly from these soils, even where artificial drainage is provided.

Most areas of Canadice soils in Mahoning County are in trees or pasture. A few areas, adjacent to more productive soils, are drained and farmed.

Typical profile of Canadice silty clay loam in a wooded area, one-fourth mile east of the junction of U.S. Highway No. 62 and Western Reserve Road in Canfield Township (sec. 4, T. 1 N., R. 3 W.):

A1—0 to 1 inch, very dark gray (10YR 3/1) silt loam; strong, very fine, granular structure; friable when moist; many roots; medium acid; abrupt, smooth boundary.

A2—1 to 7 inches, light brownish-gray (10YR 6/2) silty clay loam; many fine, yellowish-brown (10YR 5/8) mottles; weak, medium, platy structure; friable when moist; many roots; medium acid; abrupt, smooth boundary.

B21tg—7 to 13 inches, gray (10YR 5/1) silty clay; many, medium, yellowish-brown (10YR 5/8) mottles; moderate, medium, angular blocky structure breaking to moderate, fine, angular blocky structure; firm when moist, sticky and very plastic when wet; common roots; many, thin, gray (10YR 5/1) clay coats on ped surfaces; few fine pores; medium acid grading to neutral; gradual, smooth boundary.

B22tg—13 to 21 inches, gray (10YR 5/1) silty clay; many, medium, yellowish-brown (10YR 5/8) mottles; moderate, medium, angular blocky structure; firm when moist, sticky and very plastic when wet; few roots; many, thick, gray (10 YR 5/1) clay coats on ped surfaces; common fine and medium pores; mildly alkaline; gradual, smooth boundary.

B23tg—21 to 27 inches, gray (N 5/0) silty clay; many, medium, reddish-brown (2.5YR 5/4 mottles; moderate, medium, prismatic structure breaking to moderate, medium, angular blocky structure; firm when moist, sticky and very plastic when wet; thick, continuous, gray (N 5/0) clay coats on ped surfaces; common fine pores; mildly alkaline; gradual, smooth boundary.

B24tg—27 to 37 inches, mottled gray (N 5/0) and dark yellowish-brown (10YR 4/4) silty clay; weak, coarse, angular blocky structure; firm when moist, slightly sticky and very plastic when wet; many, thick, gray (N 5/0) and dark-gray (N 4/0) clay coats on ped surfaces; common fine and medium pores; mildly alkaline; gradual, smooth boundary.

B3g—37 to 54 inches, mottled gray (N 5/0) and dark yellowish-brown (10YR 4/4) clay; firm when moist; many, thick, gray (N 5/0) clay coats on ped surfaces; weakly laminated at a depth of 54 inches; gradual, smooth boundary.

Cg—54 to 66 inches, laminated dark grayish-brown (10YR 4/2) and dark yellowish-brown (10YR 4/4) clay and silty clay loam; firm when moist; weakly calcareous.

The color of the Ap horizon, or the A2 horizon in undisturbed areas, ranges from very dark gray (10YR 3/1) to light brownish gray (10YR 6/2). The content of clay in the B2 horizons ranges from 35 to 45 percent. Grayish colors are predominant in the matrix of the B2 horizons, but from 20 to 40 percent of the matrix is mottled with brownish or reddish colors. The solum ranges from 40 to 60 inches in thickness. Reaction ranges from neutral to strongly acid in the B21tg horizon. It ranges from medium acid to mildly alkaline in the lower B2 horizons and in the B3g and Cg horizons. Depth to carbonates ranges from 30 to 60 inches. The Cg horizon is predominantly clayey. It is stratified, however, and contains nonconforming silty and sandy layers in places.

Canadice soils are in the same topographic and drainage sequence as the Lorain soils, which are very poorly drained. The have a lighter colored surface layer than the Lorain soils.

Canadice silty clay loam (0 to 2 percent slopes) (Ca).—This soil is in areas that are commonly circular or oval in shape. It is the only Canadice soil mapped in Mahoning County. Some areas in which the surface layer is clay or silty clay were included in mapping.

The surface layer is low in content of organic matter, and its structure deteriorates if this soil is tilled when too wet or too dry. Undrained areas are subject to ponding. Wetness is a very severe limitation to use for crops, even though drainage is provided. (Capability unit IVw-1; woodland suitability group 5)

Canfield Series

Soils that are light colored, moderately well drained, and gently sloping or sloping are in the Canfield series. These soils have formed in loamy glacial till of Wisconsin age.

In a typical profile of a Canfield soil in an idle field, the surface layer is very dark grayish-brown silt loam about 1 inch thick. The subsurface layer is dark-brown silt loam about 10 inches thick. The upper part of the subsoil consists of a layer of yellowish-brown silt loam, about 4 inches thick, over a layer of yellowish-brown loam about 5 inches thick. A firm, dense, compact layer of brown loam is at a depth of about 20 inches, and it extends to a depth of about 50 inches. The dense, compact layer is underlain by a layer of olive-brown, friable loam about 20 inches thick. The substratum, mainly of olive-brown loam, is at a depth of about 70 inches.

Permeability is moderately slow; the movement of water and the development of roots are restricted by the firm, dense, compact material in most of the lower two-thirds of the subsoil. Mottling and grayish coatings in the subsoil indicate that these soils are naturally wet. In some seasons, generally in winter and spring, the water table is high for short periods. In most places the root zone is moderately deep. Within the root zone, the available moisture capacity is medium.

Most of the acreage is in hay, wheat, corn, and

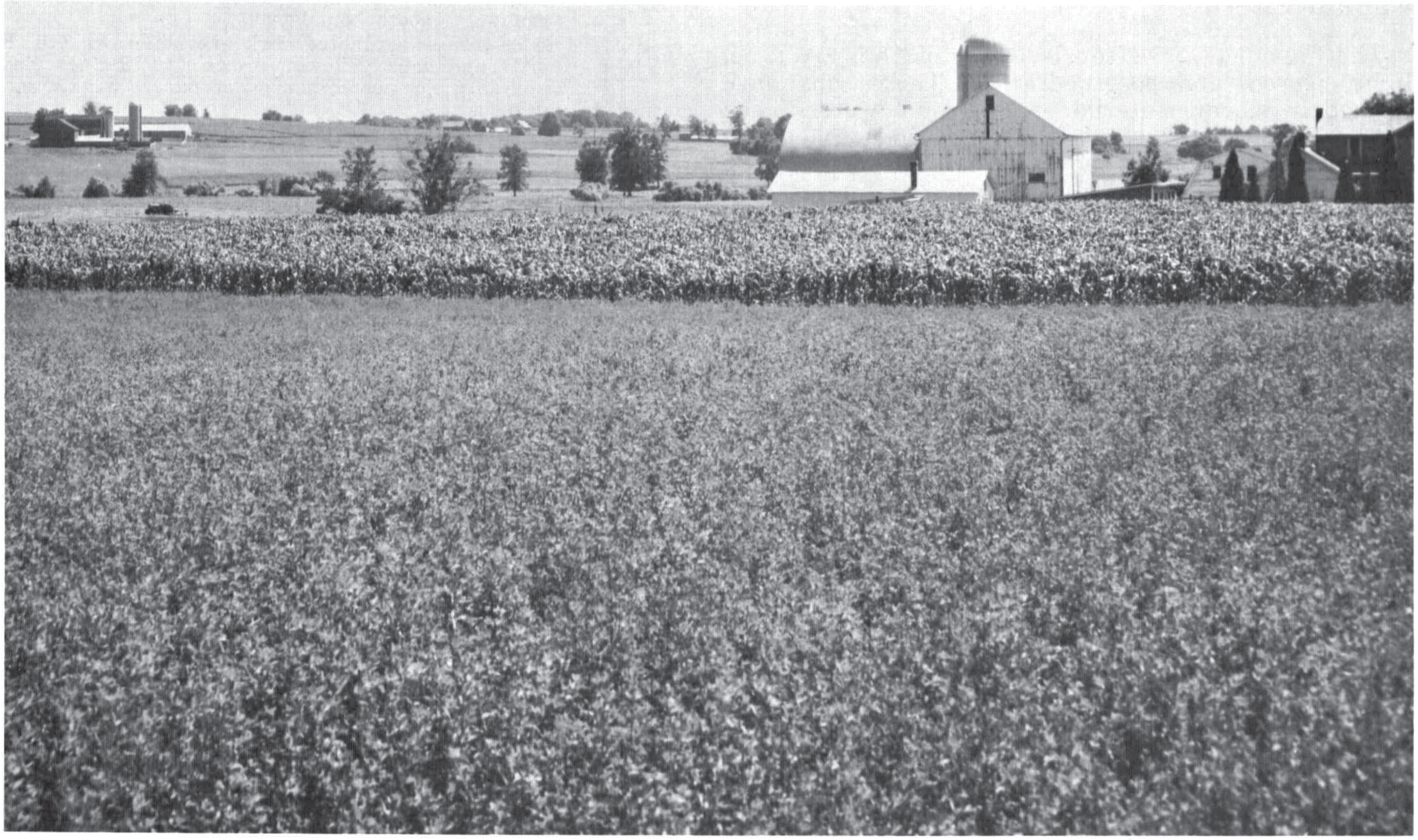

***Figure 7.*—General farm crops on a Canfield silt loam.**

other field crops (fig. 7). A small acreage is about equally divided between pasture and woodland.

Typical profile of Canfield silt loam, 2 to 6 percent slopes, in an idle field in Coitsville Township (lot 11, T. 2 N. R. 1 W; laboratory No. MH–26):

A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable when moist; 10 percent of horizon is pebbles; very strongly acid; abrupt, smooth boundary.

A2—1 to 11 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure grading to weak, coarse, granular structure in lower part of horizon; friable when moist; many roots; 10 percent of horizon is pebbles; very strongly acid; abrupt, smooth boundary.

B1—11 to 15 inches, yellowish-brown (10YR 5/4) silt loam; many, medium brown (10YR and 7.5YR 4/4) mottles; moderate, medium, subangular blocky structure; friable when moist; common roots; many, very thin, yellowish-brown (10YR 5/4) silty films on ped surfaces; many fine pores; 15 percent of horizon is pebbles; very strongly acid; abrupt, wavy boundary.

B2t—15 to 20 inches, yellowish-brown (10YR 5/4) loam; many, medium, grayish-brown (10YR 5/2) and dark-brown (7.5YR 4/4) mottles; moderate, medium, subangular blocky and angular blocky structure; friable when moist, slightly sticky when wet; few roots; many, thin, yellowish-brown (10YR 5/4) silty films over continuous dark-brown (10YR 4/3) clay films; common, fine, black stains of manganese on ped surfaces; many fine pores; 15 percent of horizon is pebbles; very strongly acid; abrupt, irregular boundary.

Bx1—20 to 41 inches, brown (10YR 4/3) heavy loam, and tongues of material from the B2t horizon that extend downward to a depth of 27 inches; moderate fragipan, with moderate, coarse, prismatic structure breaking to weak, thick, platy structure; firm when moist; a few roots in upper part of horizon, grading to none in lower part; continuous grayish brown (2.5YR 5/2) clay films, 3 millimeters thick, on the vertical surfaces of peds; continuous, thin, dark grayish-brown (10YR 4/2) clay films on the horizontal surfaces; many black stains of manganese on the clay films; common fine and medium pores; clay films in the pores; 15 percent of horizon is pebbles; very strongly acid; abrupt, wavy boundary.

Bx2—41 to 50 inches, brown (10YR 4/3) loam; weak fragipan, with very coarse polygons breaking to weak, coarse, angular blocks; firm when moist; continuous grayish-brown (2.5Y 5/2) clay films, 5 millimeters thick, with dark-brown (7.5YR 4/4), loamy inner zones on the surfaces of the polygons; continuous, very thin, dark-brown (7.5YR 4/4) clay films; common, medium, black (N 2/0) stains of manganese on the horizontal surfaces of peds; medium acid; common medium pores; 12 percent of horizon is pebbles; clear, smooth boundary.

B3—50 to 70 inches, olive-brown (2.5Y 4/3) loam; weak, very coarse, polygonal structure breaking to weak, coarse, angular blocky structure; friable when moist; continuous, olive-gray (5Y 5/2) clay films, 5 millimeters thick, with yellowish-brown (10YR 5/8), loamy inner rinds on vertical polygons; many, thin, olive-brown (2.5Y 4/4) clay films and common, medium, black (N 2/0) stains of manganese on the horizontal surfaces of peds; common medium pores; 12 percent of horizon is pebbles; slightly acid; clear, smooth boundary.

C—70 to 124 inches, olive-brown (2.5Y 4/4) loam, with common large zones of dark yellowish brown (10YR 4/4); massive; friable when moist; few, medium, black (N 2/0) stains of manganese; common coarse pores; 12 percent of horizon is pebbles; slightly acid grading to mildly alkaline or calcareous at a depth of 84 inches.

Color of the Ap horizon in cultivated areas ranges from dark grayish brown (10YR 4/2) to dark brown (10YR 3/3). Depth from the surface to the horizon that contains grayish mottles or grayish clay films ranges from 15 to 25 inches. Color of the matrix of the B2t and Bx horizons ranges from dark brown (10YR 3/3) to yellowish brown (10YR 5/4). The content of clay in the B2t and Bx horizons ranges from 21 to 27 percent. Coarse polygons and very coarse prisms are common in the fragipan horizons. The reaction of the B2t and Bx horizons ranges from very strongly acid to medium acid with increasing depth. The upper part of the C horizon is strongly acid to mildly alkaline or calcareous. Depth to neutral or calcareous material ranges from 40 to more than 60 inches. In many places depth to soil material that has a neutral reaction is about 55 inches. The solum is 41 to 70 inches thick. About 13 percent of it, by volume, is glacial pebbles.

Canfield soils are in the same drainage sequence as the well-drained Wooster, the somewhat poorly drained Ravenna, and the very poorly drained Marengo soils. They are more mottled and grayish than the Wooster soils and are less grayish and less mottled than the Ravenna soils. Canfield soils are lighter colored than the Marengo soils, and they have less clay throughout the profile than the Rittman soils.

Canfield silt loam, 2 to 6 percent slopes (CdB) — This soil has the profile described as typical for the series. It is on broad side slopes and ridgetops, mostly in areas containing 5 to 25 acres. Included in mapping in places were areas of a soil that has a loam surface layer.

Where this Canfield soil is cultivated, it generally has a medium content of organic matter. Runoff is rapid, especially when the surface is bare. Erosion is a moderate hazard if this soil is cultivated. (Capability unit IIe–5; woodland suitability group 1)

Canfield silt loam, 6 to 12 percent slopes (CdC).—This soil is on rather broad side slopes and in narrow bands along drainageways, commonly in areas that contain 10 to 25 acres. The surface layer and the subsoil are thinner than those in the profile described as typical for the series. The surface layer is in good tilth.

Runoff is rapid, especially where the surface is bare. Erosion is a severe hazard if this soil is cultivated. (Capability unit IIIe–6; woodland suitability group 1)

Canfield silt loam, 6 to 12 percent slopes, moderately eroded (CdC2) —This soil is commonly on broad side slopes in areas ranging from 10 to 25 acres in size. Part of the original surface layer has been lost through erosion, and the present surface layer and the subsoil are thinner than those in the profile described as typical for the series. The plow layer is a mixture of the remaining original surface soil and of material from the upper part of the subsoil. It has a medium to low content of organic matter.

The range of moisture content within which this soil can be satisfactorily tilled is narrower than that for a similar, but uneroded, Canfield soil. Runoff is rapid, and the hazard of further erosion is severe if this soil is cultivated. (Capability unit IIIe–6; woodland suitability group 1)

Canfield-Urban land complex (CeB).—In most places the soils of this complex have been disturbed in varying degrees by nonfarm construction and development. Most of the disturbance has resulted from grading and digging operations. Where these soils have not been disturbed, their profile is similar to the one described as typical for the Canfield series. Most of the complex consists of fill or of borrow areas.

Where these soils are used as fill, they cover an undisturbed Canfield soil to a depth of 1 to 3 feet. Most of the fill material was formerly part of the subsoil of a Canfield soil, but it includes some material from the surface layer and substratum. Borrow areas are places from which the subsoil and the substratum of Canfield soils have been removed.

The soils of this complex have a medium-textured to moderately fine textured surface layer that is low in content of organic matter. They are in poor tilth. Included with these soils in mapping were areas of somewhat poorly drained Ravenna and very poorly drained Marengo soils. These included soils, like the Canfield soils of this complex, have been disturbed during construction and development.

A severe risk of erosion is a limitation to nonfarm uses of these soils. Wetness, especially during winter and spring, is also a limitation to use. Addition of a large amount of organic matter or topsoil is necessary to make the areas suitable for landscaping. (Not placed in a capability unit or woodland suitability group)

Cardington Series

The Cardington series consists of deep, light-colored, moderately well drained soils that are gently sloping or sloping. These soils are on uplands in the south-central part of the county. They have formed in silty clay loam to loam glacial till of Wisconsin age.

In a typical profile of a Cardington soil in a wooded area, the surface layer is black silt loam about 2 inches thick. The subsurface layer extends to a depth of about 11 inches and consists of brown and dark-brown silt loam. The subsoil is brownish, loamy material that contains brown coatings and is mottled with contrasting brownish and grayish colors. The substratum is at a depth of about 42 inches. It consists of firm, compact, loamy material that restricts the movement of water and tends to limit the growth of roots.

Permeability is moderately slow, and the available moisture capacity is medium. The root zone is mostly moderately deep. The water table is high during winter and spring.

In Mahoning County the crops most commonly grown on the Cardington soils are corn, wheat, and hay.

Typical profile of Cardington silt loam, 2 to 6 percent slopes, in a wooded area of Beaver Township (sec. 34, T. 13 N., R. 2 W.):

A1—0 to 2 inches, black (10YR 2/1), smooth silt loam; moderate, fine, granular structure; friable when moist; many roots; 5 percent of horizon is pebbles;

strongly acid; abrupt, wavy boundary.

A21—2 to 7 inches, dark-brown (10YR 4/3), smooth silt loam that is brown (10YR 5/3) if crushed; weak, medium and fine, angular and subangular blocky structure breaking to moderate, very fine, granular structure; friable when moist; many roots; 10 percent of horizon is pebbles; medium acid; abrupt, smooth boundary.

A22—7 to 11 inches, brown (10YR 5/3), smooth silt loam; weak, thin, platy structure breaking to weak, fine, angular blocky structure; friable when moist; many roots; 10 percent of horizon is pebbles; strongly acid; abrupt, smooth boundary.

B1t—11 to 14 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, angular blocky structure; friable when moist, slightly sticky when wet; common roots; thin, degraded, brown (10YR 5/3) silty coats on the surfaces of peds; many fine and medium pores; 10 percent of horizon is pebbles; strongly acid; abrupt, smooth boundary.

B21t—14 to 20 inches, dark yellowish-brown (10YR 4/4) silty clay loam to fine silt loam that is brown (10YR 5/3) if crushed; few, coarse, yellowish-brown (10YR 5/4) mottles; moderate, medium, angular blocky structure; friable when moist, sticky when wet; common roots; thin, dark yellowish-brown (10YR 4/4) clay coats on 75 percent of the surfaces of peds; many fine pores; 10 percent of horizon is pebbles; strongly acid; clear, smooth boundary.

B22tg—20 to 27 inches, dark-brown (7.5YR 4/4) heavy silt loam that is yellowish brown (10YR 5/4) if crushed; many, coarse, grayish-brown (10YR 5/2) mottles; weak, medium and fine, angular and subangular blocky structure; friable when moist, slightly sticky when wet; common roots; thin, dark-brown (10YR 4/2 to 4/4) clay coats on 50 percent of the surfaces of peds; many fine and medium pores; clay flows in pores; 10 percent of horizon is pebbles; medium acid; clear, wavy boundary.

B23tg—27 to 32 inches, dark-brown (7.5YR 4/3) loam that is dark yellowish brown (10YR 4/4) if crushed; many, medium, gray (10YR 5/1) and yellowish-brown (10YR 5/6) mottles; weak, coarse, angular blocky structure; friable when moist, slightly sticky when wet; few roots; thin, brown (10YR 5/3) clay coats on 25 percent of the vertical surfaces of peds and on 50 percent of the horizontal surfaces; common fine stains of manganese; many fine pores; 10 percent of horizon is pebbles; medium acid; gradual, smooth boundary.

B3tg—32 to 42 inches, olive-brown (2.5Y 4/4 loam; common, medium, gray (10YR 5/1) mottles; weak, medium, subangular and angular blocky structure breaking to weak, fine, angular blocky, structure; friable when moist; few roots; thin, brown (7.5YR 4/4) clay coats on 15 percent of the vertical surfaces of peds and on 25 percent of the horizontal surfaces; common, fine, black (10YR 2/1) stains of manganese; many fine and medium pores; clay flows in pores; 10 percent of horizon is pebbles; slightly acid; gradual smooth boundary.

C—42 to 66 inches, dark-brown (10YR 4/3) loam to smooth silt loam; friable in upper part, firm and compact in lower part; a few roots; 10 percent glacial pebbles; neutral.

In undisturbed areas the A1 horizon ranges from 1 to 4 inches in thickness. In cultivated areas color of the Ap horizon ranges from brown (10YR 4/3) to dark grayish brown (10YR 4/2). Depth from the surface to the horizon that contains grayish mottles ranges from 17 to 25 inches. Color of the matrix of the B2 horizons ranges from brown (10YR 4/3) to dark brown (7.5YR 4/4). The reaction of the B2 horizons ranges from strongly acid to medium acid. Neutral or calcareous material is at a depth of 35 to 50 inches. The solum is 35 to 50 inches thick, and 10 to 15 percent of it, by volume, is glacial pebbles. In the C horizon, about 30 percent of the pebbles coarser than 4.7 millimeters in diameter is limestone.

Cardington soils are in the same drainage sequence as the somewhat poorly drained Bennington, the poorly drained Condit, and the very poorly drained Marengo soils. Cardington soils have a greater predominance of brownish colors and are less grayish than the other soils in this sequence. Their surface layer is lighter colored than that of the Marengo soils.

Cardington silt loam, 2 to 6 percent slopes (CgB).—This soil has the profile described as typical for the series. Size of the areas is mostly 5 to 15 acres. Drainageways are along the lower edges of many of the areas. Included with this soil in mapping were some areas of somewhat poorly drained Bennington soils.

This Cardington soil has a medium content of organic matter. Erosion is a moderate hazard if this soil is cultivated. (Capability unit IIe–1; woodland suitability group 1)

Cardington silt loam, 6 to 12 percent slopes, moderately eroded (CgC2).—This soil is mainly on the lower one-third of side slopes of rolling hills covered by glacial till. The areas mostly contain 3 to 5 acres. Much of the original surface layer has been lost through erosion. The present plow layer consists partly of material from the upper part of the subsoil, and this layer is low in content of organic matter. The surface layer and the subsoil are thinner than those in the profile described as typical for the series. Included in mapping were a few small areas in which slopes are 12 to 18 percent.

This Cardington soil generally is in poor tilth and is highly susceptible to surface crusting. The hazard of further erosion is severe if this soil is cultivated. (Capability unit IIIe–1; woodland suitability group 1)

Carlisle Series

The Carlisle series consists of dark-colored, very poorly drained, nearly level organic soils in swamps and on bottom lands. These soils consist of layers of partly decomposed remains of trees, fibrous grasses, sedges, and reeds. The organic material is more than 42 inches thick over mineral material.

A typical profile of a Carlisle soil consists of black to very dark brown and dark brown muck that grades to yellowish-brown muck and woody muck in the lower part of the profile. At a greater depth, the muck grades to peat. The organic material extends to a depth greater than 65 inches and is generally underlain by dark-gray, clayey material. Both the muck and the underlying clayey material have a smooth feel when they are wet and rubbed between the fingers.

The Carlisle soils are normally saturated with water and must be drained before they can be used for farming. They have very high available moisture capacity. Permeability is moderately rapid in the organic material and is very slow in the underlying material.

Where the Carlisle soils have been drained, they are important locally for specialized crops. A small acreage is in corn, but these soils are mostly in trees or pasture.

Typical profile of Carlisle muck in a pasture in Beaver Township (sec. 31, T. 13 N., R. 2 W.):

1—0 to 18 inches, black (N 2/0) muck; weak, medium, granular structure; friable when moist; many roots; neutral to mildly alkaline; about 20 percent of horizon is mineral material; abrupt, smooth boundary.

2—18 to 26 inches, very dark brown (10YR 2/2) muck; weak, medium, granular structure; friable when moist; common roots; neutral; less than 5 percent of horizon is mineral material; gradual boundary.

3—26 to 31 inches, dark-brown (10YR 3/3), decomposed woody muck; massive; loose; neutral; contains fragments of rotted wood; less than 5 percent of horizon is mineral material; gradual boundary.

4—31 to 65 inches, yellowish-brown (10YR 5/4) muck grading to peat; massive; loose; neutral; the organic material is partly decomposed, and the remains of plants cannot be identified; some material that resembles roots is intact.

The surface horizon ranges from black (N 2/0) to very dark brown (10YR 2/2) in color and from 8 to 36 inches in thickness. The horizon immediately beneath the surface layer is very dark brown (10YR 2/2) where it consists entirely of muck, but the color ranges to yellowish brown (10YR 5/4) where this horizon contains peat. The third and fourth horizons range from granular, well-decomposed organic material to fibrous organic material in which pieces of wood and the remains of grasses and sedges can be identified. Reaction ranges from medium acid to neutral.

Where Carlisle soils are on bottom lands, they are commonly adjacent to Chagrin, Lobdell, and Wayland soils. Where they are on uplands, they are adjacent to mineral soils that are underlain by glacial material.

Carlisle muck (Ch).—This is the only Carlisle soil mapped in Mahoning County. It generally occurs in long, narrow areas on bottom lands and in nearly circular areas on uplands. The areas contain 10 to 200 acres.

Where this soil is not drained, it is saturated with water and is generally swampy and marshy. Where it is drained, this soil is subject to subsidence as the result of oxidation of the organic material. Soil blowing is a hazard during dry periods, especially when the surface is bare and is exposed to strong prevailing winds. Wetness is a severe limitation to use of this soil for crops, even in areas that have been drained. (Capability unit IIIw–4; woodland suitability group 8)

Chagrin Series

The Chagrin series consists of deep, light-colored soils that are well drained and nearly level. These soils are on bottom lands along streams throughout the county. They have formed in loamy sediment washed from soils underlain by glacial material of Wisconsin age.

In a typical profile of a Chagrin soil, the surface layer is dark grayish-brown loam about 4 inches thick. The surface layer is underlain by yellowish-brown loam to loamy fine sand in layers 9 to 15 inches thick. Normally, bedrock is at a depth of more than 8 feet.

Chagrin soils have moderate permeability and high available moisture capacity. They have a deep root zone. Flooding is a hazard.

Corn, soybeans, and hay are the crops commonly grown on these soils. Some areas are in pasture or trees.

Typical profile of Chagrin loam in a pasture near the place where Berlin Station Road crosses Mill Creek in Berlin Township (T. 1 N., R. 5 W.):

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

AC—4 to 18 inches, yellowish-brown (10YR 5/4) loam; weak, very fine, granular structure; friable when moist; common roots; medium acid; clear, smooth boundary.

C1—18 to 27 inches, yellowish-brown (10YR 5/4) fine sandy loam; massive; very friable when moist; few roots; medium acid; gradual boundary.

C2—27 to 42 inches, yellowish-brown (10YR 5/4) loamy fine sand; single grain; loose; medium to slightly acid.

In areas that have not been cultivated, the A1 horizon ranges from 3 to 7 inches in thickness. The color of the A1 horizon ranges from 2 to 4 in value when the soil material is moist, and the value is 3 or 4 if the soil material is crushed. Chroma in the A1 horizon ranges from 1 to 3 when the soil material is either moist or dry, or when it is crushed. Reaction of the A1 horizon ranges from strongly acid to slightly acid. In cultivated areas the Ap horizon is 6 to 10 inches thick. When the Ap horizon is moist, the value is 3 or 4. The chroma ranges from 2 to 4 when the soil material is moist, and from 3 to 5 when the soil material is dry. The AC horizon ranges from 8 to 15 inches in thickness and from strongly acid to slightly acid in reaction. The value is 3 to 5, and the chroma is 3 or 4. Texture of the AC horizon ranges from silt loam to loamy fine sand. The C horizons range from loam to gravelly loamy sand in texture, from yellowish brown (10YR 5/4) to dark brown (10YR 4/3) in color, and from medium acid to slightly acid in reaction.

Chagrin soils are in the same topographic sequence as the moderately well drained Lobdell soils, the somewhat poorly drained Orrville soils, and the poorly drained Wayland soils. They have a more brownish color and are less grayish and less mottled than the Lobdell, Orrville, and Wayland soils.

Chagrin loam (0 to 2 percent slopes) (Ck).—This is the only Chagrin soil mapped in Mahoning County. Where it occurs along the smaller streams, the areas are long, narrrow, and winding. Many of the areas along the larger streams are rather wide. Size of the areas is mostly 20 to 100 acres. Included with this soil in mapping were areas of wetter Lobdell soils that were too small to be mapped separately.

This Chagrin soil is easy to cultivate and to keep in good tilth. Normally, it is susceptible to flooding. Flooding does not limit use for corn, soybeans, and other crops that mature in summer, but it does limit the overall choice of crops that can be grown. (Capability unit IIw–4; woodland suitability group 1)

Chili Series

The Chili series consists of soils that are light colored, well drained, and gently sloping to very steep. These soils are on terraces and kames. They have formed in loamy material that is underlain by layers of gravelly and sandy glacial outwash.

In a typical profile of a Chili soil in pasture, the surface layer is very dark grayish-brown to dark-brown loam about 8 inches thick. The subsoil of brownish, gravelly and loamy, friable material extends to a depth of about 50 inches. The substratum consists of layers of brown gravel and sand of variable thicknesses and degrees of sorting.

Permeability is moderately rapid. The root zone is only moderately deep because it is limited by the underlying gravelly and sandy material. In the root zone, available moisture capacity is generally low.

The less steep areas of Chili soils are used mainly to grow corn, wheat, and hay, and the steeper areas are in pasture and trees. The areas that are more nearly level are suitable for irrigation and specialized crops.

Typical profile of a Chili loam in a pasture in Green Township (sec. 36, T. 16 N., R. 3 W.):

Ap1—0 to 4 inches, very dark grayish-brown (10YR 3/2) loam; weak, fine and very fine, granular structure; friable when moist; many roots; 8 percent of horizon is pebbles; neutral; abrupt, smooth boundary.

Ap2—4 to 8 inches, dark-brown (10YR 4/3) loam; weak, fine and very fine, angular blocky structure; friable when moist; many roots; 15 percent of horizon is pebbles; slightly acid; abrupt, wavy boundary.

A2—8 to 12 inches, yellowish-brown (10YR 5/4) loam; moderate, very fine, angular blocky structure; friable when moist; many roots; 15 percent of horizon is pebbles; slightly acid; abrupt, wavy boundary.

B1—12 to 18 inches, yellowish-brown (10YR 5/4) loam; weak, fine, subangular blocky structure; friable when moist; common roots; 20 percent of horizon is pebbles; medium acid; clear, smooth boundary.

B21t—18 to 26 inches, brown (7.5YR 4/4) gravelly loam; strong, medium and fine, angular blocky structure; friable when moist; many, medium, thick, dark yellowish-brown (10YR 4/4) clay films are on peds and form continuous bridges between grains of sand; common roots; 25 percent of horizon is pebbles; medium acid; abrupt, wavy boundary.

IIB22t—26 to 39 inches, brown (7.5YR 4/4) and reddish-brown (5YR 4/4) gravelly coarse sandy loam; structure has generally formed around pebbles, but soil material has some medium granular structure in sandy layers; very friable when moist; reddish-brown (5YR 4/4) clay films on 30 percent of pebbles; some clay bridging between grains of sand; 40 percent of horizon is pebbles; many pebbles coated by black (N 2/0) stains of manganese; medium acid; abrupt, irregular boundary.

IIB3t—39 to 50 inches, reddish-brown (5YR 4/4) gravelly loamy sand; structure has formed predominantly around pebbles, but soil material has weak, medium, granular structure in sandy layers; very friable when moist; sand grains are bridged by clay; no films; 60 percent of horizon is pebbles; slightly acid; gradual boundary.

IIC—50 to 84 inches, brown (10YR 5/3) gravelly loamy sand and sandy loam in layers; structureless (single grain); very friable to loose when moist; few, thin, brown (7.5YR 4/4) clay films on pebbles; 60 percent of horizon is pebbles; slightly acid grading to calcareous at a depth of 84 inches; below a depth of 84 inches, pebbles are coated with lime.

In an undisturbed profile, the A1 horizon ranges from 1 to 3 inches in thickness, from very dark grayish brown (10YR 3/2) to black (10YR 2/1) in color and from strongly acid to very strongly acid in reaction. The Ap or the A2 horizon ranges from 4 to 12 inches in thickness and from dark brown (7.5YR 4/4) to yellowish brown (10YR 5/4) in color. In areas that have not been limed, the Ap or the A2 horizon ranges from very strongly acid to strongly acid in reaction. The B2t horizons range from 20 to 40 inches in combined thickness, from brown (10YR 5/3) to dark reddish brown (5YR 3/4) in color, and from very strongly acid to medium acid in reaction. The solum is 34 to 60 inches thick. Neutral or calcareous material is at a depth of more than 45 inches. In places the underlying material is acid to a depth of more than 10 feet.

Chili soils are in the same topographic sequence as the lower lying, moderately well drained Bogart, the somewhat poorly drained Jimtown, the poorly drained Damascus, and the very poorly drained Olmsted soils. They lack mottling and are more brownish than any of these soils, and they are lighter colored than the Olmsted soils. Chili soils are somewhat similar to Conotton soils, but they contain fewer pebbles and cobblestones than the Conotton soils. Also, their subsoil is thicker and better developed than the subsoil of the Conotton soils.

Chili gravelly loam, 2 to 6 percent slopes (ClB).—This soil is on terraces and on broad, fairly low kames, mainly in areas that are nearly circular in shape and less than 15 acres in size. The plow layer and the subsoil have a higher content of gravel than those in the profile described as typical for the series. Commonly adjacent to this soil, but at a slightly lower elevation, are areas of Bogart and Jimtown soils. This soil is well suited to truck crops.

The principal limitation to use of this gently sloping Chili soil for crops is its moderate susceptibility to erosion. Droughtiness is a secondary limitation. (Capability unit IIe–2; woodland suitability group 1)

Chili gravelly loam, 6 to 12 percent slopes (ClC).—This soil is on terraces and on broad, rather low kames. Many of the areas are nearly circular and contain 3 to 10 acres. The surface layer and the subsoil have a higher content of gravel than those in the profile described as typical for the series. Commonly adjacent to this soil are areas of Bogart soils. Small areas of Bogart soils were included with this soil in mapping.

A severe hazard of erosion is the main limitation to use of this soil for crops. If erosion is controlled, this soil is well suited to truck crops. Droughtiness is a secondary limitation. (Capability unit IIIe–4; woodland suitability group 1)

Chili gravelly loam, 12 to 18 percent slopes (ClD).—This soil is on terraces and kames. Areas in which it occurs are narrow and irregular in shape. In many areas on kames, the surface is uneven. The plow layer and the subsoil of this soil have a higher content of gravel than those in the profile described as typical for the series. Commonly adjacent to this soil, but at a lower elevation, are areas of Damascus, Sebring, and Wayland soils.

A very severe hazard of erosion is the main limitation to use of this soil for crops. Droughtiness is a secondary limitation. (Capability unit IVe–1; woodland suitability group 1)

Chili loam, 2 to 6 percent slopes (CmB).—This soil has the profile described as typical for the series. It is on terraces and on broad, rather low kames in areas that are mostly irregular in shape and 3 to 15 acres in size. Commonly adjacent are lower lying areas of Damascus, Sebring, or Wayland soils. A few areas in which the surface layer is mostly sandy loam or silt loam were included with this soil in mapping.

A moderate risk of erosion is the main limitation to use of this Chili soil for crops. Droughtiness is a secondary limitation. (Capability unit IIe–2; woodland suitability group 1)

Chili loam, 6 to 12 percent slopes (CmC).—This soil is on terraces and on broad, fairly low kames. Many of the areas are circular in shape and contain less than 10 acres. They are commonly adjacent to lower lying areas of Bogart, Jimtown, or Wayland soils. Included in mapping were a few areas in which the surface layer is sandy loam.

A severe erosion hazard is the primary limitation to use of this Chili soil for crops. With care, truck crops can be grown. Droughtiness is a secondary limitation. (Capability unit IIIe–4; woodland suitability group 1)

Chili and Conotton gravelly soils, 18 to 25 percent slopes (CnE).—In this undifferentiated unit, moderately deep Chili and Conotton soils were mapped together because of similarities in their profiles, use, and management. The profiles of these soils are similar to the ones described for the Chili and Conotton series, except that the profile of the Chili soil has a higher content of gravel than the one described as typical. The soils occupy narrow areas of irregular shape on terrace escarpments and kames. The surface is very uneven, especially where these soils are on kames. Most of the areas are between 5 and 25 acres in size.

The primary limitation to use of these soils for crops is a very severe risk of erosion. Droughtiness is a secondary limitation. (Capability unit VIe–2; woodland suitability group 3)

Chili and Conotton gravelly soils, 25 to 50 percent slopes (CnF).—This undifferentiated unit consists of areas of Chili and Conotton soils that were mapped together because they have similar uses and management requirements. The profiles are similar to the ones described as typical for the Chili and Conotton series. The Chili profile has a higher content of gravel, however, than the profile described as typical for the Chili series. These soils occupy areas of irregular shape on narrow terrace escarpments and kames. Most areas contain less than 10 acres.

The primary limitation to use of these soils for crops is the very severe hazard of erosion. Droughtiness is a secondary limitation. (Capability unit VIIe–1; woodland suitability group 3)

Chili-Urban land complex, undulating (CoB).—In most places soils of this complex have been disturbed in varying degrees by nonfarm construction and development. Most of the disturbance has resulted from grading and digging operations. Where these soils have not been disturbed, their profile is similar to the one described as typical for the Chili series. Most of the complex is fill or borrow areas, but undisturbed areas in undeveloped lots, in the back parts of developed lots, and in small patches of woodland are included.

Some fill areas consist of 1 to 3 feet of soil material over part of an undisturbed Chili soil or over an included area of Bogart soils, which are wetter than the Chili soils and occur at lower elevations. The fill material is mainly gravelly and was formerly part of the subsoil or the substratum of a Chili soil. Borrow areas are places from which the subsoil and the substratum of Chili soils have been removed.

The present surface layer of the soils in this complex commonly has a low content of organic matter. It tends to be gravelly and droughty.

A severe risk of erosion is a limitation to nonfarm uses of these soils. Erosion is an especially severe hazard where the surface is left bare during construction periods. Gullying and sedimentation commonly occur during those periods. Gully development is a severe hazard, especially around the steep outer slopes of fill areas. Addition of a large amount of organic matter or of topsoil is necessary to make the areas suitable for landscaping. (Not placed in a capability unit or woodland suitability group)

Chili-Urban land complex, rolling (CoC).—In most areas of this complex, the soils have been disturbed in varying degrees by nonfarm construction and development. Most of the disturbance has resulted from grading and digging operations. Where the soils have not been disturbed, they have a profile similar to the one described as typical for the Chili series. Most of the complex consists of borrow or of fill areas, but undisturbed areas in undeveloped lots, on the back parts of developed lots, and in small patches of woodland are included. Most areas of the complex are rolling, but slopes range from 18 to 25 percent in some places.

The fill areas consist of about 1 to 3 feet of soil material over part of an undisturbed Chili soil or over an included area of Bogart soils, which are wetter than the Chili soils and occur at lower elevations. The fill material is mainly gravelly and formerly was part of the subsoil or substratum of a Chili soil. Borrow areas are places from which the subsoil and substratum of Chili soils have been removed.

The present surface layer of the soils in this complex generally has a low content of organic matter. It tends to be gravelly and droughty.

A severe erosion hazard is a limitation to nonfarm uses of these soils. The hazard of erosion is especially severe where the surface is left bare during construction periods. Gullying and sedimentation commonly occur during these periods. The development of gullies is a severe hazard, especially around the steep outer slopes of fill areas. Addition of a large amount of organic matter or of topsoil is necessary to make the areas suitable for landscaping. (Not placed in a capability unit or woodland suitability group)

Condit Series

The Condit series consists of deep, light-colored, poorly drained soils that are nearly level. These soils have formed in silty clay loam to loam glacial till of Wisconsin age. They are in the southern and eastern parts of the county.

In a typical profile of a Condit soil that has been cultivated, the plow layer is dark-gray silt loam about 7 inches thick. The subsurface layer, about 2 inches thick, is gray heavy silt loam mottled with dark yellowish brown. The subsoil consists of grayish-brown silty clay loam, and it contains mottles and gray coatings. The substratum, at a depth of about 28 inches, is composed of silty clay loam to loam glacial till. Generally, the substratum has a rather low content of carbonates.

Permeability is slow, both in the solum and the substratum. The water table is seasonally high. The mottles and gray coatings indicate that these soils are naturally wet. Excess water drains slowly from the soils, even where artificial drainage is provided.

Most of the acreage is wooded or in pasture. A small acreage, adjacent to soils more suitable for crops, is drained and is used for farming.

Typical profile of Condit silt loam in a pasture in Springfield Township (sec. 12, T. 9. N., R. 1 W.):

Ap—0 to 7 inches, dark-gray (10YR 4/1) silt loam; many, fine, dark reddish-brown (5YR 3/4) mottles; moderate, medium, granular structure; friable when moist; many roots; 8 percent of horizon is pebbles; slightly acid; abrupt, smooth boundary.

A2g—7 to 9 inches, gray (10YR 6/1) heavy silt loam; many, fine, dark yellowish-brown (10YR 4/4) mottles and krotovinas; moderate, fine, angular blocky structure; friable when moist, slightly sticky when wet; many roots; common fine pores; 8 percent of horizon is pebbles; slightly acid; clear, smooth boundary.

B2tg—9 to 17 inches, grayish-brown (10YR 5/2) silty clay loam; common dark yellowish-brown (10YR 4/4) mottles; strong, fine, angular blocky structure; firm when moist, sticky when wet; common roots; continuous, thick, gray (10YR 5/1) clay films on ped surfaces; common fine pores; 8 percent of horizon is pebbles; medium acid; clear, smooth boundary.

B3tg—17 to 28 inches, grayish-brown (10YR 5/2) silty clay loam; common strong-brown (7.5YR 5/6) mottles; weak, medium, platy structure breaking to weak, fine, angular blocky structure; firm when moist, slightly sticky and plastic when wet; common roots; many, thick, grayish-brown (10YR 5/2) and dark-brown (7.5YR 3/2) clay coats on ped surfaces; common fine pores; 8 percent of horizon is pebbles; sand content increases with increasing depth; medium acid grading to neutral; clear, smooth boundary.

C—28 to 40 inches, olive-brown (2.5Y 4/4) silty clay loam to loam; many, medium, gray (10YR 5/1) mottles; massive; more friable than B3tg horizon; 8 percent of horizon is pebbles; mildly alkaline to moderately alkaline and calcareous.

In the foregoing profile, examination of 619 fragments coarser than 4.7 millimeters in diameter, taken from the parent till, shows that 45 percent of the fragments are sandstone; 32 percent, limestone; 8 percent, quartzite; 5 percent, concretions; 4 percent, siltstone; 2 percent, granite; 2 percent, black shale; 1 percent, schist; and 1 percent, chert.

In areas that have not been disturbed, the A1 horizon is dark colored and ranges from 2 to 4 inches in thickness. The A2 horizon is dark grayish brown (10YR 4/2) to gray (10YR 6/1). In cultivated areas color of the Ap horizon ranges from very dark grayish brown (10YR 3/2) to dark gray (10YR 4/1). All horizons beneath the A horizon have a grayish matrix and contain mottles or clay films. Reaction of the B2tg horizon ranges from medium acid to slightly acid, and the B3tg horizon is medium acid to moderately alkaline and calcareous. The solum is 25 to 40 inches thick, and 5 to 15 percent of it, by volume, is glacial pebbles. About 30 percent of the pebbles are limestone. Depth to calcareous glacial till ranges from 28 to 45 inches.

Condit soils are in the same topographic and drainage sequence as the Cardington, Bennington, and Marengo soils. They are more grayish and are wetter than the Cardington and Bennington soils, and they are lighter colored than the Marengo soils.

Condit silt loam (0 to 2 percent slopes) (Ct).—This is the only Condit soil mapped in Mahoning County. It generally occupies narrow areas along drainageways, or extensive areas on uplands. Included with this soil in mapping were some areas in which the slopes are 2 to 6 percent, and some areas of dark-colored Marengo soils.

The surface layer has a low content of organic matter. If this soil is tilled when too wet or too dry, the structure of the surface layer deteriorates. Undrained areas are subject to ponding, and some areas are subject to flash flooding. Wetness is a severe limitation to use of this soil for crops, even where drainage is provided. (Capability unit IIIw-2; woodland suitability group 5)

Conotton Series

The Conotton series consists of light-colored, well-drained soils that are steep or very steep. These soils commonly occur on terraces and kames. They have formed in loamy material over stratified gravelly and sandy outwash.

In a typical profile of a Conotton soil in pasture, the surface layer is very dark brown gravelly loam about 2 inches thick. The subsurface layer, about 4 inches thick, is dark-brown gravelly loam. The subsoil is dark yellowish-brown, very friable very gravelly sandy loam to loamy sand, with contrasting brownish coatings and bridges around and between the grains of sand in most places. The substratum, at a depth of about 29 inches, consists of layers of gravelly and sandy material that mostly are yellowish brown and are variable in thickness and in degree of sorting.

Permeability is very rapid. The root zone is only moderately deep because the depth to which roots can penetrate is limited by the underlying gravel and sand. In the root zone, the available moisture capacity is low.

The Conotton soils are mostly in trees. They were not mapped separately in this county but were mapped in complexes with the Chili soils.

Typical profile of a Conotton gravelly loam in a pasture in Green Township (sec. 35, T. 16 N., R. 3 W.):

A1—0 to 2 inches, very dark brown (10YR 2/2) gravelly loam; moderate, medium, granular structure; very friable when moist; many roots; 50 percent of horizon is pebbles and cobblestones; neutral (field limed); abrupt, wavy boundary.

A2—2 to 6 inches, dark-brown (10YR 4/3) gravelly loam; moderate, fine, subangular blocky structure breaking to moderate, very fine, granular structure; very friable when moist; many roots; 50 percent of horizon is pebbles and cobblestones; about 20 percent is composed of dark-colored worm casts; neutral (field limed); abrupt, smooth boundary.

B2t—6 to 10 inches, dark yellowish-brown (10YR 4/4) very gravelly sandy loam; weak, fine, subangular blocky structure; very friable when moist; many roots; many dark yellowish-brown (10YR 4/4) clay bridges between sand grains; 75 percent of horizon is pebbles and cobblestones; neutral (field limed); gradual boundary.

B3t—10 to 29 inches, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/4) very gravelly sandy loam to loamy sand; fine, subangular blocky structure; very friable when moist; common to few roots; few, weak, dark yellowish-brown (10YR 4/4) clay bridges between sand grains; 75 percent of horizon is pebbles and cobblestones; medium acid; gradual boundary.

C1—29 to 46 inches, yellowish-brown (10YR 5/4) very gravelly loamy sand; single grain; loose; 75 percent of horizon is pebbles and cobblestones; medium acid; abrupt, smooth boundary. In places, within a horizontal distance of 20 feet, 5 to 40 percent of this horizon consists of reddish-brown (5YR 4/3) masses of gravelly sandy loam.

C2—46 to 56 inches, yellowish-brown (10YR 5/4) loamy sand; single grain; loose; 5 percent of horizon is pebbles; medium acid grading to neutral in lower part; abrupt, smooth boundary. (Well-sorted outwash.)

C3—56 to 67 inches, yellowish-brown (10YR 5/4) gravelly loamy sand; single grain; 50 percent of horizon is pebbles and cobblestones; neutral; abrupt, smooth boundary. (Poorly sorted outwash.)

C4—67 to 97 inches, dark yellowish-brown (10YR 4/4) very gravelly sandy loam; single grain; friable but very slightly cemented; 75 percent of horizon is pebbles and cobblestones; neutral; abrupt, wavy boundary.

C5—97 to 100 inches, dark-brown (10YR 4/3) very gravelly loamy sand; single grain; 75 percent of horizon is pebbles and cobblestones; neutral.

In undisturbed areas the A1 horizon ranges from 1 to 4 inches in thickness; from very dark grayish brown (10YR 3/2) or very dark brown (10YR 2/2) to black (10YR 2/1) in color; and from strongly acid to very strongly acid in reaction where the soils have not received lime. The A2 horizon is as much as 10 inches thick in some places, but it is lacking in others. It ranges from brown (10YR 5/3) to dark brown (10YR 3/3) in color and from strongly acid to very strongly acid in reaction where the soils have not received lime. Color of the Ap horizon in cultivated areas ranges from brown (10YR 5/3) to very dark grayish brown (10YR 3/2). The Bt horizons range from 12 to 30 inches in combined thickness; from yellowish brown (10YR 5/4) or dark yellowish brown (10YR 4/4) to reddish brown (5YR 4/3) in color; and from very strongly acid to medium acid in reaction where the soils have not received lime. The solum is 18 to 40 inches thick. In areas that have not received lime, depth to neutral or calcareous material ranges from 30 to 60 inches.

The Conotton soils do not occur in a topographic sequence with less well-drained soils, but they do occur with Chili soils. They contain more pebbles and cobblestones than the Chili soils, and they have a subsoil that is thinner and contains less evident coatings than the subsoil of the Chili soils.

Damascus Series

The Damascus series consists of deep, light-colored, nearly level soils that are poorly drained. These soils are on terraces, where they have formed in loamy material over stratified sandy and gravelly material of Wisconsin age.

In a typical profile of a Damascus soil in a wooded area, the surface layer is very dark brown loam about 1 inch thick. The subsurface layer, about 8 inches thick, is dark-gray loam. The subsoil is mostly dark grayish-brown or grayish-brown loam. The grayish color is partly a result of gray coatings and films on the surfaces of the soil particles. The subsoil contains contrasting yellowish-brown mottles and some buckshot concretions. The substratum, at a depth of about 41 inches, consists of layers of mixed dark-brown gravel and sand.

These soils are permeable, and they have a seasonal high water table. The mottling and gray colors in the profile indicate natural wetness.

In Mahoning County the Damascus soils are generally in pasture and trees. Areas that are farmed are used mainly for growing corn and soybeans.

Typical profile of Damascus loam in a forest about one-half mile south of U.S. Highway No. 224, and one-fifth of a mile east of Tippecanoe Road in Boardman Township (T. 1 N., R. 2 W.):

A1—0 to 1 inch, very dark brown (10YR 2/2) loam; few, medium, yellowish-brown (10YR 5/4) mottles; moderate, fine to coarse, granular structure; friable when moist; many roots; 5 percent of horizon is pebbles; medium acid; abrupt, wavy boundary.

A2g—1 to 9 inches, dark-gray (10YR 4/1) loam; many common, dark yellowish-brown (10YR 4/4) and dark reddish-brown (5YR 3/4) mottles; moderate, fine, angular blocky structure; friable when moist; many roots; 5 percent of horizon is pebbles; medium acid; abrupt, wavy boundary.

B1g—9 to 14 inches, dark grayish-brown (10YR 4/2) loam to gravelly loam; many, coarse, gray (10YR 5/1) and yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; friable when moist, nonsticky when wet; common roots; many, thick, degraded, gray (10YR 5/1), silty films on ped surfaces; common medium pores; 10 percent of horizon is pebbles; medium acid; abrupt, irregular boundary.

B21tg—14 to 21 inches, grayish-brown (10YR 5/2) loam to gravelly loam; many, coarse, gray (10YR 5/1) and dark yellowish-brown (10YR 4/4) mottles; weak, medium, angular blocky structure; friable when moist, slightly sticky when wet; common roots; many, thick, gray (10YR 5/1) clay films on ped surfaces, and thin clay films in pores; many fine pores; 15 percent of horizon is pebbles; medium acid; clear, wavy boundary.

B22tg—21 to 30 inches, dark grayish-brown (10YR 4/2) gravelly loam; common, coarse, dark-brown (10YR 4/3) mottles; weak, medium, subangular blocky structure; friable when moist, nonsticky when wet; common roots; many, thick, gray (10YR 5/1) clay films on ped surfaces, in pores, and on pebbles; clay bridges the sand grains; many fine pores; 40 percent of horizon is pebbles; common soft ferromanganese concretions; many, medium, black (N 2/0) stains of manganese; medium acid to slightly acid; abrupt, irregular boundary.

B23tg—30 to 36 inches, dark-brown (7.5YR 4/4) loam; many, fine, grayish-brown (10YR 5/2) mottles; weak, fine, angular blocky structure; friable when moist; a few roots; many grayish-brown (10YR 5/2) clay films in pores; many fine pores; 5 percent of horizon is pebbles; slightly acid; gradual, irregular boundary.

B3g—36 to 41 inches, dark-brown (7.5YR 4/4) loam; massive; friable when moist; no roots; many, diagonally oriented, thick, gray (10YR 5/1) clay seams; 5 percent of horizon is pebbles; slightly acid; gradual, irregular boundary.

C—41 to 55 inches, dark-brown (7.5YR 4/4) layers of gravel and sand; structureless (single grain) in gravel and massive in sand; slightly acid, grading to neutral at a depth of about 48 inches and to mildly alkaline at a depth of about 55 inches.

In cultivated areas color of the Ap horizon ranges from dark grayish brown (10YR 4/2) to dark gray (10YR 4/1), with mottles of brown to reddish brown. All of the horizons beneath the A horizon have a grayish matrix, grayish mottling, or grayish clay films. The overall content of clay in the B2 horizons ranges from 18 to 25 percent, but as much as 30 percent of some thin layers is clay. In some places the Bt horizons are expressed only by an increase in the content of fine clay and by the presence of clay films and bridges. Reaction ranges from strongly acid to neutral in the B1g and upper B2 horizons and from medium acid to slightly acid in the B3g horizon. Depth to soil material that has a neutral or alkaline reaction ranges from 30 to 60 inches. The solum ranges from 38 to 50 inches in thickness.

Damascus soils are in the same drainage sequence as the somewhat poorly drained Jimtown and the very poorly drained Olmsted soils. They are more grayish and are more mottled than the Jimtown soils, and they have a lighter colored surface layer than the Olmsted soils.

Damascus loam (0 to 2 percent slopes) (Da).—This soil has the profile described as typical for the series. It occurs in areas that mostly are less than 60 acres in size. Included in mapping were some areas in which the surface layer is silt loam. Also included were areas that contain weakly cemented bog iron ore.

The content of organic matter is low, but tilth of the surface layer is generally good. Even in areas that have been drained, wetness is a severe limitation to use of this soil for crops. Surface runoff is slow. (Capability unit IIIw–2; woodland suitability group 5)

Damascus loam, till substratum (0 to 2 percent slopes) (Dc).—In many places this soil occurs in depressions that have an oval shape and that range from 3 to 10 acres in size. It has a profile similar to the one described as typical for the series. The underlying material is glacial till instead of outwash, however, and this glacial material is at a depth of only 20 to 42 inches. Included in mapping were some areas in which the surface layer is silt loam and a few areas where the substratum consists of silty and clayey material.

The content of organic matter is low, but this Damascus soil is generally in good tilth because of the loamy texture of the surface layer. If outlets are available, drainage can be easily provided. Wetness is a limitation to use of this soil for crops, however, even in areas that are drained. (Capability unit IIIw–2; woodland suitability group 5)

Dekalb Series

Light-colored, stony, well-drained soils that are steep or very steep are in the Dekalb series. These soils are mostly on valley walls. They have formed in loamy material derived from loosely bonded, medium-grained to coarse-grained sandstone, and not in glacial deposits.

In a typical profile of a Dekalb soil in a wooded area, the surface layer is very dark grayish-brown very stony loam about 1 inch thick. The subsurface layer, about 9 inches thick, is dark-brown very stony loam. The subsoil consists of yellowish-brown, friable very stony loam. Bedrock of loosely bonded sandstone is at a depth of about 24 inches.

Permeability is moderately rapid. Commonly, the root zone is moderately deep; bedrock limits its depth. The available moisture capacity is low or very low.

In Mahoning County the Dekalb soils are mainly in trees. A small acreage is in pasture.

Typical profile of Dekalb very stony loam, 2 to 12 percent slopes, in a wooded area of Green Township (sec. 33, T. 17 N., R. 3 W.):

A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) very stony loam; weak, very fine, granular structure; friable when moist; many roots; 30 percent of horizon is fragments of rock; medium acid; abrupt, smooth boundary.

A2—1 to 10 inches, dark-brown (10YR 4/3) very stony loam; weak, medium, subangular blocky structure breaking to weak, medium and fine, granular structure; friable when moist; many roots; 30 percent of horizon is fragments of rock; strongly acid; abrupt, smooth boundary.

B2—10 to 15 inches, yellowish-brown (10YR 5/4) very stony loam; weak, medium and fine, angular and subangular blocky structure; friable when moist; common roots; many fine and medium pores; 50 percent of horizon is fragments of rock; strongly acid; abrupt, wavy boundary.

B3—15 to 24 inches, yellowish-brown (10YR 5/4) very stony loam; friable when moist; common roots; many fine and medium pores; 70 percent of horizon is fragments of rock; material between the fragments is one-half inch thick; strongly acid; gradual boundary.

R—24 to 36 inches, fractured, gray, medium-grained sandstone; soil material between the fragments of fractured sandstone is up to one-half inch thick; clay coats on the fragments of sandstone; strongly acid.

In undisturbed areas the A1 horizon is dark colored and ranges from 1 to 5 inches in thickness. The A2 horizon, or the Ap horizon in cultivated areas, ranges from brown (10YR 5/3) to dark brown (10YR 4/3) in color. The B horizons range from 8 to 30 inches in combined thickness and from yellowish brown (10YR 5/4) to strong brown (7.5YR 5/6) in color. Reaction of the B horizons is strongly acid or very strongly acid. Thickness of the solum ranges from 20 to 38 inches. Depth to bedrock ranges from 20 to 42 inches.

Dekalb soils are coarser textured than the Muskingum and Loudonville soils. They are also more stony than those soils.

Dekalb very stony loam, 2 to 12 percent slopes (DkC).—This soil has the profile described as typical for the series. It is on the sides of valleys and is mostly sloping. The areas are generally long and narrow, and they range from 5 to 15 acres in size. In many places Canfield, Rittman, Ellsworth, or Geeburg soils are adjacent to this soil but are at a higher elevation.

Stoniness is a severe limitation to use of this soil for crops. Erosion is an additional hazard. (Capability unit VIs–1; woodland suitability group 4)

Dekalb very stony loam, 12 to 25 percent slopes (DkE).—This soil is mainly on the sides of valleys, and it is generally steep. Areas in which it occurs contain 10 to 100 acres, and those adjacent to streams are long and narrow. Included in mapping were rough, broken, and stony areas, and other areas consisting of bedrock escarpments. In many places Wooster, Loudonville, Ellsworth, or Geeburg soils are adjacent to this soil but at a slightly higher elevation.

A severe risk of erosion is the primary limitation to use of this Dekalb soil if the cover of plants is thinned or removed. Stoniness is an additional limitation. (Capability unit VIe–2; woodland suitability group 4)

Dekalb very stony loam, 25 to 50 percent slopes (DkF).—This soil is mainly on the sides of valleys, and it is mostly very steep. Areas in which it occurs range from 10 to 100 acres in size, and most of those adjacent to streams are long and narrow. Included with this soil in mapping were rough, broken, and stony areas and escarpments of bedrock. Wooster, Loudonville, Ellsworth, or Geeburg soils are commonly adjacent but at a slightly higher elevation.

A very severe risk of erosion is the primary limitation to some uses of this Dekalb soil. Stoniness is an additional limitation. (Capability unit VIIe–1; woodland suitability group 4)

Ellsworth Series

The Ellsworth series consists of deep, light-colored, moderately well drained soils that are gently sloping to very steep. These soils have formed in glacial till that is low in content of lime and is of Wisconsin age. They are on uplands in the western and northwestern parts of the county.

In a typical profile of a cultivated Ellsworth soil, the plow layer is dark-brown silt loam about 8 inches thick. The subsoil is silty clay loam. It is mostly brownish, but it contains contrasting grayish mottles and has some grayish coatings on the surfaces of the peds. The substratum, at a depth of about 45 inches, is brownish, weathered glacial till. A few pebbles are commonly in the till and throughout the profile.

Permeability is slow, and the root zone is moderately deep or deep. The available moisture capacity is generally medium, but it ranges to high in places. The water table is high during winter and spring, especially in the less sloping areas.

Corn, wheat, and hay are among the crops commonly grown on these soils. The steeper areas are mostly in pasture or trees.

Typical profile of Ellsworth silt loam, 2 to 6 percent slopes, in an idle field, near the junction of State Route No. 18 and Lipkey Road in Jackson Township (T. 2 N, R. 4 W.; laboratory No. MH–34):

Ap—0 to 8 inches, dark-brown (10YR 4/3) silt loam; weak, medium and fine, granular structure; friable when moist; many roots; 2 percent of horizon is pebbles; very strongly acid; clear, smooth boundary.

B1t—8 to 11 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, fine, subangular blocky structure; friable when moist, slightly sticky when wet; many roots; few fine pores; 2 percent of horizon is pebbles; very strongly acid; clear, smooth boundary.

B21t—11 to 16 inches, yellowish-brown (10YR 5/4) heavy silty clay loam; many, fine, brown (10YR 5/3) and strong-brown (7.5YR 5/6) mottles; strong, medium, angular blocky structure; firm when moist, slightly sticky when wet; common roots; common, thin, pale-brown (10YR 6/3), silty films and continuous light olive-brown (2.5Y 5/4) clay films on ped surfaces; few fine pores; 1 percent of horizon is pebbles; very strongly acid; clear, smooth boundary.

B22tg—16 to 37 inches, dark-brown (10YR 4/3) heavy silty clay loam; few, medium, distinct, grayish-brown (10YR 5/2) mottles; strong, medium and coarse, angular blocky structure grading to very coarse angular blocky structure in the lower part of horizon; firm when moist, sticky when wet; common roots grading to only a few that are on ped surfaces in the lower part of the horizon; common, thin, pale-brown (10YR 6/3), silty films in upper part of horizon; thick, continuous, olive-gray (5Y 5/2) clay films on vertical surfaces of peds, becoming thinner with depth; many, coarse, black (N 2/0) stains in lower part of horizon; many, thin, yellowish-brown (10YR 5/4) and olive-gray (5Y 5/2) clay films and many, coarse, black (N 2/0) stains of manganese on horizontal surfaces of peds; few fine and medium pores; 1 percent of horizon is pebbles; strongly acid in upper part of horizon but grades to neutral in lower part; clear, smooth boundary.

B3tg—37 to 45 inches, dark grayish-brown (10YR 4/2) silty clay loam; weak, very thick, platy structure breaking to weak, medium, platy structure; firm when moist, sticky when wet; few roots; continuous, thin, dark-brown (7.5YR 4/2) clay films on ped surfaces; many whitish films of calcium carbonate on horizontal surfaces of peds; 1 percent of horizon is pebbles; mildly alkaline; gradual, smooth boundary.

C—45 to 60 inches, dark grayish-brown (10YR 4/2) to olive-brown (2.5Y 4/3) silty clay loam; massive; firm when moist, sticky when wet; 1 percent of horizon is pebbles; mildly alkaline and calcareous.

In most places the texture of the A horizon is silt loam, but it is silty clay loam in eroded areas. In areas that have not been disturbed, the A1 horizon is dark colored and is 1 to 2 inches thick. The color of the A2 horizon, or of the Ap horizon in cultivated areas, ranges from brown (10YR 5/3) to dark yellowish brown (10YR 4/4). Depth from the surface to the horizon that contains grayish mottles or grayish clay films ranges from 16 to 21 inches. The matrix of the B2 horizons ranges from brown (10YR 5/3) to dark yellowish brown (10YR 4/4). The content of clay in the B and C horizons ranges from 35 to 45 percent. Reaction in the B1t and B21t horizons is very strongly acid or strongly acid. The solum is 30 to 50 inches thick, and less than 5 percent of it, by volume, is glacial pebbles. Depth to neutral or calcareous material ranges from 25 to about 45 inches. Where the C horizon is calcareous, the carbonates in it are equivalent to about 7 percent calcium carbonate.

The Ellsworth soils are in the same drainage sequence as the somewhat poorly drained Mahoning, the poorly drained Trumbull, and the very poorly drained Lorain soils. They are more brownish and less grayish than the other soils of this sequence, and they have a lighter colored surface layer than the Lorain soils.

Ellsworth silt loam, 2 to 6 percent slopes (EIB).—This soil has the profile described as typical for the series. It is mostly in areas containing 5 to 15 acres. The areas have curving sides that follow the undulating contours of low rises on the till plain. Generally adjacent to this soil but at a lower elevation are the Mahoning, Trumbull, and Lorain soils. Some areas of somewhat poorly drained Mahoning soils were included in mapping.

This Ellsworth soil has a medium content of organic matter. The surface layer is cloddy if worked when wet. The hazard of erosion is severe if cultivated crops are grown. (Capability unit IIIe–5; woodland suitability group 2)

Ellsworth silt loam, 6 to 12 percent slopes (EIC).—This soil is mainly in areas containing 5 to 10 acres. It generally is between a drainageway and a higher lying, less steep soil. The areas mostly have curving sides, and drainageways cut across many of them.

This soil has a medium content of organic matter. Erosion is a very severe hazard if cultivated crops are grown. (Capability unit IVe–3; woodland suitability group 2)

Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded (EIC2).—This soil has a profile similar to the one described as typical for the series, except that the plow layer and the subsoil are thinner as the result of past erosion. Much of the original surface layer has been lost through erosion, and the present plow layer contains some material from the upper part of the subsoil. The plow layer has a very low content of organic matter and is very susceptible to crusting. Included in some places during mapping were severely eroded areas in which the surface layer is silty clay

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loam. These severely eroded areas are difficult to till properly.

This soil is mostly adjacent to drainageways in areas that range from 5 to 10 acres in size. The areas are narrow and winding, and they are transected by numerous small drainageways. Further erosion is a very severe hazard. (Capability unit IVe–3; woodland suitability group 2)

Ellsworth silt loam, 12 to 18 percent slopes, moderately eroded (ElD2).—This soil has lost much of its original surface layer through erosion. The present surface layer and the subsoil are thinner than those in the profile described as typical for the series, but the profile is similar in other respects. Some severely eroded areas in which the surface layer is silty clay loam were included in mapping.

The slopes are moderately steep, and they are rather short in most places. The areas are winding and narrow, and they are transected by small drainageways. Generally, they contain 5 to 15 acres. Most of them are in fields that formerly were cultivated but that now are in pasture. Many areas of this soil are unstable and are subject to slippage.

The surface layer is low in content of organic matter. Further erosion is a severe hazard unless a protective cover of plants is maintained. (Capability unit VIe–1; woodland suitability group 2)

Ellsworth silt loam, 18 to 25 percent slopes, moderately eroded (ElE2).—This soil has a profile similar to the one described as typical for the series, except that the surface layer and the subsoil are thinner. Much of the original surface layer has been lost through erosion. In places severely eroded areas in which the texture of the surface layer is silty clay loam were included in mapping.

This Ellsworth soil is generally adjacent to major drainageways, and it has rather short, steep slopes. The areas are winding and narrow, and they are transected by numerous drainageways. Most of them are in fields that formerly were cultivated but that now are in pasture. Use of heavy equipment needed for farming is hazardous because of the slopes, especially where the gradient is 25 percent or is nearly 25 percent. Many areas are unstable and are subject to slippage.

The surface layer is low in content of organic matter. Further erosion is a severe hazard unless a protective cover of plants is maintained. (Capability unit VIe–1; woodland suitability group 2)

Ellsworth silt loam, 25 to 50 percent slopes (ElF).—This soil is adjacent to the major streams of the county. Its profile is similar to the one described as typical for the series, except that it is thinner over the till substratum. The slopes are rather short and are very steep. Areas of this soil are winding and narrow, and they are generally transected by drainageways. Most of them contain 5 to 10 acres. The surface layer has a medium content of organic matter. Many areas are unstable and are subject to slippage.

A greater proportion of the acreage of this soil than of the other Ellsworth soils is in trees. Use of equipment needed for planting and harvesting trees and for farming is severely limited by the steep slopes. Erosion is a very severe hazard. (Capability unit VIIe–2; woodland suitability group 2)

Ellsworth silty clay loam, 25 to 50 percent slopes, severely eroded (EsF3).—This soil has lost nearly all of its orginal surface layer through erosion, and the present surface layer is mostly silty clay loam from the upper part of the subsoil. Partly as the result of past erosion, the profile is considerably thinner than the profile described as typical for the series. The slopes are mostly fairly short and are very steep. Most areas of this soil formerly were cultivated, but most of the acreage is now in pasture. Both past and present uses have contributed to the severe erosion. Many areas are unstable and are subject to slippage.

This soil is in poor tilth, and its surface layer is low in content of organic matter. The steep slopes severely limit the use of equipment needed for farming or for planting and harvesting trees. Further erosion is a very severe hazard. (Capability unit VIIe–2; woodland suitability group 2)

Ellsworth-Urban land complex (EuB).—Soils of this complex have been disturbed by construction and grading operations that resulted when the areas were developed for residential and commercial purposes. Where these soils have not been disturbed, the profile is similar to the one described as typical for the Ellsworth series.

Most areas have been scalped, or they consist of about 1 to 3 feet of fill over an undisturbed soil. About 15 percent of the acreage is fill areas that are underlain by an undisturbed Mahoning soil. In scalped areas the surface layer has been removed and either the subsoil or the substratum of the Ellsworth soil is now exposed. The resulting surface layer is very low in content of organic matter and is in poor tilth. The surface layer in scalped areas is neutral or calcareous where the substratum is exposed.

Erosion is a severe hazard during periods of construction and before a cover of plants is reestablished. (Not placed in a capability unit or woodland suitability group)

Fitchville Series

The Fitchville series consists of light-colored, nearly level or gently sloping, somewhat poorly drained soils that have formed in loamy material deposited by water. In some places the Fitchville soils occur in former swamps that now are on the glacial till plain. In others they occur on terraces along the major streams of the county, in scattered areas that formerly were lakebeds.

In a typical profile of a Fitchville soil in a wooded area, the surface layer is very dark gray silt loam about 2 inches thick. The subsurface layer, about 5 inches thick, is brown silt loam. The subsoil is brown and light brownish-gray silt loam over strong-brown silty clay loam, and it has contrasting grayish and brownish mottles throughout. Grayish coatings are on most of the surfaces of the peds in the lower two-thirds of the subsoil. The substratum, at a depth of 37 inches, is strong-brown and yellowish-brown, friable silt loam to loam.

These soils are soft and compressible when wet. Permeability is moderately slow, and the water table is high during wet periods. Mottling and the gray coatings indicate natural wetness. Even artificial drainage is slow. In areas that are drained, the root zone is moderately deep. The available moisture capacity is medium.

Areas not mapped with Urban land are used mainly for corn, wheat, hay, and other common crops.

Typical profile of Fitchville silt loam, 0 to 2 percent slopes, about 1 mile N. of Western Reserve Road and E. of Mill Creek, in Boardman Township (T. 1 N., R. 2 W.; laboratory No. MH–44):

A1—0 to 2 inches, very dark gray (10YR 3/1) silt loam; moderate, fine, granular structure; friable when moist; many roots; very strongly acid; abrupt, wavy boundary.

A2—2 to 7 inches, brown (10YR 5/3) silt loam; common, medium, strong-brown (7.5YR 5/6) mottles; weak, medium, subangular blocky structure; friable when moist; many roots; very strongly acid; abrupt, smooth boundary.

B1—7 to 13 inches, brown (10YR 5/3) silt loam; many, medium, yellowish-brown (10YR 5/6) mottles; weak to moderate, medium, angular blocky structure; friable when moist; common roots; many, thin, grayish-brown (10YR 5/2), silty films on ped surfaces; many fine pores; strongly acid; abrupt, smooth boundary.

B21tg—13 to 25 inches, light brownish-gray (2.5Y 6/2) heavy silt loam; many, coarse, prominent, strong-brown (7.5YR 5/6) mottles; weak, medium, angular blocky structure; friable when moist; common roots; continuous light brownish-gray (2.5Y 6/2) clay films, as much as 1 millimeter thick, on the surfaces of peds; many fine and medium pores; very strongly acid; clear, smooth boundary.

B22tg—25 to 37 inches, strong-brown (7.5YR 5/6) silty clay loam; many, coarse, prominent, gray (10YR 6/1) mottles; weak, medium, angular blocky structure; friable when moist; few roots; nearly continuous gray (10YR 6/1) clay films, as much as 0.5 millimeter thick, on the surfaces of peds; many coarse to fine pores; medium acid; abrupt, smooth boundary.

C1—37 to 44 inches, strong-brown (7.5YR 5/6) silt loam to loam; many, coarse, prominent, gray (10YR 6/1) mottles; massive; friable when moist; slightly acid; gradual, smooth boundary.

C2—44 to 74 inches, yellowish-brown (10YR 5/4) silt loam; common, medium, light brownish-gray (10YR 6/2) mottles; massive; friable when moist; neutral.

In areas that have not been cultivated, the A1 horizon is dark colored and ranges from 1 to 4 inches in thickness. The A2 horizon, or the Ap horizon in cultivated areas, ranges from 5 to 10 inches in thickness and from dark grayish brown (10YR 4/2) or grayish brown (10YR 5/2) to brown (10YR 5/3) in color. The upper part of the B horizon is silty clay loam to silt loam. In this part of the B horizon, color of the matrix ranges from strong brown (7.5YR 5/6) to brown (10YR 4/3) and the color of the mottles ranges from gray (10YR 5/1) to dark grayish brown (10YR 4/2). Depth to grayish mottling or to grayish clay films ranges from 10 to 15 inches. The lower part of the B horizon is typically silty clay loam, but it is silt loam in places. Color of the matrix in the lower part of the B horizon ranges from dark yellowish brown (10YR 4/4) to brown (10YR 4/3), and the color of the mottles ranges from gray (N 5/0) to dark gray (10YR 4/1). Reaction in the upper part of the solum is very strongly acid or strongly acid. In the lower part of the solum it ranges from medium acid to mildly alkaline. The solum is 35 to 45 inches thick. Depth to neutral or mildly alkaline material ranges from 25 to 44 inches. In places the C horizons are calcareous, and in those areas they generally contain carbonates equivalent to 1 to 3 percent calcium carbonate.

Fitchville soils are in the same topographic and drainage sequence as the moderately well drained Glenford soils, the poorly drained Sebring soils, and the very poorly drained Luray soils. They are more grayish and more mottled than the Glenford soils and are less grayish than the Sebring soils. Fitchville soils are lighter colored than the Luray soils.

Fitchville silt loam, 0 to 2 percent slopes (FcA).—This soil has the profile described as typical for the series. It occurs in areas that are postglacial lakebeds and that range from 3 to 15 acres in size but are generally less than 10 acres in size.

In areas that are farmed, the content of organic matter is generally low. If this soil is tilled when too wet or too dry, the structure deteriorates. Some areas that have not been drained are subject to ponding. Water drains slowly, and wetness is a moderate limitation to use of this soil for crops, even where artificial drainage is provided. (Capability unit IIw–2; woodland suitability group 7)

Fitchville silt loam, 2 to 6 percent slopes (FcB).—This soil is on broad terraces. The areas are mostly oval to irregular in shape, and they range from about 3 to 10 acres in size.

The content of organic matter is low in areas that are farmed. If this soil is tilled when too wet or too dry, the structure deteriorates.

Wetness is a moderate limitation to use of this soil for crops. Water drains slowly, even where artificial drainage is provided. Because of the slopes, much of the water from precipitation runs off. As a result, erosion is also a hazard. (Capability unit IIw–2; woodland suitability group 7)

Fitchville silt loam, till substratum, 2 to 6 percent slopes (FhB).—This soil occupies areas that are commonly circular or oval in shape and that are generally less than 40 acres in size. The upper layers are similar to the ones in the profile described as typical for the series. Below a depth of about 20 to 42 inches, however, this soil is underlain by firm, massive, loamy till, and the lower part of the profile was derived from till. The till restricts the movement of water and air and has characteristics of a fragipan. Included in mapping were some areas of a soil that is moderately well drained.

Because of the slope, much of the water from precipitation runs off. Even where artifical drainage is provided, water drains slowly through the profile. Seasonal wetness is a moderate limitation to use of this soil for crops. Erosion is also a hazard. (Capability unit IIw–2; woodland suitability group 7)

Fitchville-Urban land complex (FlB).—The soils in most of this complex have been disturbed in varying degrees by nonfarm construction and development. Most of the disturbance has resulted from grading operations. Where the soils have not been disturbed, they have a profile similar to the one described as typical for the Fitchville series. Most of the complex consists of fill or of borrow areas, but undisturbed areas in undeveloped lots, on the back parts of developed lots, and in small patches of woodland are included.

Where these soils are used as fill, they cover an undisturbed Fitchville soil or an included area of Sebring or Marengo soils to a depth of 1 to 3 feet. Most fill material was formerly part of the subsoil of a Fitchville soil, or part of the substratum of a Fitchville soil. Borrow areas are places from which the subsoil and the substratum of Fitchville soils have been removed.

The present surface layer of the soils in this complex generally has a low content of organic matter. It tends to seal over, especially after rains, and as a result, the emergence of seedlings is restricted. The soils are in poor tilth and can be satisfactorily tilled only within a narrow range of moisture content.

Soils of this complex are both wet and susceptible to erosion. Wetness is a limitation because of the somewhat poor natural drainage, and it can also result where grading has been done and provision has not been made for adequate surface drainage. A severe hazard of erosion is a limitation to nonfarm uses of these soils. This hazard is especially severe when the surface of scalped or filled areas is bare during construction periods. Gullying and sedimentation commonly occur during those periods. Addition of a large amount of organic matter or of topsoil is necessary to make the areas suitable for landscaping. (Not placed in a capability unit or woodland suitability group)

Frenchtown Series

Deep, light-colored, nearly level soils that are poorly drained are in the Frenchtown series. These soils are mainly on the till plain. They have formed in medium-textured or moderately fine textured glacial till that has a low content of carbonates. The till is of Wisconsin age.

In a typical profile of a cultivated Frenchtown soil, the plow layer is dark grayish-brown silt loam about 10 inches thick. The subsoil is mostly brownish, mottled loam. The lower part of the subsoil consists of dense, compact material that has grayish coatings on most of the surfaces of the peds. The substratum, at a depth of about 59 inches, is brownish, loamy glacial till.

Because of the very compact, firm material in the subsoil, Frenchtown soils have very slow permeability. They have a seasonal high water table, and they drain slowly, even where artificial drainage is provided. Both the mottling and the gray coatings in the subsoil indicate that these soils are naturally wet. The root zone does not extend below the compact layer in the subsoil, except along vertical cracks and ped surfaces.

In Mahoning County the Frenchtown soils are mainly in pasture and trees. Where these soils are adjacent to soils better suited to crops, however, a small acreage has been drained and is farmed.

Typical profile of Frenchtown silt loam in a cultivated field in Beaver Township (sec. 6, T. 13 N., R. 2 W.; laboratory No. MH–31):

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; common, fine, dark reddish-brown (5YR 3/2) mottles; moderate, fine, granular structure; friable when moist; many roots; 2 percent of horizon is pebbles; few small iron and manganese concretions; neutral (field limed); abrupt, smooth boundary.

B1g—10 to 15 inches, grayish-brown (2.5YR 5/2) silt loam; many, medium, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; friable when moist, slightly sticky when wet; common roots; many, fine, black (N 2/0) stains of manganese; many fine pores; 2 percent of horizon is pebbles; very strongly acid; gradual, smooth boundary.

B2tg—15 to 19 inches, gray (N 5/0) heavy loam; many, medium, yellowish-brown (10YR 5/6) mottles; moderate, medium, angular and subangular blocky structure; friable when moist, sticky when wet; common roots; continuous, thick, grayish-brown (10YR 5/2) clay films on ped surfaces; common coarse to fine pores; 10 percent of horizon is pebbles; very strongly acid; abrupt, wavy boundary.

Bx1g—19 to 37 inches, brown (10YR 4/3) loam; many, medium, grayish-brown (10YR 5/2) mottles; fragipan that has weak, medium, angular blocky structure; firm when moist, sticky when wet; common roots on ped surfaces; continuous, dark-gray (N 4/0) clay films, 5 to 10 millimeters thick, on the vertical surfaces of peds and in pores; few fine pores; 10 percent of horizon is pebbles; very strongly acid; abrupt, wavy boundary.

Bx2g—37 to 46 inches, brown (10YR 5/3) loam; common, coarse, gray (N 6/0) mottles and large, irregular zones of dark reddish-brown (5YR 3/4) clay loam that make up 20 percent of horizon; fragipan that has weak, medium, angular blocky structure; firm when moist, sticky when wet; common roots on the surfaces of peds; continuous dark-gray (N 4/0) clay films, 20 millimeters thick, on the vertical surfaces of peds; films have a thick outer coat of gray (10YR 5/1) clay; a transitional zone of yellowish-brown (10YR 5/6) loam, 10 millimeters thick, is between the clay films and the soil material in the matrix; many, thick, dark-gray (10YR 4/1) clay films are on the horizontal surfaces of peds and in pores; many fine, black (N 2/0) stains of manganese; few coarse pores; 10 percent of horizon is pebbles; strongly acid; clear, wavy boundary.

B3g—46 to 59 inches, yellowish-brown (10YR 5/4) loam; many zones of gray (N 5/0) silty clay loam, 5 to 20 millimeters thick, interspersed in the matrix; weak, very coarse, angular blocky structure; friable when moist, sticky when wet; continuous dark-gray (5YR 4/1) clay films, 8 millimeters thick, on the vertical surfaces of peds; films have a thick outer coat of gray (10YR 5/1) clay; a transitional zone of yellowish-brown (10YR 5/6) loam, 10 millimeters thick, is between the clay films and the soil material in the matrix; many, thin, dark-gray (5YR 4/1) clay films and many black (N 2/0) stains of manganese are on the horizontal surfaces of peds; common medium pores; 10 percent of horizon is pebbles; strongly acid; clear, wavy boundary.

C—59 to 132 inches, yellowish-brown (10YR 5/4) loam grading to olive brown (2.5Y 5/4) with depth; few, coarse, gray (N 5/0) mottles in upper part of horizon; massive; friable when moist, slightly sticky when wet; dark-gray (5YR 4/1) vertical clay seams, 8 millimeters thick, becoming thinner with increasing depth and extending to a depth of 113 inches; many black (N 2/0) stains of manganese in upper part of horizon; common medium pores; 10 percent of horizon is pebbles; slightly acid in upper part of horizon but grades to neutral at a depth of about 77 inches, and to mildly alkaline and calcareous at a depth of about 102 inches.

In areas that have not been cultivated, the A1 horizon is dark colored and ranges from 1 to 3 inches in thickness; the A2 horizon is grayish brown (10YR 5/2) to gray (N 5/0). All of the solum has either a grayish matrix or contains grayish mottles. The content of clay in the B2tg and Bx horizons ranges from 21 to 35 percent. The matrix of the

B2tg and Bx horizons ranges from strong brown (7.5YR 5/6) or brown (10YR 4/3 or 5/3) with grayish mottles to gray (N 5/0) with brownish mottles. Depth to fragipan ranges from 18 to 24 inches. Reaction in the B2tg horizon is very strongly acid or strongly acid. The solum is 42 to 59 inches thick, and 9 to 13 percent of it is glacial pebbles. Depth to calcareous or neutral material ranges from 34 to 77 or more inches.

The Frenchtown soils are in the same drainage sequence as the well drained Wooster soils, the moderately well drained Canfield and Rittman soils, and the somewhat poorly drained Ravenna and Wadsworth soils. They are more grayish and more mottled than any of these soils.

Frenchtown silt loam (0 to 2 percent slopes) (Fr).—This is the only Frenchtown soil mapped in Mahoning County. It is mainly in nearly level areas of the undulating till plain and in long, narrow areas that straddle drainageways. Size of the areas is variable, but it is generally between 3 and 20 acres. Included in mapping were a few areas in which the slopes range from 2 to 6 percent, and some areas of dark-colored Marengo soils, which are wetter than the Frenchtown soils.

The surface layer has a low content of organic matter, and the structure deteriorates if this soil is tilled when too wet or too dry. Undrained areas are subject to ponding, and some areas are subject to flash flooding. Wetness is a severe limitation to use of this soil for farming, even in areas that are artificially drained. (Capability unit IIIw–8; woodland suitability group 5)

Geeburg Series

The Geeburg series consists of deep, light-colored, moderately well drained soils that have a high content of clay. These are mostly gently sloping but are steep in some places. They are on uplands in the northwestern part of the county, where they have formed in clay glacial till of Wisconsin age. The till is low in content of lime.

In a typical profile of a Geeburg soil in a wooded area, the surface layer is very dark gray silt loam about 2 inches thick. The subsurface layer is dark-brown and brown silt loam about 4 inches thick. The subsoil is mostly brownish clay to silty clay. It has contrasting grayish mottles throughout, and it has grayish coatings on the surfaces of many of the peds in the lower part. The substratum, at a depth of about 54 inches, is brownish silt loam over coarse silty clay loam.

These soils are very slowly permeable and have a moderately deep or deep root zone. The available moisture capacity is generally medium. The water table is high during winter and spring, especially in the less steep areas. The clayey Geeburg soils have a high shrink-swell potential. This is a severe hazard to the foundations of buildings.

The steeper areas of these soils are mostly in pasture or trees, but the less steep areas are farmed to a limited extent. Corn, wheat, and hay are the crops commonly grown.

Typical profile of Geeburg silt loam, 2 to 6 percent slopes, 2½ miles northwest of Canfield, 25 feet south of Herbert Road, and one-fourth mile west of Turner Road (Laboratory No. MH–13):

A1—0 to 2 inches, very dark gray (10YR 3/1) silt loam; moderate, fine, crumb structure; friable when moist; many roots; 2 percent of horizon is pebbles; very strongly acid (pH 5.0); abrupt, smooth boundary.

A21—2 to 4 inches, dark-brown (10YR 4/3) silt loam; faint mottles of dark yellowish brown (10YR 4/4); moderate, fine, crumb structure; friable when moist; many roots; 2 percent of horizon is pebbles; very strongly acid (pH 5.0); abrupt, smooth boundary.

A22—4 to 6 inches, brown (10YR 5/3) silt loam; faint mottles of dark yellowish brown (10YR 4/4); weak, thin, platy structure breaking to moderate, fine, crumb structure; friable when moist; many roots; 2 percent of horizon is pebbles; strongly acid (pH 5.2); abrupt, smooth boundary.

B1—6 to 9 inches, strong-brown (7.5YR 5/6) and grayish-brown (10YR 5/2) light silty clay loam; if crushed, soil material is brown (10YR 5/3); many, fine, distinct mottles; strong, medium, subangular blocky structure breaking to peds that have weak, fine, subangular blocky structure; firm when moist; many roots; 2 percent of horizon is pebbles; strongly acid (pH 5.3); clear, smooth boundary.

B21t—9 to 13 inches, strong-brown (7.5YR 5/6) silty clay; if crushed, soil material is dark brown (10YR 4/3); strong, medium, angular blocky structure breaking to peds that have strong, fine, angular blocky structure; grayish-brown (2.5Y 5/2) coatings, 1 millimeter thick, cover the surfaces of peds; very firm when moist; common roots; 2 percent of horizon is pebbles; strongly acid (pH 5.3); clear, smooth boundary.

B22t—13 to 17 inches, dark-brown (10YR 4/3) clay; if crushed, soil material is dark yellowish brown (10YR 4/4); many, medium, distinct, grayish-brown (10YR 5/2) mottles; strong, coarse, angular blocky structure breaking to strong, fine, angular blocky structure; dark grayish-brown (10YR 4/2) coatings, 1 millimeter thick, cover the surfaces of peds; very firm when moist; a few roots; 2 percent of horizon is pebbles; strongly acid (pH 5.3); gradual boundary.

B23t—17 to 22 inches, dark yellowish-brown (10YR 4/4) and grayish-brown (10YR 5/2) clay; if crushed, soil material is brown (10YR 5/3); many, medium, distinct mottles; moderate, very coarse, angular blocky structure breaking to peds that have strong, fine, angular blocky structure; ped surfaces grayish brown (10YR 5/2); extremely firm when moist; a few roots; a few black stains of ferromanganese; 2 percent of horizon is pebbles; strongly acid (pH 5.6); diffuse boundary.

B24t—22 to 34 inches, brown (10YR 4/3) and dark-gray (10YR 4/1) clay; if crushed, soil material is brown (10YR 4/3); many, medium, distinct mottles; weak, very coarse, subangular blocky structure breaking to peds that have strong, fine, angular blocky structure; dark-gray (10YR 4/1) ped surfaces, with vertical surfaces stronger than horizontal surfaces; very firm when moist; a few roots; prominent stains of ferromanganese in upper part of horizon; 2 percent of horizon is pebbles; neutral (pH 7.0); diffuse boundary.

B25t—34 to 39 inches, coarsely mottled, dark-brown (10YR 4/3) and gray (5Y 5/1) silty clay; if crushed, soil material is brown (10YR 5/3); weak, medium, prismatic structure; surfaces of peds gray (5Y 5/1); very firm; no roots; 2 percent of horizon is pebbles; diffuse boundary.

B26t—39 to 45 inches, dark grayish-brown (10YR 4/2) silty clay; if crushed, soil material is gray (10YR 5/1); strong, coarse, angular blocky structure; surfaces of peds gray (10YR 5/1); very firm when moist; no roots; 2 percent of horizon is pebbles; mildly alkaline (pH 7.4); diffuse boundary.

B3—45 to 54 inches, dark-brown (10YR 4/3) clay; if crushed, soil material is light olive brown (2.5Y

5/4); strong, coarse, subangular blocky structure; surfaces of peds have gray (5Y 5/1) coatings 1 millimeter thick; very firm when moist; no roots; 2 percent of horizon is pebbles; calcareous; abrupt boundary.

IIC1—54 to 70 inches, dark yellowish-brown (10YR 4/4) silt loam; massive; firm in place; 20 percent of horizon is pebbles; calcareous; abrupt boundary. (Appears to be a buried Early Cary type of glacial till.)

IIIC2—70 to 91 inches, olive-brown (2.5Y 4/3) silt loam; massive; very friable when moist; no roots; contains a discontinuous layer of lacustrine silt; calcareous; abrupt boundary.

IVC3—91 to 102 inches. olive-brown (2.5Y 4/3) coarse silty clay loam; moderate to strong, medium, subangular blocky structure; surfaces of peds dark yellowish brown (10YR 4/4); firm when moist; no roots; 20 percent of horizon is pebbles. (This horizon is a buried young soil on glacial till.)

Examination of 162 pebbles from this profile shows that 33 percent are sandstone; 22 percent, limestone; 10 percent, siltstone; 7 percent granite; 5 percent, chert; 3 percent, gray shale; 2 percent, schist; and 6 percent each, black shale, quartzite, and concretions.

In most places the texture of the A horizon is silt loam, but it is silty clay loam in small eroded areas. The A1 horizon ranges from one-half inch to 2 inches in thickness. Color of the A2 horizon, or of the Ap horizon in cultivated areas, ranges from brown (10YR 5/3) and dark brown (10YR 4/3) to dark grayish brown (10YR 4/2). Depth to the horizon that contains grayish mottles or grayish clay films ranges from 16 to 24 inches. In the B2 horizons, the color of the matrix ranges from brown (10YR 4/3) to strong brown (7.5YR 5/6) or olive brown (2.5Y 4/4). In some places the B3 horizon extends to a depth of 61 inches. In others, tongues of soil material from this horizon extend to a depth of 61 inches and the horizontal cracks below a depth of 54 inches contain crystals of gypsum. The content of clay in the B and C horizons ranges from 45 to 63 percent. The solum is 33 to 61 inches thick. Depth to calcareous material ranges from 30 to 52 inches. The content of calcium carbonate in the C horizons ranges from 9 to 14 percent, but it is generally about 12 percent. About 2 percent of the solum is glacial pebbles.

Geeburg soils are in the same drainage sequence as the somewhat poorly drained Remsen, the poorly drained Trumbull, and the very poorly drained Lorain soils. They are more brownish and less grayish than the other soils of this sequence, and they have a lighter colored surface layer than the Lorain soils. Geeburg soils are similar in many respects to the Ellsworth soils, but they are more clayey than those soils.

Geeburg silt loam, 2 to 6 percent slopes (GbB).—This soil has the profile described as typical for the series. It is on the top and on the side slopes of rises on broad, undulating till plains, above and adjacent to the Remsen, Trumbull, or Lorain soils. The areas have curving sides and range from 5 to 15 acres in size. Included in mapping were small areas of somewhat poorly drained Remsen soils.

This Geeburg soil has a medium content of organic matter. Runoff is rapid, and erosion is a severe hazard if this soil is cultivated. (Capability unit IIIe–5; woodland suitability group 2)

Geeburg silt loam, 2 to 6 percent slopes, moderately eroded (GbB2).—This soil has a profile similar to the one described as typical for the series, except that part of the original surface layer has been lost through erosion. The present surface layer contains material from the upper part of the subsoil that has been mixed into it by tillage. This soil has rather long slopes of about 5 percent. It occupies areas containing 5 to 15 acres, and it is generally on convex slopes along drainageways. In many places this soil is above the Remsen, Trumbull, or Lorain soils on the same side slopes. In most places small areas of lower lying, somewhat poorly drained Remsen soils were included in mapping.

This Geeburg soil has a medium content of organic matter. Runoff is rapid, and further erosion is a severe hazard. (Capability unit IIIe–5; woodland suitability group 2)

Geeburg silt loam, 6 to 12 percent slopes (GbC).—This soil is mostly on the lower one-third of side slopes of rolling hills in areas of glaciated till plains and in narrow bands along drainageways. It is in strips that are transected by drainageways and that range from 5 to 15 acres in size. Included in mapping were some areas that are moderately eroded.

This Geeburg soil has a medium content of organic matter. Runoff is very rapid, and erosion is a severe hazard if this soil is cultivated. (Capability unit IVe–3; woodland suitability group 2)

Geeburg silt loam, 12 to 18 percent slopes (GbD).—This soil is on hills that are covered by a deep layer of till. The areas are in narrow bands and are irregular in shape. They range from 5 to 15 acres in size. They are transected by drainageways in many places, and as a result, the surface is uneven. In many places some moderately eroded areas were included in mapping. A few severely eroded areas were also included.

This Geeburg soil has a medium content of organic matter. It is mostly in trees or pasture. Erosion is a severe hazard, even in areas used for pasture. (Capability unit VIe–1; woodland suitability group 2)

Geeburg silty clay loam, 6 to 12 percent slopes, moderately eroded (GeC2).—This soil is on the glaciated till plain, generally on the lower one-third of side slopes of rolling hills. It has rather long slopes. Typically, the areas are long and narrow, have curving sides, and contain 5 to 15 acres. Drainageways that cross them make the shape of the areas irregular. The profile of this soil is similar to the one described as typical for the series, except that part of the original surface layer has been removed by erosion. The present plow layer is a mixture of material from the remaining original surface layer and the upper part of the subsoil. It is harder to work and has a greater tendency to become cloddy than the plow layer of a similar, but uneroded, Geeburg soil.

The content of organic matter is medium to low. Further erosion is a very severe hazard in cultivated areas. (Capability unit IVe–3; woodland suitability group 2)

Geeburg silty clay loam, 6 to 12 percent slopes, severely eroded (GeC3).—This soil commonly occupies areas 3 to 5 acres in size in fields that have been repeatedly cultivated up and down the slope. In most places the slopes are irregular, and they contain the upper parts of drainageways. Most of the original surface layer has been lost through erosion, and most areas contain a few gullies. The plow layer has a low content of organic matter and is sticky when wet.

This soil is in poor tilth and can be satisfactorily tilled only with a narrow range of moisture content.

A crust that restricts the emergence of plants during germination tends to form on the surface. Runoff is rapid, and further erosion is a severe hazard unless a protective cover of plants is maintained. (Capability unit VIe–1; woodland suitability group 2)

Geeburg silty clay loam, 12 to 18 percent slopes, moderately eroded (GeD2).—This soil is generally on side slopes adjacent to drainageways. Most of the areas are somewhat circular or have a long, narrow, irregular shape, and they commonly range from 5 to 10 acres in size. The profile is similar to the one described as typical for the series. The substratum is at a depth of only 33 to 44 inches, however, and mostly it is at a depth that is nearer to 33 than to 44 inches. Part of the original surface layer has been lost through erosion. In a few places, severely eroded areas were included in mapping.

This Geeburg soil has a medium content of organic matter. It is mainly in pasture or trees. Further erosion is a very severe hazard unless a protective cover of plants is maintained. (Capability unit VIe–1; woodland suitability group 2)

Geeburg silty clay loam, 18 to 25 percent slopes, moderately eroded (GeE2).—This soil is generally on side slopes adjacent to drainageways. Most of the areas have a long, narrow, irregular shape, and they range from 5 to 15 acres in size. The profile is similar to the one described as typical for the series, except that the substratum is at a depth of only 33 to 44 inches. Mostly, the substratum is at a depth that is nearer to 33 than to 44 inches. Part of the original surface layer has been lost through erosion. In some places slightly eroded areas were included with this soil in mapping. In others severely eroded areas were included.

This Geeburg soil is mainly in trees. It has a medium content of organic matter. Further erosion is a very severe hazard. (Capability unit VIIe–2; woodland suitability group 2)

Glenford Series

The Glenford series consists of light-colored, moderately well drained soils that are gently sloping or sloping. These soils are in the larger valleys in areas that are outwash terraces or former glacial lakebeds. They have formed in loamy material deposited by water.

In a typical profile of a Glenford soil in pasture, the surface layer is very dark grayish-brown silt loam about 1 inch thick. The subsurface layer is brown silt loam about 7 inches thick. The subsoil is mostly dark yellowish-brown silty clay loam, and it contains grayish or brownish mottles. The upper two-thirds of the subsoil also has brownish coatings on the surfaces of the peds. The substratum, at a depth of about 40 inches, is brown silty clay loam, silt loam, and very fine sandy loam.

Permeability is moderately slow, and the water table is high for short periods, generally during winter and spring. The root zone is mostly deep for the annual crops commonly grown. The available moisture capacity within the root zone is high.

In Mahoning County Glenford soils are mainly in such crops as corn, wheat, and hay.

Typical profile of Glenford silt loam, 2 to 6 percent slopes, in a pasture in Goshen Township (sec. 23, T. 17 N., R. 4 W.):

A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable when moist; many roots; strongly acid; abrupt, wavy boundary.

A2—1 to 8 inches, brown (10YR 4/3) silt loam; weak, fine, angular blocky structure breaking to weak, fine, granular structure; friable when moist; many roots; common krotovinas filled with soil material from the A1 horizon; very strongly acid; clear, smooth boundary.

B1—8 to 11 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, angular blocky structure; friable when moist; common roots; thin, yellowish-brown (10YR 5/4) silty films on ped surfaces; common fine pores; very strongly acid; abrupt, wavy boundary.

B21t—11 to 19 inches, dark yellowish-brown (10YR 4/4 to 5/4) coarse silty clay loam; moderate to strong, fine, angular and subangular blocky structure; friable when moist, sticky when wet; common roots; thin, continuous, dark-brown (7.5YR 4/4) and dark yellowish-brown (10YR 4/4) clay films on ped surfaces; common fine pores; strongly acid; abrupt, wavy boundary.

B22tg—19 to 27 inches, dark yellowish-brown (10YR 4/4) silty clay loam; common, medium, grayish-brown (10YR 5/2) and strong-brown (7.5YR 5/6) mottles; moderate to strong, fine, angular blocky structure; less friable when moist than B21t horizon, sticky when wet; common roots; many, thin, dark-brown (7.5YR 4/4) clay films on ped surfaces; common fine pores; strongly acid; abrupt, wavy boundary.

B23tg—27 to 32 inches, mottled dark-brown (7.5YR and 10YR 4/4) and grayish-brown (2.5Y 5/2) coarse silty clay loam; weak, medium, angular blocky structure; more friable when moist than B22tg horizon; few roots; many, thin, dark yellowish-brown (10YR 4/4), dark-brown (7.5YR 4/4), and grayish-brown (2.5Y 5/2) clay films on ped surfaces; common fine and medium pores; medium acid; abrupt, irregular boundary.

B3g—32 to 40 inches, dark yellowish-brown (10YR 4/4) silt loam; common, medium, gray (10YR 6/1) and reddish-brown (5YR 4/4) mottles; weak, coarse, angular blocky structure; friable when moist; continuous light olive-brown (2.5Y 5/4) silty films, 2 millimeters thick, on the vertical surfaces of peds; many, thin, dark-brown (7.5YR 4/4) and dark grayish-brown (10YR 4/2) clay films on the horizontal surfaces of peds; many fine to coarse pores; 5 percent of horizon is pebbles; medium acid; clear, smooth boundary. Weakly laminated.

Cg—40 to 70 inches, brown (10YR 4/3) layers of silty clay loam, silt loam, and very fine sandy loam; many, coarse, gray (N 6/0) and strong-brown (7.5YR 5/6) mottles; massive, friable or very friable; a few pebbles; slightly acid grading to neutral with increasing depth; material is stratified.

The A1 horizon ranges from 1 to 2 inches in thickness. The A2 horizon, or an Ap horizon in cultivated areas, ranges from 5 to 8 inches in thickness and from brown (10YR 5/3) to dark yellowish brown (10YR 4/4) in color. The B horizons range from silt loam to silty clay loam in texture and from yellowish brown (10YR 5/4) to dark brown (7.5YR 4/4) in color. Depth to grayish mottles is 14 to 24 inches. Reaction in the upper part of the solum ranges from very strongly acid to strongly acid, and reaction in the lower part of the B horizon ranges from medium acid to neutral. The solum is 40 to 47 inches thick. Depth to carbonates ranges from 40 to more than 70 inches.

Glenford soils are in the same topographic and drainage sequence as the lower lying, somewhat poorly drained Fitchville, poorly drained Sebring, and very poorly drained

Luray soils. They are less grayish and less mottled than the Fitchville and Sebring soils, and they are lighter colored than the Luray soils.

Glenford silt loam, 2 to 6 percent slopes (GfB).—This gently sloping soil occupies broad areas on stream terraces. Some of these areas were formerly glacial lakebeds. Areas of this soil contain 5 to 25 acres. The profile is the one described as typical for the series. Included in mapping were a few nearly level areas.

The plow layer in cultivated areas generally has a medium content of organic matter. Runoff is moderate, especially when the surface is not protected by a cover of plants. Erosion is a moderate hazard if this soil is cultivated. (Capability unit IIe-1; woodland suitability group 1)

Glenford silt loam, 6 to 12 percent slopes, moderately eroded (GfC2).—This soil is on side slopes, mainly in areas that range from 5 to 15 acres in size. It is generally between areas of Glenford silt loam, 2 to 6 percent slopes, and lower lying soils, such as the Fitchville or Sebring. Most of the areas are long and narrow, and they have curving sides. The slopes are shorter than those of Glenford silt loam, 2 to 6 percent slopes. Erosion has removed part of the original surface layer, and the present plow layer is a mixture of the remaining original surface soil and of material from the upper part of the subsoil. In other respects the profile is similar to the one described as typical for the series.

Runoff is rapid, especially when the surface is not protected by a cover of plants. Erosion is a severe hazard if this soil is cultivated. (Capability unit IIIe-1; woodland suitability group 1)

Gravel Pits

Gravel pits (Gp) is a miscellaneous land type that generally occurs on kames, eskers, and outwash terraces. The pits are normally 15 to 30 feet deep. In many places they are within areas of Chili and Conotton soils. The gravel is generally in layers that are variable in thickness and that differ in composition within short horizontal distances. Between the gravelly layers are sandy ones that contain variable amounts of silty and clayey material. The gravel consists mainly of quartz and granite minerals, but it is partly shale and limestone. Only a few pits in this county are active.

Because the soils have been disturbed during excavation, erosion is active in and around areas of this land type. Uncontrolled runoff has eroded the unstable soil material, has caused gullies, and has deposited silt in nearby drainageways. Since the soil material contains little organic matter and has low available moisture capacity, establishing a cover of plants is difficult. Plants that are tolerant of this kind of soil material commonly establish themselves naturally if they are not disturbed by mining operations. (Not placed in a capability unit or a woodland suitability group)

Hornell Series

The Hornell series consists of soils that are light colored, somewhat poorly drained, and gently sloping. These soils have formed in loamy glacial material that is underlain by shale at a depth of 20 to 42 inches. They are on hills where the layer of till of Wisconsin age is fairly thin over shale bedrock.

In a typical profile of a cultivated Hornell soil, the plow layer is dark grayish-brown silt loam about 10 inches thick. The subsoil is mostly yellowish-brown silty clay loam. The lower two-thirds of the subsoil contains contrasting brownish and grayish mottles and grayish coatings. Commonly, a brownish and grayish layer of clay, about 6 inches thick, is between the loamy part of the subsoil and the layer of black rotted shale that underlies the subsoil at a depth of about 29 inches. Bedrock, at a depth of about 35 inches, consists of thin layers of siltstone or shale.

The mottling and grayish coatings in the subsoil indicate that these soils are naturally wet. Permeability is slow because of restrictive layers in the lower part of the subsoil and in the underlying shale. The root zone is generally moderately deep, but the depth depends on the depth to shale. Available moisture capacity in the root zone is medium or low.

The Hornell soils are mostly in pasture or forest, but a small acreage is farmed or is idle. These soils are limited in suitability for crops.

Typical profile of Hornell silt loam, 2 to 6 percent slopes, near the intersection of Victoria and Silica Roads in Austintown Township:

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; weak, very fine, angular blocky structure; friable when moist; many roots; 10 percent of horizon is fragments; neutral (field limed); abrupt, smooth boundary.

B1t—10 to 13 inches, yellowish-brown (10YR 5/4) silty clay loam; common, medium, brown (10YR 5/3) mottles; weak, medium, angular and subangular blocky structure; friable when moist, plastic and sticky when wet; common roots; many, thin, yellowish-brown (10YR 5/4) clay films on peds and in pores; many fine and medium pores; 10 percent of horizon is fragments; medium acid; abrupt, wavy boundary.

B21tg—13 to 18 inches, yellowish-brown (10YR 5/4) silty clay loam; many, medium, grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/4) mottles; weak, medium, angular blocky structure; friable when moist, sticky and slightly plastic when wet; common roots; many, thin, continuous, brown (10YR 5/3) films on the vertical surfaces of peds, and grayish-brown (10YR 5/2) clay films on other surfaces; clay films in pores; many fine to coarse pores; 10 percent of horizon is fragments; medium acid; clear, smooth boundary.

B22tg—18 to 23 inches, yellowish-brown (10YR 5/8) heavy silty clay loam; many, medium, dark-red (2.5YR 3/6) and grayish-brown (10YR 5/2) mottles; moderate, medium, prismatic structure breaking to moderate, medium, subangular blocky structure; friable when moist, sticky and slightly plastic when wet; common roots; continuous, thin, grayish-brown (10YR 5/2) films on vertical surfaces and many, thick, grayish-brown (10YR 5/2) and brown (10YR 5/3) clay films on other ped surfaces; many fine pores; 10 percent of horizon is fragments; strongly acid; abrupt, wavy boundary.

IIB3tg—23 to 29 inches, dark-brown (7.5YR 4/4) and very dark gray (10YR 3/1) clay weathered from clay shale; interiors of peds are thinly laminated; moderate, coarse, angular blocky structure; firm when moist, sticky and very plastic when wet; few roots on ped surfaces; thick, continuous, grayish-brown (10YR 5/2) and dark-gray (10YR 4/1) clay films on ped surfaces; few fine pores; very strongly acid; gradual, smooth boundary.

IICg—29 to 35 inches, thin-bedded, rotted, black (10YR 2/1) shale, with dark-brown (7.5YR 4/4) laminae; very strongly acid; abrupt, smooth boundary.

IIIR—35 to 50 inches, yellowish-brown (10YR 5/8) siltstone; very strongly acid.

In areas that have not been cultivated, the A1 horizon is dark colored and is 1 to 2 inches thick. The A2 horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 5/3). In cultivated areas color of the Ap horizon ranges from very dark grayish brown (10YR 3/2) to brown (10YR 5/3). Depth from the surface to the horizon that has a grayish matrix or that contains grayish mottles or grayish clay films ranges from 8 to 14 inches. The content of clay in the B2 horizons ranges from 35 to 50 percent. Color of the matrix of the B2 horizons ranges from strong brown (7.5YR 5/6) or brown (10YR 4/3) to yellowish brown (10YR 5/4 to 5/8). Reaction of the upper part of the B horizon ranges from medium acid to strongly acid. Reaction of the lower part is strongly acid or very strongly acid. The solum is 25 to 40 inches thick. Depth to shale or siltstone ranges from 20 to 42 inches.

The Hornell soils of Mahoning County are not in a topographic sequence with other soils. They are similar to the Ravenna and Wadsworth soils in being light colored and somewhat poorly drained, but they lack the fragipan that is typical in the profile of the Ravenna soils, and they have a higher content of clay than the Wadsworth soils. Hornell soils are somewhat similar to the Mahoning, but unlike the Mahoning soils, they are underlain by bedrock at a depth of about 35 inches.

Hornell silt loam, 2 to 6 percent slopes (HoB).—This is the only soil of the Hornell series mapped in Mahoning County. It is on the sides and at the bases of hills that have a core of shale bedrock. Some areas are long and narrow, and others have an oval shape. They normally contain about 3 to 20 acres, but one area in this county contains more than 200 acres. Because this soil has rather long, gentle slopes, has a shale substratum, and contains restrictive layers, much of the water from precipitation runs off. This soil is too wet in winter and spring and is too dry in summer for a good growth of crops.

Wetness is a severe limitation to use of this soil for crops. Erosion is also a hazard. (Capability unit IIIw-5; woodland suitability group 2)

Jimtown Series

Light-colored, somewhat poorly drained soils that are nearly level or gently sloping are in the Jimtown series. These soils are on stream terraces. They have formed in loamy material over stratified sandy and gravelly outwash of Wisconsin age.

In a typical profile of a Jimtown soil in pasture, the surface layer is about 1 inch thick and consists of very dark brown loam. The subsurface layer, about 8 inches thick, is brown loam. The subsoil is gravelly and loamy, mostly has a brownish color, and contains contrasting grayish and brownish mottles. It also has grayish coatings on many of the surfaces of the peds, and it contains gravel. The substratum, at a depth of about 51 inches, consists of sandy loam, gravelly loam, and silt loam in layers.

These soils are permeable, and they have a seasonal high water table. Both the mottling and the grayish coatings indicate that the soils are naturally wet. The available moisture capacity is medium, and the root zone is moderately deep.

Jimtown soils are moderately well suited to farming, and most of the acreage is farmed. Wheat, corn, and hay are the commonly grown crops.

Typical profile of Jimtown loam, 2 to 6 percent slopes, in a pasture field in Smith Township (sec. 13, T. 18 N., R. 5 W.; laboratory No. MH-33):

A1—0 to 1 inch, very dark brown (10YR 2/2) loam; weak, medium and fine granular structure; friable when moist; many roots; 12 percent of horizon is pebbles; very strongly acid; abrupt, smooth boundary.

A2—1 to 9 inches, brown (10YR 5/3) loam; weak, fine, subangular blocky structure; friable when moist; many roots; 12 percent of horizon is pebbles; very strongly acid; clear, smooth boundary.

B1—9 to 12 inches, brown (10YR 5/3) gravelly loam; common, medium, strong-brown (7.5YR 5/6) mottles; weak, fine, subangular blocky structure; friable when moist; common roots; common fine pores; 40 percent of horizon is pebbles; very strongly acid; clear, wavy boundary.

B21tg—12 to 14 inches, yellowish-brown (10YR 5/4) gravelly sandy loam; many, medium, light brownish-gray (10YR 6/2) and strong-brown (7.5YR 5/6) mottles; weak, fine, angular blocky structure; friable when moist; few roots; continuous, yellowish-brown (10YR 5/4), silty films bridge sand grains and pebbles; many medium pores; 30 percent of horizon is pebbles; very strongy acid; abrupt, wavy boundary.

B22tg—14 to 24 inches, light brownish-gray (10YR 6/2) gravelly heavy sandy loam; many, medium, dark yellowish-brown (10YR 4/4) and reddish-brown (5YR 4/4) mottles; weak, medium, angular and subangular blocky structure; very friable when moist; few roots; continuous, thick, grayish-brown (10YR 5/2) clay films on ped surfaces; many medium to coarse pores; 30 percent of horizon is pebbles; very strongly acid; abrupt, wavy boundary.

B23tg—24 to 30 inches, grayish-brown (2.5Y 5/2) gravelly sandy clay loam; many, medium, dark-brown (7.5YR 4/2) and strong-brown (7.5YR 5/8) mottels; moderate, fine, angular blocky structure; firm when moist; few roots; many, very thick, gray (10YR 5/1) clay films on pebbles and bridging sand grains; common coarse pores; 40 percent of horizon is pebbles; very strongly acid; abrupt, smooth boundary.

B24g—30 to 46 inches, layers of brown (10YR 4/3) loamy sand and olive-brown (2.5Y 4/3) fine sandy loam; massive; very friable when moist; many, thick, gray (N 5/0) clay films in vertical seams; 80 percent of horizon is pebbles; slightly acid; abrupt, smooth boundary.

B3—46 to 51 inches, brown (10YR 4/3) gravelly sandy loam; massive; very friable when moist; many brown (10YR 4/3) clay films on pebbles; 40 percent of horizon is pebbles; slightly acid grading to neutral in lower part; gradual, smooth boundary.

C—51 to 60 inches, layers of yellowish-brown sandy loam, gravelly loam, and silt loam; massive; very friable; 40 percent of horizon is pebbles; neutral.

In cultivated areas color of the Ap horizon ranges from very dark grayish brown (10YR 3/2) to brown (10YR 5/3). Color of the matrix of the B horizons ranges from brownish with grayish mottles to grayish with brownish mottles. The content of clay in the B2 horizons is generally between 18 and 26 percent, but it is as much as 30 percent in some thin layers. The B2t horizons in some places are expressed only by an increase in the content of fine clay and by the presence of clay films and bridges. Depth from the surface to grayish mottles or grayish clay films ranges from 8 to 15 inches. Reaction of the B1 and the upper B2 horizons is strongly acid or very strongly acid. The solum is 30 to 51 inches thick. Depth to material that is neutral or alkaline in reaction ranges from 30 to 50 inches.

Jimtown soils are in the same drainage sequence as the higher lying, moderately well drained Bogart soils and the lower lying, poorly drained Damascus and very poorly drained Olmsted soils. They are more grayish and more mottled than the Bogart soils and are less grayish and less mottled than the Damascus and Olmsted soils. Also, they are lighter colored than the Olmsted soils.

Jimtown loam, 0 to 2 percent slopes (JtA).—This soil is mostly in areas that are irregular in shape and less than 60 acres in size. In some places small gravelly areas and areas in which the surface layer is silt loam were included in mapping.

The content of organic matter is low. Seasonal wetness is a moderate limitation to use of this soil for crops. The surface layer is generally in good tilth. (Capability unit IIw–2; woodland suitability group 7)

Jimtown loam, 2 to 6 percent slopes (JtB).—This soil has the profile described as typical for the series. It is mostly in areas that have an irregular shape and that range from 3 to 30 acres in size. Included in mapping were small gravelly areas and areas in which the surface layer is silt loam.

Seasonal wetness is a moderate limitation to use of this Jimtown soil for crops. Erosion is also a hazard. (Capability unit IIw–2; woodland suitability group 7)

Jimtown loam, till substratum, 2 to 6 percent slopes (JuB).—This soil has a profile similar to the one described as typical for the series, except that it is underlain by loamy, massive glacial till at a depth of 20 to 42 inches. It is mostly in areas that have a nearly circular shape and that contain 3 to 10 acres. In some places areas in which the surface layer is silt loam were included with this soil in mapping. Also included were some nearly level areas and areas in which the substratum is silty and clayey lacustrine material.

This Jimtown soil has a low content of organic matter, but it is generally in good tilth because of the loamy texture of the surface layer. Wetness is a moderate limitation to use of this soil for crops, but drainage can be easily provided if outlets are available. (Capability unit IIw–2; woodland suitability group 7)

Jimtown-Urban land complex (JwB).—In most areas of this complex, the soils have been disturbed in varying degrees by nonfarm construction and development. Most of the disturbance has resulted from grading and digging operations. Where the soils have not been disturbed, they have a profile similar to the one described as typical for the Jimtown series. Most of the complex consists of fill or of borrow areas, but undisturbed areas in undeveloped lots, on the back parts of developed lots, and in small patches of woodland are included.

The fill areas consist of about 1 to 3 feet of fill material over part of an undisturbed Jimtown soil or over an included area of Damascus or Olmsted soils. Most of the fill material was formerly part of the subsoil of a Jimtown soil, but in some places it was part of the substratum. Borrow areas are places from which the subsoil and the substratum of Jimtown soils have been removed.

The present surface layer of the soils in this complex generally has a low content of organic matter, and it commonly varies in texture and reaction within short horizontal distances. Material washed away during gullying on the outer slopes of fill areas commonly is a source of sedimentation.

Soils of this complex are both wet and susceptible to erosion. Wetness is a limitation because of the somewhat poor natural drainage, and it can also result where grading has been done and provision has not been made for adequate surface drainage. Erosion is a hazard when the surface is bare during construction periods. Addition of a large amount of organic matter or of topsoil is necessary to make the areas suitable for landscaping. (Not placed in a capability unit or woodland suitability group)

Kerston Series

The Kerston soils are dark colored and very poorly drained. They occur throughout the county and consist of alternate layers of organic material and alluvial mineral soil material. Accumulations of partly decomposed trees, fibrous grasses, sedges, and reeds comprise the layers of organic material. The alluvial mineral material is inwash from higher surrounding areas. The combined thickness of these alternate soil layers is greater than 42 inches.

In a typical profile of a Kerston soil, the soil material to a depth of about 12 inches is mostly very dark grayish-brown muck and dark reddish-brown woody peat, but it includes some silty mineral material. Below this material are alternate layers of very dark gray silty clay loam, black muck, and dark-brown peat. These layers are commonly 3 to 14 inches thick, but the material is intermixed to some extent.

The Kerston soils are normally saturated with water and must be drained before they can be used for farming. They have very high available moisture capacity. Permeability of the organic material is moderately rapid, but permeability in the layered mineral material and in the substratum is very slow.

Where these soils have been drained, they are locally important for growing specialized crops. Most of the acreage is in trees and pasture, but a small acreage is in corn and hay.

Typical profile of Kerston muck in a swamp in Goshen Township (sec. 30, T. 17 N., R. 4 W.):

1—0 to 1 inch, dark yellowish-brown (10YR 4/4) silty peat; weak, medium, granular structure; friable when moist; many roots; strongly acid; clear, smooth boundary.

2—1 to 7 inches, very dark grayish-brown (10YR 3/2) muck; common, coarse, dark reddish-brown (5YR 3/4) mottles; weak, medium, granular structure; friable when moist; many roots; medium acid; abrupt, smooth boundary.

3—7 to 12 inches, dark reddish-brown (5YR 3/4) woody peat, and a few layers of gray (10YR 5/1) silt loam 10 millimeters thick; moderate, medium, platy structure; friable when moist; many roots; medium acid; abrupt, smooth boundary.

IIC1—12 to 15 inches, very dark gray (10YR 3/1) silty clay loam; many, medium, dark reddish-brown (5YR 3/4) mottles; weak, coarse, angular blocky structure; friable when moist; many roots; slightly acid; abrupt, wavy boundary.

4—15 to 20 inches, black (N 2/0) granular muck; weak, medium, angular blocky structure; friable when moist; slightly acid; abrupt, smooth boundary.

IIIC2—20 to 22 inches, very dark gray (10YR 3/1) silty clay loam; massive; friable when moist; slightly acid; abrupt, smooth boundary.

5—22 to 36 inches, black (N 2/0) woody muck and thin layers of dark grayish-brown (10YR 4/2) silt loam and silty clay loam; massive; friable when moist; slightly acid; gradual boundary.

6—36 to 55 inches, alternate layers of black (N 2/0), greasy muck and gray (10YR 5/1) silty clay and silty clay loam; massive; friable when moist; neutral; abrupt, smooth boundary.

7—55 to 60 inches, dark-brown (10YR 3/3), granular woody peat; massive; friable; neutral.

In some places the surface layer is black (N 2/0) muck or dark-brown (10YR 3/3) peat, but the soil material ranges to silt loam or silty clay loam that is black (N 2/0) or very dark gray (10YR 3/1). Reaction of the surface layer ranges from strongly acid to neutral. The thickness and sequence of horizons of organic material and mineral material in the substratum are variable. The organic material ranges from muck to peat, and the mineral material ranges from sandy to silty in texture. In places reaction of the substratum is neutral or mildly alkaline, but it is commonly slightly acid.

Where the Kerston soils are on bottom lands, they are commonly adjacent to Chagrin, Lobdell, and Wayland soils.

Kerston muck (Km).—This is the only Kerston soil mapped in Mahoning County. Where it occurs on bottom lands, this soil is in small areas of irregular shape containing 3 to 10 acres. Undrained areas are saturated with free water and are generally swampy and marshy. Drained areas are subject to some subsidence as the result of oxidation of the organic material. Where the surface layer is composed mostly of muck, this soil is subject to blowing. Soil blowing is an especially severe hazard when this soil is dry and bare and is exposed to the strong prevailing winds.

Wetness is a severe limitation to use of this soil for crops, even in areas that have been drained. (Capability unit IIIw–4; woodland suitability group 8)

Lobdell Series

The Lobdell series consists of deep, moderately well drained, light-colored soils that are nearly level. These soils are on bottom lands along many of the streams throughout the county. They have formed in loamy sediment washed from soils derived from glacial material of Wisconsin age.

In a typical profile of a Lobdell soil in a wooded area, the surface layer is very dark grayish-brown silt loam about 3 inches thick. Beneath the surface layer and extending to a depth of about 15 inches is brown silt loam. The underlying material, to a depth of 42 inches or more, consists of layers of brown and dark yellowish-brown loam and sandy loam. Grayish-brown mottles, indicating that the soils are moderately wet, are at a depth of about 23 inches. Normally, bedrock is at a depth of more than 8 feet.

Lobdell soils are moderately permeable, have high available moisture capacity, and have a deep root zone. They also have a seasonal high water table during winter and spring. Flooding is a hazard where these soils are not protected.

Corn, soybeans, and hay are the crops commonly grown. Some areas are in pasture or trees.

Typical profile of Lobdell loam in a wooded area about 0.5 miles north of Berlin Station Road and 1.25 miles west of Ohio Route No. 45 in Ellsworth Township (T. 1 N., R. 4 W.):

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

AC—3 to 15 inches, brown (10YR 4/3) silt loam; very weak, medium, angular blocky structure; friable when moist; many roots; medium acid; abrupt, smooth boundary.

C1—15 to 23 inches, brown (10YR 4/3) loam; massive; friable when moist; medium acid; clear, smooth boundary.

C2—23 to 30 inches, dark yellowish-brown (10YR 4/4) loam; many, fine, grayish-brown (2.5Y 5/2) mottles; massive; medium acid; gradual boundary.

C3—30 to 42 inches, coarsely mottled, grayish-brown (2.5Y 5/2) and brown (7.5YR 4/4) sandy loam; massive; friable when moist; slightly acid.

The A1 horizon ranges from 3 to 6 inches in thickness. Color values in the A1 horizon range from 2 to 4 when the soil is moist and from 3 to 5 when the soil is dry. The value is 3 or 4 if the soil is rubbed between the fingers. The chroma is predominantly 2, but it is 3 in a few places. Reaction of the A1 horizon ranges from strongly acid to slightly acid. The AC horizon ranges from 7 to 16 inches in thickness and from slightly acid to strongly acid in reaction. The color value of the AC horizon is 4 or 5, and chroma is 3 or 4. Texture of the AC horizon is silt loam to fine sandy loam. Depth from the surface to grayish mottles ranges from 20 to 30 inches. The C horizon is medium acid to slightly acid in the upper part and is slightly acid to neutral below a depth of 40 inches. Texture of the C horizon ranges from loam to sandy loam in the upper part and from loam to gravelly loamy sand below a depth of 40 inches.

Lobdell soils are adjacent to well-drained Chagrin, somewhat poorly drained Orrville, and poorly drained Wayland soils. They are more grayish and more mottled than the Chagrin soils and are less grayish and less mottled than the Wayland soils.

Lobdell loam (0 to 2 percent slopes) (Lb).—This is the only Lobdell soil mapped in Mahoning County. It is along streams in areas that range from 10 to 100 acres in size. Where this soil is along the smaller streams, the areas are long, narrow, and winding. In many places along the larger streams, the areas are fairly wide, long and narrow, or crescent shaped. Included in mapping in some places were areas of Chagrin soils that were too small to be mapped separately.

This Lobdell soil is easy to cultivate and to keep in good tilth. Normally, the hazard of flooding is slight. Flooding does not limit use of this soil for corn, soybeans, and other crops that mature in summer, but it does limit the overall choice of crops. (Capability unit IIw–4; woodland suitability group 1)

Lorain Series

The Lorain series consists of very poorly drained soils that are deep and dark colored. These soils have formed in clayey material deposited by water. They are in nearly level areas or depressions that were lakebeds and swamps during the Wisconsin glacial period.

In a typical profile of a Lorain soil, the surface layer is black silty clay loam and silty clay about 10 inches thick. The subsoil is mostly dark-gray or gray clay. Some yellowish-brown mottles and gray and black coatings on the peds within the subsoil indicate that these soils are naturally wet. The substratum, at a depth of about 41 inches, is dark grayish-brown, plastic clay.

Permeability is very slow, both in the subsoil and in the substratum. The available moisture capacity is high, and the root zone is deep where drainage is adequate. Unless these soils are artificially drained, they have a seasonal high water table for long periods of time.

Typical profile of Lorain silty clay loam in a cultivated field about 3 miles southwest of Canfield along Route 62, 0.3 mile north of the junction of Route 62 and Western Reserve Road in Canfield Township (T. 1 N., R. 3 W.; laboratory No. MH–40):

Ap—0 to 7 inches, black (N 2/0) silty clay loam; moderate, medium, granular structure; friable when moist, slightly sticky when wet; many roots; slightly acid; abrupt, smooth boundary.

A1—7 to 10 inches, black (N 2/0) silty clay; many, coarse, dark-gray (10YR 4/1) mottles; moderate, coarse, angular blocky structure; firm when moist, plastic and slightly sticky when wet; common roots; slightly acid; clear, wavy boundary.

B21tg—10 to 16 inches, dark-gray (5Y 4/1) clay; common, coarse, yellowish-brown (10YR 5/8) mottles; moderate, medium, angular blocky structure; firm when moist, plastic and slightly sticky when wet; common roots; many, thin to thick, dark-gray (10YR 4/1) and black (10YR 2/1) clay films on ped surfaces, in pores, and as krotovinas; many fine pores; medium acid; clear, wavy boundary.

B22tg—16 to 26 inches, mottled gray (N 5/0) and dark yellowish-brown (10YR 4/4) clay; strong, medium, angular blocky structure; firm when moist, slightly plastic and slightly sticky when wet; a few roots; continuous, thick, gray (N 5/0) clay films on ped surfaces, and black (N 2/0) krotovinas; many fine pores; medium acid; gradual, smooth boundary.

B23tg—26 to 32 inches, mottled gray (5Y 5/1) and olive-brown (2.5Y 4/4) clay; moderate, medium, angular blocky structure; firm when moist, slightly sticky and slightly plastic when wet; few roots; many thick, gray (N 5/0) clay films on ped surfaces, and very dark gray (N 3/0) krotovinas; many fine and medium pores; slightly acid; gradual, smooth boundary.

B3tg—32 to 41 inches, dark grayish-brown (2.5Y 4/2) clay; many, medium, yellowish-brown (10YR 5/8) mottles; weak, medium, angular blocky structure; firm when moist, sticky and plastic when wet; few roots; common, thick, gray (N 5/0) clay films on ped surfaces; few medium pores; mildly alkaline; gradual, smooth boundary.

C—41 to 60 inches, dark grayish-brown (2.5Y 4/2) clay; many, medium, yellowish-brown (10YR 5/6) mottles; massive; firm when moist, plastic and slightly sticky when wet; few roots; few medium pores; mildly alkaline.

The A horizon is dark colored and ranges from 6 to 10 inches in thickness. The upper B horizons are clayey, and their color ranges from black (N 2/0) to gray (10YR 5/1), with brownish or reddish mottles. In most places the reaction of the upper B horizons is strongly acid to slightly acid. The lower B horizons are also clayey and are mottled with grayish, brownish, or reddish colors. The reaction of these horizons is commonly slightly acid to mildly alkaline. The solum is 35 to 48 inches thick. Depth to neutral or mildly alkaline material ranges from 24 to 60 inches. In some places the profile is neutral throughout, however, and in others it is strongly acid. As a rule, the content of clay in the profile is between 35 and 45 percent. Because these soils formed in stratified material, however, some thin layers contain less than 35 percent clay.

The Lorain soils are commonly adjacent to the slightly higher lying Canadice soils, but they are more poorly drained than those soils. They are similar to the Luray soils but are more clayey than Luray soils.

Lorain silty clay loam (0 to 2 percent slopes) (Lc).—This is the only Lorain soil mapped in Mahoning County. It generally occupies areas that are irregular in shape and that vary in size. Size of many of the areas is 3 to 5 acres.

The surface layer has a high content of organic matter, and this soil is in good tilth if it is cultivated when neither too wet nor too dry. Areas that are not drained are subject to ponding. Erosion is not a hazard. Wetness is a severe limitation to use of this soil for crops, even in areas that are artificially drained. (Capability unit IIIw–6; woodland suitability group 6)

Loudonville Series

The Loudonville series consists of light-colored, well-drained, moderately deep soils that range from gently sloping to steep. These soils occur where only a thin mantle of till overlies bedrock. They have formed in loamy till of Wisconsin age over sandstone and siltstone bedrock.

In a typical profile of a cultivated Loudonville soil, the plow layer is brown or dark-brown loam about 11 inches thick. The subsoil is dark yellowish-brown and dark-brown friable loam. Thinly bedded sandstone and siltstone are at a depth of about 34 inches.

Permeability is moderate. The root zone is only moderately deep because of the limited depth to bedrock. Mostly, the available moisture capacity is low.

In Mahoning County a fairly large acreage of Loudonville soils has been used for construction and development, and about three-fourths of the remaining acreage is in trees. The rest of the acreage, which is mostly gently sloping, is in pasture or field crops, mainly wheat and hay.

Typical profile of Loudonville loam, 2 to 6 percent slopes, in a cultivated field in Beaver Township (sec. 23, T. 13 N., R. 2 W.):

Ap—0 to 11 inches, brown to dark-brown (10YR 4/3) loam; weak, medium, granular structure; friable when moist; 10 percent of horizon is channery fragments; neutral (field limed); abrupt, smooth boundary.

B1t—11 to 18 inches, dark yellowish-brown (10YR 4/4) loam, weak, fine, subangular blocky structure; friable when moist; few roots; many, thin, dark yellowish-brown (10YR 4/4) clay films on ped surfaces; many fine and medium pores; 10 percent of horizon is channery fragments; strongly acid; clear, smooth boundary.

B2t—18 to 25 inches, dark yellowish-brown (10YR 4/4) loam; weak, medium and fine, subangular blocky structure; friable when moist; few roots; many, thin, degraded, dark yellowish-brown clay films on ped surfaces; common fine pores; 15 percent of horizon is channery fragments and pebbles; strongly acid; clear, smooth boundary.

B3t—25 to 34 inches, dark-brown (7.5YR 3/4) loam; moderate, fine, subangular blocky structure; friable when moist; plentiful roots; common, thin, dark-brown (7.5YR 4/4) clay films on ped surfaces; common fine pores; 20 percent of horizon is channery fragments and pebbles; strongly acid; abrupt, irregular boundary.

IIR—34 to 40 inches, white quartzitic sandstone oxidized to brownish yellow on the surface.

In cultivated areas the color of the Ap horizon ranges from brown (10YR 5/3) to dark yellowish brown (10YR 4/4). In areas that have not been disturbed, the A1 horizon is ½ inch to 2 inches thick. It is very dark gray (10YR 3/1) to very dark brown (10YR 2/2). The A2 horizon is brown (10YR 5/3). In many places the color of the B horizons depends on the lithology, but the color ranges from dark brown (10YR 4/3) to strong brown (7.5YR 5/6). Texture of the B horizons ranges from loam to clay loam, silty clay loam, or heavy silt loam. The content of coarse fragments ranges from 10 to 40 percent. The solum is 30 to 42 inches thick. Depth to bedrock ranges from 30 to 42 inches.

In Mahoning County Loudonville soils are not associated with other soils in a topographic sequence. They are similar to the Wooster soils, except that they are only moderately deep over bedrock and contain a large number of coarse fragments.

Loudonville loam, 2 to 6 percent slopes (LdB).—This soil has the profile described as typical for the series. It is on the crests of hills and commonly is surrounded by steeper Loudonville, Muskingum, Wooster, or Canfield soils. The areas are nearly circular and commonly contain 5 to 25 acres. Included with this soil in mapping were a few areas of Wooster soils and some areas in which the surface layer is silt loam. Also included were areas of a soil that is mostly moderately well drained and that has a seasonal high water table.

Erosion is a moderate hazard if this soil is cultivated. (Capability unit IIe-3; woodland suitability group 1)

Loudonville loam, 6 to 12 percent slopes, moderately eroded (LdC2).—This soil occupies long, narrow areas, below less sloping soils on ridgetops. Many of the areas contain 5 to 15 acres. The profile is similar to the one described as typical for the series, except that erosion has removed part of the original surface layer. The present plow layer consists of the remaining original surface soil and of material from the upper part of the subsoil. Included in mapping were some slightly eroded areas and some areas in which the surface layer is silt loam. Also included were areas of moderately well drained soils that have a seasonal high water table.

Further erosion is a severe hazard if this soil is cultivated, for runoff is rapid. (Capability unit IIIe-3; woodland suitability group 1)

Loudonville loam, 12 to 18 percent slopes, moderately eroded (LdD2).—This soil occupies some long, narrow areas and other areas that are nearly circular. The surface is uneven in many places, especially near drainageways. Mostly, the areas contain 5 to 25 acres. The profile is similar to the one described as typical for the series, except that erosion has removed part of the original surface layer. The present plow layer is a mixture of the remaining original surface soil and of material from the upper part of the subsoil. Included with this soil in mapping were some areas that are mostly slightly eroded. Also included were areas in which the surface layer is mainly silt loam.

Further erosion is a very severe hazard. Runoff from cultivated areas is rapid. (Capability unit IVe-2; woodland suitability group 1)

Loudonville loam, 18 to 25 percent slopes, moderately eroded (LdE2).—Some areas in which this soil occurs are long and narrow, and they occupy steep escarpments. Many of the areas contain 5 to 25 acres. The surface is uneven in many places, especially near drainageways. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the remaining original surface soil and of material from the upper part of the subsoil. Included in mapping were some areas that are mostly slightly eroded, areas that mainly have a surface layer of silt loam, and areas where the slopes are mostly between 25 and 35 percent.

A large part of the acreage is in pasture or trees. Further erosion is a very severe hazard. (Capability unit IVe-2; woodland suitability group 1)

Loudonville-Urban land complex, undulating (LrB).—In most of this complex, the soils have been disturbed in varying degrees by construction and development. Most of the disturbance has resulted from digging and grading operations. Where the soils have not been disturbed, they have a profile similar to the one described as typical for the Loudonville series. The complex is on gently sloping hillsides, commonly adjacent to areas of undisturbed Loudonville soils and to complexes of Urban land and Rittman and Canfield soils. The areas are variable in size.

Where these soils are used as fill, the material covers an undisturbed Loudonville soil to a depth of 1 to 3 feet. Most of the fill material was formerly part of the medium-textured subsoil of a Loudonville soil, and it contains some material that was formerly surface soil. In many places the fill contains coarse fragments from bedrock and has coarse fragments scattered on the surface. The surface layer varies considerably in texture and reaction. It has a low content of organic matter and is in poor tilth. These soils can be worked only within a narrow range of moisture content. After rains, especially when the surface is bare, the surface layer tends to seal over, and as a result, the emergence of seedlings is restricted.

Erosion is a severe hazard, particularly when the surface is bare during construction periods. Gullying is also a hazard along the steep outer perimeter of the areas. The material washed away during gullying is a source of sedimentation. Addition of a large amount of organic matter or of topsoil is necessary to make the areas suitable for landscaping. (Not placed in a capability unit or woodland suitability group)

Loudonville-Urban land complex, rolling (LrC).—In most of this complex, the soils have been disturbed in varying degrees by construction and development. Most of the disturbance has resulted from digging and grading operations. Where the soils have not been disturbed, they have a profile similar to the one described as typical for the Loudonville series. The complex is on sloping hillsides, commonly adjacent to areas of undisturbed Loudonville soils and to complexes of Urban land and Rittman and Canfield soils. The areas are variable in size.

Where these soils are used as fill, they cover an undisturbed Loudonville soil to a depth of 1 to 3 feet. Most of the fill material was formerly part of the medium-textured subsoil of a Loudonville soil, but it contains some material that was formerly surface soil. In many places the fill contains coarse fragments from bedrock and has fragments scattered on the surface.

The surface layer varies considerably in texture and reaction. It has a low content of organic matter and is in poor tilth. These soils can be worked only within a narrow range of moisture content. After rains, especially when the surface is bare, the surface layer tends to seal over, and as a result, the emergence of seedlings is restricted.

Erosion is a severe hazard, particularly when the surface is bare during construction periods. Gullying is also a hazard along the steep outer perimeter of the areas. The material washed away during gullying is a source of sedimentation. Addition of a large amount of organic matter or of topsoil is necessary to make the areas suitable for landscaping. (Not placed in a capability unit or woodland suitability group)

Luray Series

The Luray series consists of very poorly drained, dark-colored soils that are nearly level. These soils are in depressions and in areas that were formerly lakebeds and swamps during the Wisconsin glacial period. They have formed in moderately fine textured material deposited by water.

In a typical profile of a Luray soil, the surface layer is black to very dark brown silty clay loam about 11 inches thick. The subsoil is dominantly silty clay loam that is dark gray in the upper part and yellowish brown in the lower part. The subsoil contains grayish and brownish mottles and grayish coatings that indicate that these soils are naturally wet. The substratum, at a depth of about 52 inches, consists mainly of medium-textured and moderately fine textured material, but it generally contains thin layers of sandy and gravelly material.

Permeability is moderately slow, and the available moisture capacity is high. Where these soils are adequately drained, the root zone is deep. Where the soils are not adequately drained, they have a seasonal high water table and the water table remains high for long periods.

Luray soils are suited to corn, soybeans, hay, and other commonly grown crops.

Typical profile of Luray silty clay loam in a forest, about 2,000 feet south of Starrs Corners and 300 feet east of Tippecanoe Road in Boardman Township (T. 1 N., R. 2 W.):

A11—0 to 5 inches, black (10YR 2/1) silty clay loam; moderate, medium, granular structure breaking to strong, fine, granular structure; friable when moist; many roots; slightly acid; clear, wavy boundary.

A12—5 to 11 inches, very dark brown (10YR 2/2) light silty clay loam; common, fine, distinct, reddish-brown mottles; strong, medium, subangular blocky structure breaking to strong, fine, granular structure; friable when moist; many roots; slightly acid; clear, smooth boundary.

B21tg—11 to 20 inches, dark-gray (10YR 4/1) light silty clay loam; many, fine, olive-brown (2.5Y 4/4) mottles; strong, medium, angular to subangular blocky structure; friable when moist, sticky when wet; common roots; continuous, very thin, gray (10YR 5/1) silty films; thin, dark-gray (10YR 4/1) clay films on ped surfaces; many medium and fine pores; medium acid; clear, smooth boundary.

B22tg—20 to 38 inches, mottled yellowish-brown (10YR 5/8) and gray (10YR 5/1) silty clay loam; moderate, medium, angular blocky structure ranging to coarse angular blocky structure in lower part of horizon; friable when moist; common roots; continuous, thick, dark-gray (10YR 4/1) clay films on ped surfaces; few black (N 2/0) stains of manganese in lower part of horizon; common soft iron concretions; common fine pores; slightly acid; clear, smooth boundary.

B23tg—38 to 45 inches, yellowish-brown (10YR 5/4) silty clay loam; many, medium, grayish-brown (10YR 5/2) mottles; moderate to weak, coarse, subangular blocky structure; friable when moist; no roots; many gray (10YR 5/1) clay films, 0.5 millimeter to 2 millimeters thick, on ped surfaces; common fine pores; common soft iron concretions; neutral; clear, smooth boundary.

B3g—45 to 52 inches, yellowish-brown (10YR 5/4) silt loam; many, medium, grayish-brown (10YR 5/2) mottles; weak, coarse, subangular blocky structure; friable when moist; many gray (10YR 5/1) clay films, 0.5 millimeter to 2 millimeters thick, on ped surfaces; common fine pores; neutral; clear, smooth boundary.

C1—52 to 72 inches, yellowish-brown (10YR 5/8) silt loam, ranging to brown (10YR 5/3) silty clay loam in lower part of horizon; many, coarse, gray (10YR 5/1) mottles; massive; mildly alkaline; abrupt, smooth boundary.

IIC2—72 to 75 inches, dark-brown (10YR 4/3) gravelly loamy sand; mildly alkaline.

The A1 horizon ranges from 10 to 14 inches in thickness, and it generally contains reddish-brown mottles. The B horizons have either a grayish matrix, or they contain grayish mottles and have gray coatings on the peds. The content of clay in the B2 horizons ranges from 27 to 35 percent. The solum is 30 to 55 inches thick. Reaction of the B2 horizons ranges from medium acid to neutral, and reaction of the B3g horizon ranges from neutral to alkaline.

Luray soils are commonly adjacent to slightly higher lying areas of Sebring and Fitchville soils, but they are darker colored than those soils. They are similar to the Lorain soils but are less clayey.

Luray silt loam (Ls).—This soil has a profile similar to the one described as typical for the series, except for the texture of the surface layer. It occurs mostly in areas of irregular shape or in long, narrow areas that range from 3 to 10 acres in size. Some areas are covered by several inches of silt that has washed from surrounding areas.

The surface layer has a high content of organic matter. Undrained areas are subject to ponding. Wetness is a moderate limitation to use of this soil for crops, even where drainage has been provided. (Capability unit IIw-1; woodland suitability group 6)

Luray silty clay loam (Ly).—This soil has the profile described as typical for the series. Most of the areas have a circular shape or are long and narrow, and they contain 3 to 20 acres.

This soil has favorable structure and is in good tilth if it is cultivated when neither too wet nor too dry. The surface layer has a high content of organic matter. Undrained areas are subject to ponding. Wetness is a moderate limitation to use of this soil for crops, even where drainage has been provided. (Capability unit IIw–1; woodland suitability group 6)

Made Land

Made land (Ma) consists mostly of nearly level to steep areas to which soil and other material have been added as fill and then developed for heavy industrial use. The fill consists of many kinds of material, including mixed or unmixed brick, masonry material, cinders, and related industrial refuse. In many places near factories and related service facilities, this material has been graded.

In addition to fill, Made land consists of slag piles, coal piles, city dumps, and areas used for the disposal, aeration, and leaching of sewage effluent. Slag piles represent industrial waste from steelmills, and the coal piles consist of coal piled for storage. The dumps are generally covered by soil material. In some degree all of these areas are hazardous to the environment. Gullying, erosion, and siltation are additional hazards in most areas.

Improving and landscaping many of these areas would require resurfacing with 1 to 3 feet of soil material. Addition of a large amount of organic matter or of topsoil is necessary to make the areas suitable for landscaping. (Not placed in a capability unit or woodland suitability group)

Mahoning Series

Light-colored, somewhat poorly drained soils that are nearly level or gently sloping are in the Mahoning series. These soils have formed in silty clay loam glacial till that contains little calcareous material and is of Wisconsin age. They are in the northwestern and western parts of the county.

In a typical profile of a cultivated Mahoning soil, the plow layer is dark-brown silt loam about 8 inches thick. The subsoil is mostly dark-brown or dark grayish-brown silty clay loam. It contains grayish mottles and has grayish coatings on the peds that indicate restricted permeability and restricted internal drainage. The substratum, at a depth of about 48 inches, is

Figure 8.—**Raking hay on a Mahoning silt loam.**

mildly alkaline, dark grayish-brown silty clay loam.

Permeability of the subsoil and the substratum is very slow. During wet periods, these soils are saturated with free water for long enough periods that their use and management are affected.

Most areas of the Mahoning soils are farmed (fig. 8).

Typical profile of Mahoning silt loam, 2 to 6 percent slopes, in a cultivated field, 1.3 miles south of West Austintown in Austintown Township (T. 2 N., R. 3 W.; laboratory No. MH–30):

Ap—0 to 8 inches, dark-brown (10YR 4/3) silt loam; moderate, medium, granular structure; friable when moist; many roots; 2 percent of horizon is coarse fragments; slightly acid (field limed); abrupt smooth boundary.

B1tg—8 to 11 inches, brown (10YR 4/3) heavy silt loam; many, medium, faint, light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/4) mottles; moderate, medium, angular and subangular blocky structure; friable when moist; many, thin, brown (10YR 5/3) silty films on ped surfaces; 2 percent of horizon is coarse fragments; very strongly acid; clear, smooth boundary.

B21tg—11 to 23 inches, dark-brown (7.5YR 3/4) silty clay loam; many, medium, prominent, gray (10YR 5/1) mottles; weak, fine to medium, prismatic structure breaking to strong, medium, angular blocky structure; firm when moist; common roots; continuous, light brownish-gray (10YR 6/2) silt coatings on vertical surfaces of peds, and thick, dark grayish-brown (10YR 4/2) clay films on horizontal surfaces; common fine and medium pores; 2 percent of horizon is coarse fragments; very strongly acid; gradual, smooth boundary.

B22tg—23 to 32 inches, dark grayish-brown (10YR 4/2) silty clay loam; moderate, medium, prismatic structure breaking to moderate, medium to coarse, angular blocky structure; firm when moist; common roots; continuous, very thin, gray (5Y 5/1), degraded clay films on ped surfaces; common medium and fine pores; 2 percent of horizon is coarse fragments; strongly acid; abrupt, smooth boundary.

B3tg—32 to 48 inches, dark-brown (7.5YR 4/2) silty clay loam; weak, medium, prismatic structure breaking to strong, medium, angular blocky structure; firm when moist; common to few roots on ped surfaces; continuous, thick and thin, olive-gray (5Y 5/2) clay films on ped surfaces, and the surfaces are coated with many patches of pale-brown (10YR 6/3) fine loam and reddish-black (10R 2/1) clay; 3 percent of horizon is coarse fragments; neutral grading to mildly alkaline in lower part of horizon; gradual, smooth boundary.

C1g—48 to 69 inches, dark grayish-brown (10YR 4/2) silty clay loam; moderate, coarse, angular blocky structure; friable when moist; no roots; continuous, thick, olive-gray (5Y 5/2) clay films on ped surfaces, and surfaces are coated with many patches of pale-brown (10YR 6/3) loam and with thick patches of reddish-black (10R 2/1) clay; 4 percent of horizon is coarse fragments; mildly alkaline; abrupt, smooth boundary.

C2g—69 to 74 inches, dark grayish-brown (10YR 4/2) silty clay loam; massive; friable when moist; 5 percent of horizon is coarse fragments; mildly alkaline.

In cultivated areas color of the Ap horizon ranges from very dark grayish brown (10YR 4/2) to brown (10YR 5/3) or dark brown (10YR 4/3). In areas that have not been cultivated, the A1 horizon is dark colored and is 1 to 2 inches thick. Color of the A2 horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 5/3). Depth from the surface to the horizon that has a grayish matrix, that contains grayish mottles, or that contains grayish clay films ranges from 8 to 14 inches. The content of clay in the B horizons ranges from 35 to 45 percent. Color of the matrix of the B2 horizons ranges from strong brown (7.5YR 5/6) to brown (10YR 4/3). Reaction of the B1tg horizon and of the B2 horizons is very strongly acid or strongly acid, and that of the B3tg horizon is slightly acid to mildly alkaline Depth to mildly alkaline material ranges from 30 to 50 inches. The solum is 30 to 70 inches thick, and the horizons generally contain less than 5 percent, by volume, of glacial pebbles. In places the C horizons are calcareous. The calcium carbonate equivalent in those areas ranges from 4.8 to 8.8 percent and is generally about 6.6 percent.

Mahoning soils are typically adjacent to Ellsworth, Trumbull, or Lorain soils. They are more grayish throughout than the Ellsworth soils, are less grayish than the Trumbull soils, and are lighter colored than the Lorain soils.

Mahoning silt loam, 0 to 2 percent slopes (MgA).—This soil occupies small areas ranging from 2 to 10 acres in size. In most places it is surrounded by areas of gently sloping Mahoning soils.

Unless adequate drainage is provided, wetness is a severe limitation to use of this soil for crops. Surface runoff is commonly slow. Erosion is not a hazard or is only a slight hazard. (Capability unit IIIw–5; woodland suitability group 2)

Mahoning silt loam, 2 to 6 percent slopes (MgB).—This soil has the profile described as typical for the series. It occupies broad areas that have an irregular shape, characteristic of ground moraines. Size of many areas is 5 to 15 acres.

Seasonal wetness is the major limitation to use of this soil for crops. Erosion is also a hazard because runoff is moderate to rapid. (Capability unit IIIw–5; woodland suitability group 2)

Mahoning-Urban land complex (MhB).—In most areas of this complex, the soils have been disturbed in varying degrees by grading and digging during development. Where the soils have not been disturbed, they have a profile similar to the one described as typical for the Mahoning series. Included in mapping were similarly disturbed areas of Ellsworth and Trumbull soils.

This complex consists of fill or of borrow areas. Where these soils are used as fill, the material covers an undisturbed Mahoning soil to a depth of 1 to 3 feet. Most of the fill material was formerly part of the subsoil of a Mahoning soil, but it was part of the substratum in some places and was part of the surface layer in a few places. Borrow areas are places from which the subsoil and the substratum of Mahoning soils have been removed.

The present surface layer of the soils in this complex typically is clayey and is in poor tilth. The substratum material left in the borrow areas generally is calcareous.

Seasonal wetness is the major limitation to use of these soils, but erosion is also a moderate hazard. Addition of a large amount of organic matter is necessary to make the areas suitable for landscaping. Topsoil should be graded in most areas intended for landscaping. (Not placed in a capability unit or woodland suitability group)

Marengo Series

The Marengo series consists of very poorly drained soils that are deep and dark colored. These soils have formed in glacial till that has a clay loam or loam texture, contains little lime, and is of Wisconsin age. They are mainly in nearly level areas or depressions in the central, northern, and eastern parts of the county, but they also occur in upland drainageways.

In a typical profile of a Marengo soil that has not been disturbed, the surface layer is black silty clay loam about 13 inches thick. A subsurface layer of mottled gray loam, about 4 inches thick, is just beneath the surface layer. The subsoil is loam that is dominantly grayish and mottled, indicating that these soils are wet. Brownish, compact glacial till underlies these soils at a depth of about 48 inches.

Marengo soils have moderately slow permeability and high available moisture capacity. Where they are adequately drained, they have a deep root zone. If artificial drainage has not been provided, these soils have a seasonal high water table, and the water table remains high for long periods of time.

The Marengo soils in some parts of the county are important for farming. Where they are adequately drained, they are especially well suited to corn, hay, and similar crops.

Typical profile of Marengo silty clay loam in an idle field, 100 feet southwest of the junction of Herbert and Tuner Roads and 2½ miles northwest of Canfield in Canfield Township (T. 1 N., R. 3 W.):

A1—0 to 13 inches, black (10YR 2/1) silty clay loam; common, medium, dark-gray (10YR 4/1) mottles; moderate, fine, granular structure; friable when moist; many roots; 8 percent of horizon is coarse fragments; slightly acid; abrupt, smooth boundary.

A2g—13 to 17 inches, gray (10YR 5/1) loam; many, coarse, strong-brown (7.5YR 4/8) and grayish-brown (10YR 5/2) mottles; weak, fine, subangular blocky structure; friable when moist; common roots; 10 percent of horizon is coarse fragments; clear, smooth boundary.

B1tg—17 to 22 inches, coarsely mottled grayish-brown (10YR 5/2) and strong-brown (7.5YR 4/8) loam; weak, medium, subangular blocky structure breaking to moderate, fine, subangular blocky structure; friable when moist; common roots; continuous gray (10YR 5/1) clay loam films, 2 millimeters thick, on ped surfaces; 5 percent of horizon is coarse fragments; slightly acid; clear, smooth boundary.

B21tg—22 to 32 inches, coarsely mottled dark-gray (N 4/0), gray (10YR 5/1) and strong-brown (7.5YR 4/8) loam; moderate, coarse, subangular blocky structure breaking to strong, medium, subangular blocky structure; friable when moist; common to few roots; continuous grayish-brown (10YR 5/2) grading to dark-gray (N 4/0) silty clay films, 5 millimeters thick, on ped surfaces; 10 percent of horizon is coarse fragments; slightly acid; clear, smooth boundary.

B22tg—32 to 43 inches, coarsely mottled gray (10YR 5/1) and grayish-brown (2.5Y 5/2) heavy loam; strong, coarse, prismatic structure breaking to strong, medium, angular blocky structure; firm when moist; few roots; continuous gray (10YR 5/1) silty clay films, 3 millimeters thick, on ped surfaces; 10 percent of horizon is coarse fragments; neutral; abrupt, smooth boundary.

B3tg—43 to 48 inches, dark-brown (10YR 4/3) loam; common, fine, gray (N 6/0) mottles; strong, coarse, prismatic structure breaking to strong, coarse, angular blocky structure; firm when moist; few roots on prism surfaces; many, thin, gray (N 6/0) clay films on ped surfaces; 10 percent of horizon is coarse fragments; mildly alkaline; gradual boundary.

C—48 to 60 inches, dark-brown (10YR 4/3) loam grading to olive brown (2.5Y 4/3) with depth; massive; friable when moist; thick, gray (N 5/0) clay seams in polygonal pattern occur in upper part of horizon; 10 percent of horizon is coarse fragments; mildly alkaline.

The A1 horizon ranges from very dark gray (N 3/0) to very dark brown (10YR 2/2) in color and from 10 to 14 inches in thickness. In places the profile lacks an A2 horizon. All horizons beneath the A1 have a grayish matrix or grayish mottles or clay films. The content of clay in the B2 horizons ranges from 21 to 35 percent. Reaction of the solum is commonly slightly acid to medium acid, but it ranges to strongly acid in some profiles. The solum is 30 to 48 inches thick, and it contains 5 to 20 percent, by volume, of coarse fragments of glacial material. These soils generally occur in areas that receive calcareous seepage water. The calcium carbonate equivalent of the underlying till ranges from 1 to 7 percent and is about 3.5 percent in most places.

Marengo soils generally are adjacent to Wooster or Ravenna soils but are lower lying than those soils.

Marengo silty clay loam (0 to 2 percent slopes) (Mn). —This is the only soil of the Marengo series mapped in Mahoning County. The areas are generally narrow and range from 2 to 15 acres in size.

The surface layer has a high content of organic matter, and this soil is generally in good tilth if it is not cultivated when too wet or too dry. Areas that have not been drained are subject to ponding. Wetness is a moderate limitation to use, even where artificial drainage is provided. Erosion is not a hazard. (Capability unit IIw–1; woodland suitability group 6)

Muskingum Series

The Muskingum series consists of soils that are light colored, well drained, and gently sloping to very steep. These soils have formed in loamy material derived from the underlying interbedded siltstone and sandstone bedrock, instead of glacial materials.

In a typical profile of a cultivated Muskingum soil, the plow layer is brown channery silt loam about 7 inches thick. The subsoil is brownish, friable, loamy material. Thinly bedded siltstone and sandstone are at a depth of about 23 inches.

Permeability is moderately rapid, and the available moisture capacity is generally low. Because bedrock near the surface limits the depth to which roots can penetrate, the root zone is only moderately deep in most places.

These soils are mostly in trees, but some areas are in pasture.

Typical profile of Muskingum channery silt loam, 2 to 6 percent slopes, near Milton School and north of State Route No. 534 in Milton Township (T. 2 N., R. 5 W.):

Ap—0 to 7 inches, brown (10YR 4/3) channery silt loam; weak, fine, granular structure; friable when moist; many roots; 25 percent of horizon is fragments; strongly acid; abrupt, smooth boundary.

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B21—7 to 16 inches, dark yellowish-brown (10YR 4/4) channery silt loam; weak, medium and fine, subangular blocky structure; friable when moist; common roots; 25 percent of horizon is fragments; strongly acid; clear, smooth boundary.

B22—16 to 20 inches, yellowish-brown (10YR 5/4) channery loam; weak, fine, angular blocky structure; friable when moist; few roots; 40 percent of horizon is fragments; strongly acid; abrupt, smooth boundary.

B3—20 to 23 inches, yellowish-brown (10YR 5/4) channery loam; weak, fine, subangular blocky structure; friable when moist; few roots; 90 percent of horizon is fragments of sandstone; layers of soil material, 5 millimeters thick, are between the fragments; strongly acid; gradual, irregular boundary.

R1—23 to 36 inches, brown (10YR 5/3), weathered, fine-grained sandstone bedrock; strongly acid.

Color of the Ap horizon, or of the A2 horizon in undisturbed areas, ranges from dark grayish-brown (10YR 4/2) to yellowish brown (10YR 5/4) or brown (10YR 4/3). In areas that have not been disturbed, the A1 horizon is dark colored and is 1 to 2 inches thick. The B horizons range from 8 to 20 inches in combined thickness, and at least 8 inches of the soil material in those horizons contains less than 35 percent coarse fragments. Reaction of the B horizons ranges from medium acid to very strongly acid. The solum ranges from 20 to 29 inches in thickness.

Muskingum soils are similar in some respects to the Loudonville soils, but they are less clayey than those soils. They are less sandy and contain fewer fragments of stone than the Dekalb soils.

Muskingum channery silt loam, 2 to 6 percent slopes (MsB).—This soil has the profile described as typical for the series. It is on uplands and ridgetops in long, narrow areas that have a somewhat irregular shape. Size of the areas is generally 5 to 30 acres.

Erosion is a moderate hazard. In addition, this soil dries out quickly in spring and is droughty in summer. (Capability unit IIe-3; woodland suitability group 3)

Muskingum channery silt loam, 6 to 12 percent slopes, moderately eroded (MsC2).—The profile of this soil is similar to the one described as typical for the series, except that part of the original surface layer has been lost through erosion. The present plow layer is a mixture of the remaining original surface soil and of material from the upper part of the subsoil. Areas of this soil have an irregular shape and range from 5 to 20 acres in size. Mostly, they are on the sides of valleys along the Mahoning River. Commonly adjacent to them are areas of Loudonville, Wooster, Canfield, or steeper Muskingum soils. Further erosion is a severe hazard if this soil is cultivated. (Capability unit IIIe-3; woodland suitability group 3)

Muskingum channery silt loam, 12 to 18 percent slopes, moderately eroded (MsD2).—This soil has lost part of its original surface layer through erosion. The present plow layer is a mixture of the remaining original surface soil and of material from the upper part of the subsoil. Areas of this soil have an irregular shape, and they range from 5 to 20 acres in size. They are mainly on the sides of valleys along the Mahoning River. Commonly adjacent are areas of Loudonville, Wooster, Canfield, and steeper Muskingum soils. Runoff is rapid, and further erosion is a very severe hazard. (Capability unit IVe-2; woodland suitability group 3)

Muskingum channery silt loam, 18 to 25 percent slopes, moderately eroded (MsE2).—This soil is on short slopes, commonly adjacent to Wooster, Canfield, or Loudonville soils. It has an uneven surface, especially in areas near the channels of drainageways. Size of many of the areas is 5 to 20 acres. The profile is similar to the one described as typical for the series, except that part of the original surface layer has been lost through erosion. The present surface layer is a mixture of the remaining original surface soil and of material from the upper part of the subsoil. Included in mapping were a number of slightly eroded areas.

Most of the acreage is used as woodland, but a small acreage is in pasture. Further erosion is a very severe hazard if this soil is farmed. (Capability unit IVe-2; woodland suitability group 3)

Muskingum channery silt loam, 25 to 50 percent slopes, moderately eroded (MsF2).—Part of the original surface layer of this soil has been lost through erosion. The present surface layer is a mixture of the remaining original surface soil and of material from the upper part of the subsoil. This soil is on hillsides, commonly adjacent to Wooster, Canfield, or Loudonville soils. The surface is uneven, especially in areas near drainageways. Size of the areas generally is 5 to 20 acres, but one area contains more than 200 acres. Included with this soil in mapping were a number of slightly eroded areas.

Most of the acreage is in trees, but a small acreage is in pasture. Further erosion is a severe hazard unless a protective cover of plants is maintained. (Capability unit VIe-2; woodland suitability group 3)

Olmsted Series

Soils that are very poorly drained and that have a dark-colored surface layer make up the Olmsted series. These soils have formed in medium-textured material over moderately coarse textured, gravelly material of Wisconsin age. They commonly occur in nearly level areas and in depressional areas on outwash terraces, where they receive seepage water.

In a typical profile of a cultivated Olmsted soil, the plow layer is very dark brown loam about 7 inches thick. The subsoil is mostly dark-gray loam. It commonly contains thin layers of gravelly and sandy material and some yellowish-brown or dark yellowish-brown mottles. Both the grayish color and the mottling indicate that these soils are naturally wet. The substratum, at a depth of about 33 inches, is stratified sand and gravel. The layers in the substratum are variable in thickness, and the sand and gravel vary in degree of sorting.

Permeability is moderate in the subsoil and very rapid in the substratum. In areas that are drained, the root zone is moderately deep or deep. Within the root zone, the available moisture capacity is medium to high. Where adequate drainage has not been provided, these soils have a seasonal high water table and the water table remains high for long periods of time.

Olmsted soils that are adequately drained are especially well suited to corn, soybeans, hay, and similar crops.

Typical profile of Olmsted loam in a cultivated field in Smith Township (sec. 32, T. 18 N., R. 5 W.):

Ap—0 to 7 inches, very dark brown (10YR 2/2) loam; moderate, fine, angular blocky structure; friable when moist; neutral; 10 percent of horizon is pebbles; abrupt, smooth boundary.

B21tg—7 to 12 inches, dark grayish-brown (10YR 4/2) gravelly loam; many, fine, dark-gray (10YR 4/1) and dark yellowish-brown (10YR 4/4) mottles; moderate, coarse, angular blocky structure breaking to moderate, medium, angular blocky structure; friable when moist; common roots; continuous, very thin, very dark grayish-brown (10YR 3/2) clay films on vertical surfaces of peds, and many, thin, very dark grayish-brown (10YR 3/2) clay films on horizontal surfaces and in pores; common coarse pores; slightly acid; clear, wavy boundary.

B22tg—12 to 23 inches, dark-gray (10YR 4/1) heavy loam to gravelly loam; many, coarse, dark yellowish-brown (10YR 4/4) mottles; very weak, medium, prismatic structure breaking to strong, medium and fine, angular blocky structure; friable when moist; common roots; continuous dark-gray (10YR 4/1) clay loam films, 1 millimeter thick, on vertical surfaces of peds; many fine pores; neutral; abrupt, wavy boundary.

B23g—23 to 33 inches, dark-gray (10YR 4/1) gravelly sandy loam to loam; many, medium, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; friable when moist; common roots; many, thin, dark-gray (10YR 4/1) clay films on surfaces of peds and in pores; neutral; abrupt, wavy boundary.

C1g—33 to 39 inches, very dark gray (10YR 3/1 to 3/2) very gravelly sandy loam; single grain; loose; few roots; few clay bridges between pebbles and sand grains; mildly alkaline; abrupt, smooth boundary.

C2—39 to 55 inches, dark-brown (10YR 4/3) layers of silt and coarse and medium sand; massive; friable when moist; no roots; mildly alkaline; abrupt, smooth boundary.

IIC3—55 to 60 inches, dark-gray (5Y 4/1) layers of silt and fine sand; massive; friable when moist; mildly alkaline. Unconforming layer that retards drainage.

Color of the Ap horizon ranges from black (N 2/0) to very dark grayish brown (10YR 3/2) or very dark brown (10YR 2/2). The A1 horizon in undisturbed areas is 6 to 10 inches thick. It has the same range of color as the Ap horizon, except that it contains brown (10YR 5/3) to yellowish-red (5YR 4/8) mottles. Generally, the horizons beneath the A1 have either a grayish or a brownish matrix, and they contain grayish mottles or grayish clay films or both. In general, the content of clay in the B2 horizons ranges from 10 to 20 percent, but it is as much as 35 percent in some layers. In some places the B2 horizons are expressed only by an increase in the content of fine clay and in the presence of clay films and bridges. Reaction of the upper part of the profile ranges from slightly acid to neutral. The solum is 30 to 55 inches thick.

Olmsted soils are in the same topographic and drainage sequence as the light-colored, poorly drained Damascus and somewhat poorly drained Jimtown soils. They are grayer throughout and have a darker surface layer than the Damascus and Jimtown soils.

Olmsted loam (Od).—This is the only Olmsted soil mapped in Mahoning County. It is nearly level and is mostly in areas of irregular shape that range from 3 to 15 acres in size. Included in mapping were areas in which the surface layer is silt loam and other areas in which the surface layer is silty clay loam.

The plow layer of this Olmsted soil is high in content of organic matter. This soil is in good tilth if it is not tilled when too wet or too dry. Undrained areas are subject to ponding. Wetness is a moderate limitation to use of this soil for crops, even where drainage has been provided. (Capability unit IIw-1; woodland suitability group 6)

Orrville Series

The Orrville series consists of deep, light-colored soils that are somewhat poorly drained and nearly level. These soils are on flood plains throughout the county. They have formed in medium-textured alluvium that has a medium acid reaction. This alluvium was washed from areas of dominantly acid soils formed in Wisconsin age glacial till that has a low content of carbonates.

In a typical profile of an Orrville soil in a wooded area, the surface layer is black silt loam about 3 inches thick. The subsurface layer is dark yellowish-brown loam about 7 inches thick. The underlying material, to a depth of about 42 inches, consists of loamy alluvial material in layers that are 5 to 12 inches thick. These layers are dominantly grayish, but they contain mottles of brown and yellowish red. The grayish color and mottling indicate that these soils are naturally wet. Normally, bedrock is at a depth of more than 8 feet.

Permeability is moderate, and the available moisture capacity is high. Where adequate drainage is provided so that these soils can be farmed, the root zone is deep. These soils have a high water table during winter and spring, and they are subject to flooding if they are not protected.

Some areas of Orrville soils are in field crops, but part of the acreage is used for pasture or trees.

Typical profile of Orrville silt loam in Goshen Township (sec. 23, T. 17 N., R. 4 W.):

A1—0 to 3 inches, black (10YR 2/1) silt loam; moderate, medium, granular structure; friable when moist; many roots; strongly acid; abrupt, irregular boundary.

A2—3 to 10 inches, dark yellowish-brown (10YR 4/4) loam; moderate, fine, granular structure; friable when moist; many roots; medium acid; abrupt, irregular boundary.

C1g—10 to 15 inches, brown (10YR 5/3) loam; common, fine, yellowish-red (5YR 4/8) mottles; massive; friable when moist; common roots; many fine to coarse pores; strongly acid; abrupt, smooth boundary.

C2g—15 to 21 inches, grayish-brown (10YR 5/2) sandy loam; common, fine, yellowish-red (5YR 4/8) and grayish-brown (10YR 5/2) mottles; massive; very friable when moist; few roots; common fine to coarse pores; medium acid; clear, smooth boundary.

C3g—21 to 33 inches, mottled gray (10YR 6/1) and strong-brown (7.5YR 5/6) sandy loam grading to loam with depth; massive; very friable when moist; few roots; many fine to coarse pores; slightly acid; abrupt, smooth boundary.

C4g—33 to 42 inches, dark-gray (N 4/0) loam to sandy loam; massive; loose; few roots; neutral.

In areas that have not been disturbed, the A1 horizon ranges from 1 to 4 inches in thickness. The A2 horizon ranges from 5 to 16 inches in thickness. In cultivated areas the Ap horizon is 6 to 8 inches thick, and it ranges from grayish brown (10YR 5/2) to dark yellowish brown (10YR

4/4) in color and from strongly acid to medium acid in reaction. Color of the matrix in the upper Cg horizons ranges from dark grayish brown (10YR 4/2) to brown (10YR 5/3), and those horizons contain mottles that are yellowish red (5YR 4/8) to gray (10YR 5/1). Color of the lower Cg horizons ranges from dark gray (N 4/0) to strong brown (7.5YR 5/6).

Orrville soils are adjacent to Chagrin, Lobdell, Wayland, and other soils of flood plains. They have a more grayish color than the Chagrin and Lobdell soils, and they are less grayish than the Wayland soils.

Orrville silt loam (0 to 2 percent slopes) (Ov).—This is the only Orrville soil mapped in Mahoning County. Where it is along the smaller streams, the areas are long, narrow, and winding. Along the larger streams, the areas commonly occupy low-lying, long, narrow swales that parallel the channel of the stream. Size of the areas is generally less than 50 acres. Included with this soil in mapping were some areas in which the surface layer is loam, and a few areas of Lobdell and Wayland soils.

Natural wetness is a moderate limitation to use of this soil for crops. Flooding is also a moderate hazard in areas that are not protected. (Capability unit IIw-3; woodland suitability group 5)

Papakating Series

Deep, very poorly drained soils that are dark colored and nearly level are in the Papakating series. These soils occupy flood plains throughout the county, and they have formed in clayey alluvium. The alluvium was washed from acid soils of uplands that had formed in Wisconsin age glacial till low in content of carbonates.

In a typical profile of a Papakating soil in pasture, the surface layer is black silty clay loam about 7 inches thick. The subsurface layer, about 4 inches thick, is very dark gray, mottled silt loam. The underlying material, to a depth of about 46 inches, is silt loam and silty clay loam grading to silty clay with depth. It is gray, but it contains brownish mottles in most places. Both the gray colors and the mottles indicate that these soils are naturally wet. Normally, bedrock is at a depth of more than 8 feet.

Permeability is moderately slow, and the available moisture capacity is high. Where adequate drainage is provided, the root zone is deep. The water table is high during winter and spring, and flooding is a hazard if these soils are not protected.

Where the Papakating soils are adequately drained, they are suitable for farming. Most of the acreage is in corn or soybeans, but part of it is in pasture or trees.

Typical profile of Papakating silty clay loam in a pasture in Beaver Township (sec. 31, T. 13 N., R. 2 W.):

A11—0 to 7 inches, black (10YR 2/1) coarse silty clay loam; strong, very fine, granular structure; friable when moist; many roots; slightly acid; abrupt, smooth boundary.

A12—7 to 11 inches, very dark gray (5Y 3/1) silt loam; many, coarse, dusky-red (10R 3/3) mottles; weak, fine, angular blocky structure; friable when moist; many roots; medium acid; clear, smooth boundary.

C1g—11 to 21 inches, gray (2.5Y 5/1) silt loam; many, coarse, brown (7.5YR 4/4) and reddish-brown (5YR 4/4) mottles; massive; friable when moist; few roots; slightly acid; abrupt, smooth boundary.

C2g—21 to 30 inches, gray (N 5/0) silty clay loam grading to silty clay in lower part of horizon; many, coarse, very dark grayish-brown (10YR 3/2) mottles; massive; friable when moist; few roots; neutral; abrupt, smooth boundary.

C3g—30 to 38 inches, gray (N 5/0) silt loam; many, coarse, brown (10YR 4/3) mottles; massive; friable when moist; neutral; abrupt, smooth boundary.

C4g—38 to 46 inches, gray (N 5/0) silty clay; massive; friable when moist; neutral.

Color of the A horizons ranges from black (N 2/0) to very dark gray (10YR 3/1) or very dark brown (10YR 2/2), and combined thickness of those horizons ranges from 10 to 16 inches. In general, the C horizons are gravelly sandy loam to silty clay loam, but they contain thin layers of silty clay and clay in many places. These horizons generally are grayish and contain brownish mottles, but some are brownish and contain grayish mottles. Reaction of the C horizons ranges from medium acid to neutral.

Papakating soils are mostly adjacent to Wayland and Orrville soils on flood plains, but they are adjacent to Lobdell and Chagrin soils in some places. Papakating soils have a darker colored surface layer than any of these adjacent soils.

Papakating silt loam (0 to 2 percent slopes) (Pa).—This soil generally occupies areas that are oval or are long and narrow and are parallel to the outer edges of the flood plain. Size of the areas ranges to 40 acres. The profile is similar to the one described as typical for the series, except that the surface layer is silt loam. Included with this soil in mapping were some areas in which the surface layer is loam.

The surface layer has a high content of organic matter, and this Papakating soil is in good tilth if it is cultivated when neither too wet nor too dry. Flooding is a hazard in areas that are not protected. Wetness is a severe limitation to use of this soil for crops, even though artificial drainage is provided. (Capability unit IIIw-1; woodland suitability group 6)

Papakating silty clay loam (0 to 2 percent slopes) (Pc).—This soil has the profile described as typical for the series. Most of the areas are oval or are long and narrow, and they are parallel to the outer edges of the flood plains. Some of the areas are as large as 60 acres. Included with this soil in mapping were areas in which the surface layer is silty clay.

The surface layer has a high content of organic matter. This soil is in good tilth if it is cultivated when neither too wet nor too dry, but the range of moisture content within which it can be satisfactorily tilled is narrower than for Papakating silt loam. Flooding is a hazard in areas that are not protected. Wetness is a severe limitation to use of this soil for crops, even though artificial drainage is provided. (Capability unit IIIw-1; woodland suitability group 6)

Quarries

Quarries (Qu) is a miscellaneous land type that occurs where the limestone is fairly close to the surface and of quality suitable for mining. It consists of limestone quarries that are generally about 2 acres in size or larger. The size of the areas constantly increases as mining progresses. Part of the limestone is ground to produce lime, some of which is used in farming. Some of the limestone is used for construction of roads or buildings and for other industrial uses.

Where limestone is to be mined, the soil material is scalped from the area and piled in mounds. Then, erosion becomes a severe hazard and gullying occurs in steep areas of this unconsolidated material. Where such areas lack a cover of plants, they are a source of material that causes siltation. Where mining is no longer active, planting of trees and other kinds of plants is desirable. Only trees and seedlings that can survive and grow in this limy, generally unfavorable soil material should be planted.

Developing areas of this land type for recreational purposes and for wildlife habitat commonly is feasible. Large areas are suitable for use by migratory waterfowl. (Not placed in a capability unit or woodland suitability group)

Ravenna Series

The Ravenna series consists of light-colored, somewhat poorly drained soils that are nearly level or gently sloping. These soils are on uplands, where they have formed in loamy glacial till of Wisconsin age.

In a typical profile of a Ravenna soil in a wooded area, the surface layer is very dark brown to dark grayish-brown and yellowish-brown silt loam about 11 inches thick. The subsoil is mostly dark yellowish-brown loam that has contrasting grayish and brownish mottles throughout and has grayish coatings on many of the peds in the upper part. The substratum, at a depth of about 44 inches, is dark yellowish-brown, loamy glacial till.

Permeability is moderately slow, and the mottling and grayish coatings in the subsoil indicate that these soils are naturally wet. The lower two-thirds of the subsoil contains layers of firm, brittle material that restrict the movement of water and the development of roots. In most places the root zone is moderately deep. The available moisture capacity within the root zone is medium. The water table is high during wet periods.

In Mahoning County about a third of the acreage of Ravenna soils is in field crops, another third is in pasture, and the rest is in forest. Hay, wheat, and corn are the crops most commonly grown.

Typical profile of Ravenna silt loam, 2 to 6 percent slopes, in a woodlot 2½ miles south of the city of Canfield in Canfield Township (T. 1 N., R. 3 W.):

A1—0 to 1 inch, very dark brown (10YR 2/2) silt loam; moderate, fine, granular structure; friable when moist; many roots; 10 percent of horizon is pebbles; very strongly acid; abrupt, wavy boundary.

A21—1 to 5 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium and fine, granular structure; friable when moist; many roots; 10 percent of horizon is pebbles; very strongly acid; clear, wavy boundary.

A22—5 to 11 inches, yellowish-brown (10YR 5/4) silt loam; common, coarse, brown (10YR 4/3) mottles; weak, fine, subangular blocky structure; friable when moist; common roots; many medium pores; 10 percent of horizon is pebbles; very strongly acid; abrupt, wavy boundary.

B2tg—11 to 21 inches, yellowish-brown (10YR 5/4) loam; common, coarse, grayish-brown (2.5Y 5/2) mottles; weak, medium, angular blocky structure; friable when moist; common roots; many moderately thick clay films on ped surfaces, which are mottled yellowish brown (10YR 5/4) and grayish brown (10YR 5/2); many fine pores; 10 percent of horizon is pebbles; very strongly acid; clear, smooth boundary.

Bx1g—21 to 27 inches, dark yellowish-brown (10YR 4/4) loam; common, fine, gray (10YR 5/1) mottles; weak fragipan, with weak, medium, angular and subangular blocky structure; firm when moist; common roots; continuous, thick, brown (10YR 5/3) and gray (10YR 5/1) clay films on ped surfaces; common black (N 2/0) stains of manganese; many fine and medium pores; 10 percent of horizon is pebbles; very strongly acid; abrupt, smooth boundary.

Bx2g—27 to 35 inches, dark yellowish-brown (10YR 4/4) loam; common, coarse, gray (10YR 5/1) mottles; moderate fragipan, with weak, very coarse, angular blocky structure; firm when moist; few roots; continuous, thick and thin, gray (10YR 5/1) clay films on ped surfaces and common, medium, black (N 2/1) stains of manganese; 10 percent of horizon is pebbles; very strongly acid; clear, wavy boundary.

Bx3g—35 to 44 inches, dark yellowish-brown (10YR 4/4) loam; common, coarse, gray (10YR 5/1) and strong-brown (7.5YR 5/6) mottles; weak, medium, platy structure; friable when moist; few roots; thin, grayish-brown (10YR 5/2) clay films on ped surfaces, and many, coarse, black (N 2/1) stains of manganese on the horizontal surfaces; common medium pores; 10 percent of horizon is pebbles; strongly acid; gradual boundary.

C—44 to 64 inches, dark yellowish-brown (10YR 4/4) loam; massive; friable when moist; 10 percent of horizon is pebbles; slightly acid grading to neutral at a depth of about 52 inches.

In areas that have not been disturbed, thickness of the A1 horizon ranges from 1 to 5 inches and color of the A2 horizon ranges from dark grayish brown (10YR 4/2) to yellowish brown (10YR 5/4). Color of the Ap horizon in cultivated fields ranges from very dark grayish brown (10YR 3/2) to dark brown (10YR 4/3). Depth from the surface to the horizon that contains grayish mottles or grayish clay films is 10 to 14 inches. Color of the matrix of the B2 horizons ranges from dark brown (10YR 4/3) to yellowish brown (10YR 5/4). Reaction of the B horizons ranges from very strongly acid to medium acid, but the lower B horizons tend to be less acid than the upper ones. The upper part of the C horizon is medium acid to calcareous. Depth to neutral or calcareous material ranges from 40 to 75 inches, but depth to soil material that has a neutral reaction is generally about 55 inches. Depth to the fragipan ranges from 15 to 24 inches, and the thickness of the fragipan ranges from 16 to 35 inches. The solum is 38 to 55 inches thick, and about 13 percent of it, by volume, is glacial pebbles.

Ravenna soils are in the same drainage sequence as the well drained Wooster, the moderately well drained Canfield, and the very poorly drained Marengo soils. They are less well drained than the Wooster and Canfield soils, and unlike those soils, they have a grayish color in the subsoil. They are less wet and have a lighter colored surface layer and a less grayish subsoil than the Marengo soils.

Ravenna silt loam, 0 to 2 percent slopes (RaA).—This soil is in nearly level areas that are characteristic of those on undulating till plains. Most areas of this soil are oval or nearly circular, contain 3 to 10 acres, and are surrounded by more sloping Canfield and Ravenna soils. In many places areas of lower lying, wetter, dark-colored Marengo soils were included in mapping.

In cultivated areas the plow layer of this Ravenna

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soil has a low content of organic matter. Runoff is slow, and water ponds on the surface in some places. Wetness is a moderate limitation to use of this soil for crops, even though adequate drainage is provided. (Capability unit IIw-5; woodland suitability group 7)

Ravenna silt loam, 2 to 6 percent slopes (RaB).—This soil has the profile described as typical for the series. It is in rather broad areas that have long, curving sides and that typically contain 10 to 50 acres. In most places areas of lower lying Frenchtown soils in drainageways were included in mapping.

In cultivated areas the plow layer of this Ravenna soil has a low content of organic matter. Wetness is a moderate limitation to use of this soil for crops, even though adequate drainage is provided. Erosion is also a hazard. (Capability unit IIw-5; woodland suitability group 7)

Remsen Series

The Remsen series consists of light-colored, somewhat poorly drained soils that are nearly level or gently sloping. These soils are on uplands, where they have formed in clayey glacial till that has a low content of lime. The till is of Wisconsin age.

In a typical profile of a Remsen soil in pasture, the surface layer is very dark grayish-brown and dark grayish-brown silt loam about 10 inches thick. The subsoil is mostly brownish clay that contains contrasting grayish and brownish mottles and has grayish coatings on many of the surfaces of the peds. The substratum, at a depth of about 48 inches, is olive-brown clay.

These soils have a seasonal high water table, and they have mottling and grayish coatings in the subsoil indicating that the soils are naturally wet. In most places the root zone is moderately deep and the available moisture capacity is medium. Remsen soils have a high shrink-swell potential, which is a hazard to foundations.

About half of the acreage is in field crops. The rest is about equally divided between pasture (fig. 9) and woodland. Commonly grown crops are corn, wheat, and hay.

Figure 9.—Pasture that has low carrying capacity on a Remsen silt loam.

Typical profile of Remsen silt loam, 2 to 6 percent slopes, in a pastured field in Smith Township (sec. 29, T. 18 N., R. 5 W.; laboratory No. MH–39):

A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; many roots; 1 percent of horizon is pebbles; very strongly acid; clear, smooth boundary.

A2—1 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, platy structure breaking to weak, fine, granular structure; friable when moist; many roots; 1 percent of horizon is pebbles; very strongly acid; abrupt, smooth boundary.

B1t—10 to 12 inches, yellowish-brown (10YR 5/4) silty clay loam; many, fine, light olive-brown (2.5Y 5/4) mottles; moderate, medium, subangular and angular blocky structure; friable when moist; common roots; many, thin, light olive-brown (2.5Y 5/4) silty films on ped surfaces; many fine pores; 1 percent of horizon is pebbles; very strongly acid; abrupt, smooth boundary.

B21tg—12 to 23 inches, dark grayish-brown (10YR 4/2) clay; many, fine, olive-gray (5Y 5/2) mottles; moderate, medium, prismatic structure breaking to strong, medium, angular blocky structure; firm when moist; common roots; continuous, thick, light brownish-gray (10YR 6/2), silty clay films and thin, mottled, olive-gray (5Y 5/2) and dark yellowish-brown (10YR 4/4) clay films on ped surfaces; few fine pores; 1 percent of horizon is pebbles; strongly acid; clear, smooth boundary.

B22tg—23 to 35 inches, olive-brown (2.5Y 4/4) clay; many, medium, dark-gray (10YR 4/1) mottles; weak, medium, prismatic structure breaking to strong, coarse, angular blocky structure; firm when moist; common roots on ped surfaces; 1 percent of horizon is pebbles; continuous, very thin, dark-gray (10YR 4/1) clay films on ped surfaces; no pores; neutral; clear, smooth boundary.

B3tg—35 to 48 inches, olive-brown (2.5Y 4/3) clay; weak, medium, prismatic structure breaking to strong, fine, angular blocky structure; firm when moist; a few roots on ped surfaces; 1 percent of horizon is pebbles; mildly alkaline; gradual, smooth boundary.

C—48 to 72 inches, olive-brown (2.5Y 4/4) clay; moderate, medium, angular blocky structure; less firm than B3tg horizon; many, very thin, dark grayish-brown (2.5Y 4/2) clay films and a few black (N 2/0) stains of manganese in upper part of horizon; 1 percent of horizon is pebbles; mildly alkaline.

In areas that have not been disturbed, the A1 horizon ranges from 1/2 inch to 2 inches in thickness. Color of the A2 horizon, or of an Ap horizon in cultivated areas, ranges from dark grayish brown (10YR 4/2) to brown (10YR 5/3). Depth from the surface to the part of the B horizon that has a grayish matrix or that contains grayish mottling or grayish clay films ranges from 8 to 14 inches. Color of the matrix in the B2 horizons ranges from light olive brown (2.5Y 5/6) to dark grayish brown (10YR 4/2). The content of clay in the B horizons ranges from 45 to 63 percent. The firm or very firm consistence in the B and C horizons is the result of the high content of clay. Reaction of the upper B horizon is very strongly acid, but reaction of the lower B horizons and of the C horizon is mildly alkaline to neutral. Depth to neutral or mildly alkaline material ranges from 20 to 36 inches. The solum is 33 to 48 inches thick, and about 2 percent of it, by volume, is glacial pebbles.

Remsen soils are in the same topographic sequence as the higher lying, moderately well drained Geeburg and the lower lying, poorly drained Trumbull and very poorly drained Lorain soils. The Remsen soils are more grayish and more mottled than the Geeburg soils, are less grayish and less mottled than the Trumbull soils, and are lighter colored than the Lorain soils. Remsen soils are similar to the Mahoning and Wadsworth soils, but they have a higher content of clay than those soils.

Remsen silt loam, 0 to 2 percent slopes (ReA).—This soil generally occupies low rises on undulating till plains. Most of the areas have an oval shape and contain 5 to 10 acres. In most places some lower lying areas of Trumbull and dark-colored Lorain soils were included with this soil in mapping.

Runoff is slow, and water is ponded on the surface in places. Wetness is a severe limitation to use of this soil for crops. (Capability unit IIIw–5; woodland suitability group 2)

Remsen silt loam, 2 to 6 percent slopes (ReB).—This soil has the profile described as typical for the series. Mostly, it is on rather broad side slopes of rises on the till plains. The areas generally are nearly circular or have a crescent shape, and they range from 5 to 20 acres in size. In most places small areas of lower lying Trumbull and dark-colored Lorain soils in drainageways were included with this soil in mapping.

Wetness is a severe limitation to use of this Remsen soil for crops. Erosion is also a hazard. (Capability unit IIIw-5; woodland suitability group 2)

Remsen-Urban land complex (RmB).—In most of this complex, the soils have been disturbed in varying degrees by nonfarm construction and development. Most of the disturbance has resulted from grading and digging operations. Where the soils have not been disturbed, they have a profile similar to the one described as typical for the Remsen series. Most of the complex consists of fill or of borrow areas, but undisturbed areas in undeveloped lots, on the back parts of developed lots, and in small patches of woodland are included.

The fill areas consist of 1 to 3 feet of soil material over part of an undisturbed Remsen soil. Most of the fill material was formerly part of the subsoil or substratum of a Geeburg soil or of some other adjacent, higher lying soil. Borrow areas are places from which the subsoil and the substratum of Remsen soils have been removed. Both in the fill and borrow areas, the exposed soil material varies considerably in texture and reaction within short horizontal distances.

The present surface layer of the soils in this complex generally has a low content of organic matter. It tends to seal over when wet, and as a result, the emergence of seedlings is restricted. The soils are in poor tilth and can be satisfactorily worked only within a narrow range of moisture content.

Wetness is a severe limitation to use of this complex. The Remsen soils are naturally wet, but wetness also results where grading has been done and adequate drainage has not been provided. Erosion is a hazard, especially during construction periods, when the surface soil is bare, or after construction is finished and before a cover of plants has been established. Soil material that is washed out when gullying takes place causes sedimentation. Addition of a large amount of organic matter or of topsoil is necessary to make the areas suitable for landscaping. (Not placed in a capability unit or woodland suitability group)

Rittman Series

Light-colored, moderately well drained, deep soils that are mostly gently sloping to moderately steep are in the Rittman series. These soils are on till plains, and they have formed in clay loam glacial till of Wisconsin age.

In a typical profile of a cultivated Rittman soil, the plow layer is dark-brown silt loam about 7 inches thick. The subsoil is brownish silt loam and clay loam. It contains contrasting grayish and brownish mottles and has grayish coatings on many of the peds. The substratum of brownish clay loam is at a depth of about 50 inches.

Rittman soils normally have a dense, compact layer, or fragipan, in about the center one-third of the subsoil, and permeability of this layer is very slow. The root zone for annual crops is moderately deep, and the available moisture capacity is medium. The water table is high during winter and spring, especially in the less sloping areas. This water table is generally perched above the fragipan in the subsoil.

In Mahoning County the less sloping areas of Rittman soils, exclusive of those in nonfarm uses, are commonly in wheat, hay, corn, and similar crops. The steeper areas are in pasture or trees.

Typical profile of Rittman silt loam, 2 to 6 percent slopes, in a cultivated field near U. S. Highway No. 224, about one-half mile west of Duck Creek Road (T. 1 N., R. 5 W.):

Ap—0 to 7 inches, dark-brown (10YR 4/3) silt loam; moderate, medium and fine, granular structure; friable when moist; many roots; neutral (field limed); abrupt, smooth boundary.

B1—7 to 15 inches, yellowish-brown (10YR 5/4) silt loam; moderate to weak, medium and fine, subangular blocky structure; friable when moist, slightly sticky when wet; common roots; continuous, yellowish-brown (10YR 5/4), silty films on vertical surfaces of peds; many medium and fine pores; 8 percent of horizon is pebbles; neutral; abrupt, wavy boundary.

B2tg—15 to 20 inches, yellowish-brown (10YR 5/6) clay loam; many, medium, grayish-brown (10YR 5/2) and brown (7.5YR 4/4) mottles; moderate, medium, angular and subangular blocky structure; friable when moist, slightly sticky when wet; common roots; continuous, thick, grayish-brown (10YR 5/2) clay films on vertical surfaces of peds; continuous, thick, dark-brown (7.5YR 4/4) clay films and many, thin, brown (10YR 5/3) coats on the horizontal surfaces; common fine pores; 8 percent of horizon is pebbles; very strongly acid; clear, wavy boundary.

Bx1g—20 to 28 inches, dark yellowish-brown (10YR 4/4) light clay loam; common, medium, gray (10YR 5/1) mottles; strong fragipan, with moderate, coarse, prismatic structure; firm when moist, sticky when wet; common roots on vertical surfaces of peds; continuous, thick, dark-gray (10YR 4/1) clay films on surfaces of peds; few, fine, black (N 2/0) stains of manganese; common fine pores; 8 percent of horizon is pebbles; very strongly acid; clear, wavy boundary.

Bx2g—28 to 37 inches, dark grayish-brown (10YR 4/2) light clay loam, but contains small horizontal zones of reddish brown (5YR 4/4) that amount to about 10 percent of horizon; weak fragipan, with weak, coarse, prismatic structure breaking to moderate, thick, platy structure; firm when moist, slightly sticky when wet; no roots; continuous, coarsely mottled, gray (10YR 5/1) and dark grayish-brown (10YR 4/2) clay films, 1 to 20 millimeters thick, on the vertical surfaces of peds; continuous, thin, black (N 2/0) stains of manganese on the horizontal surfaces of peds; few fine pores; 8 percent of horizon is pebbles; strongly acid; clear, wavy boundary.

B3g—37 to 50 inches, dark-brown (10YR 4/3) light clay loam; weak, medium to thick, platy structure that in upper part of the horizon breaks to moderate, fine, angular blocky structure; friable when moist, slightly sticky when wet; continuous, thin, dark-brown (10YR 4/3) clay films, coated by continuous black (N 2/0) stains of manganese, are on the surfaces of peds; clay films in pores; few fine pores; 10 percent of horizon is pebbles; neutral; gradual boundary.

C—50 to 70 inches, dark-brown (10YR 4/3) light clay loam; common, fine, very dark gray (5Y 3/1) mottles; massive breaking to weak, medium, angular blocky clods; friable when moist; common coarse to fine pores; 12 percent of horizon is pebbles; mildly alkaline and calcareous.

In areas that have not been cultivated, the profile contains a dark-colored A1 horizon about 2 inches thick. The A2 horizon, or an Ap horizon in cultivated areas, ranges from very dark grayish brown (10YR 3/2) to brown (10YR 4/3) in color. Where lime has been added, the uppermost part of the profile to a depth of about 15 inches is neutral in reaction. Depth from the surface to the horizon that contains grayish mottles ranges from 13 to 18 inches. Color of the matrix in the B2 and Bx horizons ranges from yellowish brown (10YR 5/6) to dark brown (7.5YR 4/2). The content of clay in the B2tg horizon ranges from 30 to 35 percent. Depth to the fragipan ranges from 15 to 28 inches, and thickness of the fragipan ranges from 15 to 25 inches. Reaction in the B2tg and Bx horizons is very strongly acid or strongly acid. The B3g horizon is medium acid to alkaline or calcareous. Texture of the C horizon ranges from clay loam to heavy loam. Depth to neutral or calcareous material ranges from 36 to 50 inches. The solum is 48 to 60 inches thick, and 3 to 15 percent of it, by volume, is glacial pebbles.

Rittman soils are in the same drainage sequence as the lower lying, somewhat poorly drained Wadsworth, poorly drained Frenchtown, and very poorly drained Marengo soils. They are more brownish than the other soils in this sequence, and they have a lighter colored surface layer than the Marengo soils. Rittman soils are similar to the Canfield soils, but they are more clayey than those soils.

Rittman silt loam, 2 to 6 percent slopes (RsB).—This soil has the profile described as typical for the series. It is on broad side slopes and rises in areas that contain 5 to 25 acres. Included with this soil in mapping were a few areas that are mostly moderately eroded.

The content of organic matter is medium. Runoff is rapid, especially where this soil is not protected by a cover of plants. Erosion is a moderate hazard if this soil is cultivated. (Capability unit IIe-4; woodland suitability group 2)

Rittman silt loam, 6 to 12 percent slopes (RsC).—This soil has a profile similar to the one described as typical for the series, except that the surface layer and the subsoil are thinner. It is on rather broad side slopes in areas that range from 5 to 20 acres in size.

Runoff is rapid, especially where this soil is not protected by a cover of plants. Erosion is a severe hazard if this soil is cultivated. (Capability unit IIIe-2; woodland suitability group 2)

Rittman silt loam, 6 to 12 percent slopes, moderately eroded (RsC2).—This soil is on side slopes and sloping hilltops, mostly in areas containing 10 to 20 acres. It has a profile similar to the one described as typical for the series, except that the surface layer and the subsoil are thinner as a result of past erosion. The present plow layer consists of a mixture of the remaining original surface soil and of material from the upper part of the subsoil. The plow layer has a medium to low content of organic matter. As a result, the range of moisture content within which this soil can be satisfactorily tilled is narrower than for an uneroded Rittman soil.

Runoff is rapid, especially where this soil is not protected by a cover of plants. Further erosion is a severe hazard if this soil is cultivated. (Capability unit IIIe-2; woodland suitability group 2)

Rittman silt loam, 12 to 18 percent slopes, moderately eroded (RsD2).—This soil is on side slopes and in areas adjacent to or partly surrounding drainageways. The areas in which it occurs are commonly nearly circular or have a crescent shape, and they range from 5 to 15 acres in size. The profile is similar to the one described as typical for the series, except that the surface layer and the subsoil are thinner. The plow layer is partly material from the original surface layer and partly material from the upper part of the subsoil. It has a medium to low content of organic matter. This soil can be satisfactorily tilled only within a narrow range of moisture content.

Runoff is rapid, especially where this soil is not protected by a cover of plants. Most of the areas are eroded as a result of being cultivated up and down the slope. Further erosion is a very severe hazard. (Capability unit IVe-4; woodland suitability group 2)

Rittman-Urban land complex (RuB).—In most of this complex, the soils have been disturbed in varying degrees by nonfarm construction and development. Most of the disturbance has resulted from grading and digging operations. Where the soils have not been disturbed, they have a profile similar to the one described as typical for the Rittman series. Most of the complex consists of fill or of borrow areas, but undisturbed areas of typical Rittman soils in undeveloped lots, on the back parts of developed lots, and in small patches of woodland are included.

Where these soils are used as fill, the material covers an undisturbed Fitchville soil or an included wetter, lower lying Wadsworth, Frenchtown, or Marengo soil to a depth of 1 to 3 feet. Most of the fill material was formerly part of the subsoil of a Rittman soil, but some of it was part of the substratum. Borrow areas are places from which the subsoil and the substratum of Rittman soils have been removed.

The present surface layer of the soils in this complex generally has a low content of organic matter. It tends to seal over when wet, and as a result, the emergence of seedlings is restricted. The soils are in poor tilth and can be satisfactorily tilled only within a narrow range of moisture content.

A severe hazard of erosion is a limitation to nonfarm uses of these soils. This hazard is especially severe where the surface of scalped or filled areas is bare during periods of construction. Soil material lost as a result of gullying or sheet erosion causes sedimentation. Addition of a large amount of organic matter or topsoil is necessary to make these areas suitable for landscaping.

Seasonal wetness is also a limitation, especially where the areas contain depressions, or bowl-shaped places, caused by grading. It is also a limitation in areas of included soils, where the underlying undisturbed soil is naturally wet and has not been drained. (Not placed in a capability unit or woodland suitability group)

Sebring Series

The Sebring series consists of light-colored, poorly drained soils that are nearly level. These soils are in scattered former glacial lakebeds on uplands of glacial till plains and on terraces along the major streams in the county. They have formed in loamy material deposited by water.

In a typical profile of a Sebring soil in pasture, the surface layer is very dark brown and gray silt loam about 10 inches thick. Except for the uppermost 1 inch, this layer is mottled with strong brown and yellowish brown. The subsoil is mostly gray silty clay loam, and it contains many contrasting brownish mottles and has grayish coatings on many of the peds. The substratum, at a depth of about 36 inches, consists of olive-brown silt loam mottled with gray.

Permeability is moderately slow, and the water table is seasonally high. The predominantly grayish colors in the profile, along with the mottles and gray coatings, indicate that these soils are naturally wet. Water drains slowly, even where these soils are artificially drained. Where these soils are drained and used for farming, they have a deep root zone for most annual crops. The available moisture capacity is medium.

In Mahoning County areas of Sebring soils, excluding those in nonfarm uses, are mainly in trees or pasture. Artificially drained areas are used for growing corn, hay, and similar crops.

Typical profile of Sebring silt loam in a pasture in Goshen Township (sec. 9, T. 17 N., R. 4 W.; laboratory No. MH-41):

A1—0 to 1 inch, very dark brown (10YR 2/2) silt loam; weak, coarse and fine, granular structure; friable when moist, nonsticky and nonplastic when wet; many roots; medium acid;

A2g—1 to 10 inches, gray (10YR 6/1) silt loam; many, medium, strong-brown (7.5YR 5/8) and yellowish-brown (10YR 5/4) mottles; weak, medium, angular blocky structure breaking to weak, fine, granular structure; friable when moist, slightly sticky and plastic when wet; many roots; many fine pores; medium acid; abrupt, wavy boundary.

B1tg—10 to 16 inches, mottled gray (10YR 6/1) and strong-brown (7.5YR 5/6) silty clay loam; soil material is yellowish brown (10YR 5/6) if crushed; mottles are of medium size; moderate, medium, angular blocky structure; friable when moist, slightly sticky and plastic when wet; common roots; many, thick, gray (10YR 6/1), silty coats on the vertical surfaces of peds; many fine pores; medium acid; clear, smooth boundary.

B21tg—16 to 24 inches, gray (N 6/0) silty clay loam; many, medium, prominent, strong-brown (7.5YR 5/6) and yellowish-brown (10YR 5/4) mottles comprise 25 to 40 percent of matrix; weak, medium, angular blocky structure; firm when moist, slightly sticky and plastic when wet; common roots; many fine pores; many gray (10YR 6/1) silt coats and many, gray (10YR 5/1) and brown (10YR 5/3) clay coats on ped surfaces; few, fine, black (N 2/0) stains of manganese; medium acid; abrupt, wavy boundary.

B22tg—24 to 30 inches, gray (N 5/0) silty clay loam; many, medium, prominent, strong-brown (7.5YR 5/6) and yellowish-brown (10YR 5/4) mottles comprise 25 to 40 percent of matrix; moderate, coarse, angular blocky structure breaking to weak, fine, angular blocky structure; firm when moist, slightly sticky and plastic when wet; few roots; continuous, thick, gray (N 5/0) clay coats on ped surfaces; few fine stains of manganese; common fine pores; medium acid; clear, smooth boundary.

B3tg—30 to 36 inches, mottled light olive-brown (2.5Y 5/4) and strong-brown (7.5YR 5/6) silty clay loam; very coarse, angular blocky structure; friable when moist, plastic and sticky when wet; few roots; thick, dark-gray (N 4/0) clay coats on ped surfaces; common, fine, black (N 2/0) stains of manganese; many fine pores; medium acid; clear, smooth boundary.

C1g—36 to 47 inches, olive-brown (2.5Y 4/4) silt loam; many, coarse, gray (N 5/0) mottles; massive; friable when moist; many, thick, dark-gray (N 4/0) films on ped surfaces; common fine pores; horizon is laminated; neutral.

C2g—47 to 59 inches, olive-brown (2.5Y 4/4) silt loam; common, coarse, gray (N 5/0) mottles; massive; friable when moist; common fine pores; mildly alkaline.

In areas that have not been disturbed, the A1 horizon ranges from 1 to 2 inches in thickness. Color of the Ap horizon in cultivated areas ranges from very dark gray (10YR 4/1) to grayish brown (10YR 5/2). The matrix has a grayish color near the surface, or grayish mottles are near the surface. The matrix of the B2 horizons is grayish, with brownish mottles. The content of clay in the B2 horizons ranges from 27 to 35 percent. The solum is 30 to 50 inches thick. Reaction ranges from strongly acid to medium acid in the B1tg and B2 horizons and from medium acid to mildly alkaline in the B3tg and C horizons.

Sebring soils are in the same topographic and drainage sequence as the lower lying, very poorly drained Luray soils and the higher lying, somewhat poorly drained Fitchville and moderately well drained Glenford soils. They have a lighter colored surface layer than the Luray soils, and they are more grayish and more mottled than the Fitchville and Glenford soils.

Sebring silt loam (0 to 2 percent slopes) (Sb).—This soil has the profile described as typical for the series. It is in irregular, nearly level areas that range from 3 to 10 acres in size. Areas where slopes are 2 to 6 percent were included in mapping.

In areas that have been farmed, the plow layer commonly has a low content of organic matter. This soil is generally in poor tilth if it has been cultivated when too wet or too dry. Many undrained areas are subject to ponding, and these areas are mostly in trees. In areas that are farmed, wetness is a severe limitation to use of this soil for crops, even though artificial drainage is provided. Erosion is also a hazard in the gently sloping areas. (Capability unit IIIw-2; woodland suitability group 5)

Sebring silt loam, till substratum (0 to 2 percent slopes) (Se).—This soil is in broad areas that are mostly circular or oval in shape and that range from 3 to 10 acres in size. The upper layers are similar to those in the profile described as typical for the series. At a depth of 20 to 42 inches, however, this soil is underlain by firm, massive, loamy till that is restricted in permeability and has characteristics of a fragipan. Areas where slopes are 2 to 6 percent were included in mapping.

This Sebring soil is generally in poor tilth if it has been cultivated when too wet or too dry. Many of the areas that are not drained are subject to ponding, and those areas are mostly in trees. In areas that are farmed, wetness is a severe limitation to use of this soil for crops, even though artificial drainage is provided. Erosion is also a hazard in the gently sloping areas. (Capability unit IIIw-8; woodland suitability group 5)

Sebring-Urban land complex (Sg).—In most of this complex, the soils have been disturbed in varying degrees by nonfarm construction and development. Most of the disturbance has resulted from grading and digging operations. Where the soils have not been disturbed, the profile is similar to the one described as typical for the Sebring series. Most of the complex consists of fill areas, because during grading operations this rather low lying soil was covered by material transported from higher adjacent areas. Included, however, are undisturbed areas of Sebring soils in undeveloped lots, on the back parts of developed lots, and in small patches of woodland.

The fill areas consist of 1 to 3 feet of soil material over part of an undisturbed Sebring soil. Formerly, most of the fill material was part of the subsoil or the substratum of a Glenford or Fitchville soil.

The present surface layer of the soils in this complex generally has a low content of organic matter. It tends to seal over, especially after rains, and as a result, the emergence of seedlings is restricted. The soils are in poor tilth and can be satisfactorily tilled only within a narrow range of moisture content.

Wetness is a very severe limitation to nonfarm uses of these soils. This wetness is primarily the result of the natural wetness of the underlying undisturbed Sebring soils, but it also results where adequate surface drainage was not provided when the areas were graded.

Erosion is also a hazard, especially when the surface is bare during construction periods and after construction is finished. Gullying and sedimentation also occur during those periods. Soil material washed away in gullying and sheet erosion is the source of material that causes sedimentation. Addition of a large amount of organic matter or topsoil is necessary to make these areas suitable for landscaping. (Not placed in a capability unit or woodland suitability group)

Strip Mine Spoils

Coal and clay suitable for mining underlie some areas in the southern and eastern parts of Mahoning County. About three-fourths of the acreage in those areas has been stripped within the past 20 years. Mining was shallower in the areas stripped first than in areas stripped more recently. Nearly all mining was done by use of a scoop-type power shovel, which moved the overburden of soil and rock to the downhill side of the excavation so that coal or clay was exposed and could be removed.

When mining is ended, the pile of excavated material, or spoil, is graded on top to conform to State law. The lower, or downhill, side of the spoil is very steep, and the uphill side generally is a vertical wall or rock escarpment. As a rule, the pit is left open. The spoil is seeded to grass or is planted to trees, with varying success (fig. 10). Water that is suitable for fishing or other recreational uses accumulates in many pits.

Spoil from strip mining is extremely variable in physical and chemical properties, depending on the characteristics of the excavated material and on how the material was mixed and dumped. Freshly exposed spoil is soon affected by weathering, especially by oxidation and leaching. Other soil-forming processes also become evident, but they progress very slowly. In older areas of Strip mine spoils, some development of a profile is recognizable, particularly the development of surface and subsurface horizons.

Strip mine spoils, shale and sandstone materials, undulating (SsB) consists of excavated gray and black shale and siltstone mixed with smaller amounts of gray sandstone and a small amount of glacial till. It has been graded to slopes of 2 to 6 percent. This spoil material occurs in the spoil area nearest the pit, or high wall, left by the last cut when coal was removed.

This spoil material has low available moisture capacity and is rapidly permeable. It is loose and easily handled but contains large stones in places. Reaction ranges from extremely acid to neutral. Organic matter is lacking, and natural fertility is very low. Many small areas contain toxic material, and small areas are bare of plants because of the extreme acidity. Other areas are alkaline because the spoil contains some limy material. The toxic material is the result of weathering of pyritic rocks.

Most of the spoil has high bearing capacity, good stability, low shrink-swell potential, and moderate corrosion potential. Where the toxic material occurs, however, the corrosion potential is very high. Pyritic material expands when it oxidizes, and it should be removed before the spoil is covered with concrete or other paving.

Some areas of this land type have been resurfaced

***Figure 10.*—An area of Strip mine spoils that has been graded and reseeded.**

with about 1 foot of mixed soil material, and these areas are shown on the soil map by a special symbol. Such resurfaced areas generally have a more suitable root zone than those that have not been resurfaced.

This land type has very severe limitations to use. Erosion is a hazard. (Capability unit VIs-1; woodland suitability group 9)

Strip mine spoils, shale and sandstone materials, rolling (SsC) consists of spoil material that has been graded so that the slopes are 6 to 12 percent. It commonly occupies the outer parts of spoil banks adjacent to undisturbed areas. Less sloping areas of spoil are adjacent in many places also, but they are at a higher elevation, closer to the trench and high wall.

This land type has very severe limitations to use. Erosion is a hazard. (Capability unit VIs-1; woodland suitability group 9)

Strip mine spoils, shale and sandstone materials, steep (SsF) consists of ungraded spoil material, mostly in very steep areas and on escarpments that are adjacent to areas of graded spoil. It occurs mainly on the outermost edges of areas of recently excavated spoil and in older areas that were excavated before laws were passed that required grading of the areas. In the older areas, this land type is adjacent to normal soils.

Surface runoff is rapid. Many large stones litter the surface in many places. Some areas of this land type are extremely toxic, and many are extremely acid as the result of exposure and weathering of minerals in the original layers of rock. The toxic places are indicated on the soil map by a special symbol.

This land type has very severe limitations to use. Erosion is also a hazard. (Capability unit VIIs-1; woodland suitability group 9)

Strip mine spoils, loamy till materials, undulating (StB) consists of excavated loam glacial till mixed with a small amount of material from shale, siltstone, and sandstone. When the area was strip mined, the overburden of soil material and till was excavated and piled in mounds. The soil material was buried deeply beneath gray, limy glacial till. This mantle of till has been graded to slopes of 2 to 6 percent.

In some places this land type has been resurfaced by adding a layer of mixed soil material about 1 foot thick. Such resurfaced areas are shown on the soil map by a special symbol. In the resurfaced areas, the root zone is more suitable for plants than the root zone in areas that have not been resurfaced.

This land type is friable and stable, and it has moderate available moisture capacity and moderate permeability. It is limy, however, and contains a few large boulders. Organic matter is lacking, and natural fertility is low. The bearing capacity is fair, the shrink-swell potential is low, and the corrosion potential is moderate.

Limitations to use of this land type are severe. Erosion is a hazard. (Capability unit VIs-1; woodland suitability group 9)

Strip mine spoils, loamy till materials, rolling (StC) consists of spoil material that mostly has slopes of 6 to 12 percent, though a few moderately steep areas are included. In many places this land type is bordered on the uphill side by areas of gently sloping spoil and on the lower side, by areas of undisturbed soils.

Limitations to use of this land type are very severe. Erosion is a hazard. (Capability unit VIs-1; woodland suitability group 9)

Strip mine spoils, loamy till materials, steep (StF) consists of areas of ungraded spoil material, mostly in very steep areas and on escarpments that are adjacent to areas of graded spoil material. It occurs mainly on the outermost edges of areas of recently excavated spoil and in older areas that were excavated before laws were passed that required grading of these areas. This land type is bordered on the downhill side by areas of undisturbed soils. Commonly, large rocks are on the surface.

This land type has very severe limitations to use. Runoff is rapid, and erosion is a hazard. (Capability unit VIIs-1; woodland suitability group 9)

Strip mine spoils, clayey till materials, undulating (SuB) consists mainly of silty clay till, but it contains a fairly large amount of loam till and some material from shale, siltstone, and sandstone. It resulted when the upper layer of soil material and the clayey till were excavated and were deposited over loam till and bedrock material excavated from a previous cut during strip mining. The till has been graded to slopes of 2 to 6 percent in most places. A few areas where slopes are 6 to 12 percent, however, were included in mapping. In many places this land type is adjacent to steep areas of spoil material. The outer borders are generally adjacent to areas of spoil material that has a high content of shale and sandstone.

Organic matter is lacking, and natural fertility is low. The available moisture capacity is moderate, and permeability is very slow. This land type contains few boulders, but it is limy, dense, and cloddy. It is in poor tilth, and when exposed to rain, the surface layer seals over and a crust forms that restricts the emergence and growth of seedlings. The bearing capacity is high, and stability is reasonably good. The shrink-swell potential and the corrosion potential are high.

This land type has very severe limitations to use. Runoff is rapid, and erosion and gullying are hazards. (Capability unit VIs-1; woodland suitability group 9)

Trumbull Series

Light-colored, poorly drained soils that are nearly level or gently sloping are in the Trumbull series. These soils have formed in loamy glacial till that is low in content of calcareous material and is of Wisconsin age. They are mostly in the northwestern and western parts of the county.

In a typical profile of a Trumbull soil in a wooded area, the surface layer is very dark grayish-brown silt loam about 8 inches thick. This layer is mostly light brownish gray but is very dark grayish brown in the uppermost 2 inches. The subsoil is brownish and grayish silty clay loam that contains gray and brown mottles in most places and has gray coatings on many of the peds. The substratum of olive-brown silty clay loam is at a depth of about 38 inches.

Permeability is very slow, both in the subsoil and in the substratum. The mottlings and coatings throughout most of the profile indicate that these soils are naturally wet. The water table is high during wet periods, and water drains slowly, even where artificial drainage is provided. In areas that are drained, the root zone for most annual crops is moderately deep. Within the root zone, the available moisture capacity is medium to high.

In Mahoning County areas of Trumbull soils, except those in nonfarm uses, are used as woodland, for pasture, or for growing field crops, mainly corn, hay, and wheat. More than one-third of the acreage is in trees, less than one-third is in field crops, and the rest is in pasture.

Typical profile of Trumbull silt loam, 0 to 2 percent slopes, in a woodlot in Jackson Township near the intersection of Lipkey and New Roads (T. 2 N., R. 4 W.):

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable when moist; many roots; 8 percent of horizon is pebbles; strongly acid; abrupt, wavy boundary.

A2g—2 to 8 inches, light brownish-gray (10YR 6/2) silt loam; many, coarse, dark yellowish-brown (10YR 4/4) mottles; weak, medium and fine, granular structure; friable when moist; many roots; 8 percent of horizon is pebbles; strongly acid; abrupt, smooth boundary.

B1tg—8 to 11 inches, mottled gray (10YR 6/1) and yellowish-brown (10YR 5/4) light silty clay loam; moderate, fine, subangular blocky structure; friable when moist, nonsticky when wet; many roots; many fine pores; 8 percent of horizon is pebbles; strongly acid; clear, smooth boundary.

B21tg—11 to 26 inches, yellowish-brown (10YR 5/6 to 5/4) silty clay loam; many, medium, gray (10YR 5/1) mottles; strong, medium and fine, angular blocky structure; when moist, friable in upper part of horizon and firm in lower part, slightly sticky grading to sticky when wet; common roots; continuous, thick, gray (10YR 5/1) clay films on ped surfaces; many coarse to fine pores; 4 percent of horizon is pebbles; medium acid; abrupt, wavy boundary.

B22tg—26 to 38 inches, olive-brown (2.5Y 4/4) heavy silty clay loam; many, medium, gray (N 5/0) mottles; strong, coarse, angular blocky structure; firm when moist, sticky when wet; few roots on ped surfaces; continuous, thick, gray (N 5/0) clay films on ped surfaces and on pore fillings; few, fine, black (N 2/0) stains of manganese on ped surfaces; many fine and medium pores; 4 percent of horizon is pebbles; slightly acid grading to neutral in lower part of horizon; gradual boundary.

C—38 to 50 inches, olive-brown (2.5Y 4/4) heavy silty clay loam; massive; 4 percent of horizon is pebbles; firm; mildly alkaline.

The A1 horizon in areas that have not been disturbed ranges from one-half inch to 3 inches in thickness. The A2 horizon is 4 to 10 inches thick, and color of the matrix of the A2 horizon ranges from light gray (N 6/0) and light brownish gray (10YR 6/2) to dark grayish brown (2.5Y 4/2). Color of the mottles in the A2 horizon ranges from yellowish brown (10YR 5/4) or dark yellowish brown (10YR 4/4) to dark reddish brown (5YR 3/4). In areas that are cultivated, color of the Ap horizon ranges from very dark grayish brown (10YR 3/2) to dark gray (N 4/0). In the B2 horizons, color of the matrix ranges from olive brown (2.5Y 4/4) to strong brown (7.5YR 5/6), with grayish mottles, or from light gray (N 6/0) to dark grayish brown (2.5Y 4/2), with brownish mottles. The content of clay in the B and C horizons ranges from 35 to 55 percent. Reaction of the B1tg horizon is very strongly acid or strongly acid, but reaction ranges from medium acid to neutral in the lower B horizons. Depth to calcareous material ranges from 30 to 60 inches. The content of carbonates, where the C horizon is calcareous, is equivalent to about 7 percent calcium carbonate. The solum is 35 to 50 inches thick. Glacial pebbles comprise about 3 percent or more of the profile, by volume, in most places.

Trumbull soils are in the same topographic sequence as the lower lying, very poorly drained Lorain soils and the higher lying, somewhat poorly drained Mahoning and moderately well drained Ellsworth soils. The Trumbull soils are more grayish and more mottled than the other soils in this sequence. Also, they are lighter colored than the Lorain soils.

Trumbull silt loam, 0 to 2 percent slopes (TrA).—This soil commonly occupies depressions of irregular shape surrounded by slightly higher lying Mahoning soils. Size of the areas is variable. The profile is the one described as typical for the series. Included in mapping in some places were areas of dark-colored Lorain soils, generally at the lowest elevation in the area.

Wetness is a very severe limitation to use of this Trumbull soil for crops. (Capability unit IVw-1; woodland suitability group 5)

Trumbull silt loam, 2 to 6 percent slopes (TrB).—This soil is in small areas that have an irregular oval shape and that range from 3 to 10 acres in size. It is on the lower slopes of rises on gently rolling till plains.

Wetness is a very severe limitation to use of this soil for crops. Erosion is also a hazard because of the rapid runoff. (Capability unit IVw-1; woodland suitability group 5)

Trumbull-Urban land complex (Tu).—In most of this complex, the soils have been disturbed in varying degrees by nonfarm construction and development. Most of the disturbance has resulted from grading and digging operations. Where the soils have not been disturbed, the profile is similar to the one described as typical for the Trumbull series. Most of the complex consists of fill areas, because during grading operations this rather low lying soil is covered by material transported from higher adjacent areas. Included, however, were undisturbed areas of Trumbull soils in undeveloped lots, on the back parts of developed lots, and in small patches of woodland.

Where these soils are used as fill, the soil material covers an undisturbed Trumbull soil to a depth of 1 to 3 feet. The fill material is variable in characteristics. Formerly, most of it was part of the subsoil or the substratum of a higher lying Mahoning or Ellsworth soil.

The present surface layer of the soils in this complex generally has a low content of organic matter. It tends to seal over, especially after rains, and as a result, the emergence of seedlings is restricted. The soils are in poor tilth and can be satisfactorily tilled only within a narrow range of moisture content.

Wetness is a very severe limitation to use of these soils. This limitation is primarily the result of the natural wetness of the underlying undisturbed Trumbull soils, but it also results where adequate surface drainage was not provided when the areas were graded. Erosion is also a hazard, especially when the surface is bare during construction periods and after construction is finished. Also, gullying and sedimentation occur during those periods. Soil material washed away as a result of gullying and sheet erosion in scalped or filled areas is the source of sedimentation. Addition of a large amount of organic matter or topsoil is necessary to make these areas suitable for landscaping. (Not placed in a capability unit or woodland suitability group)

Wadsworth Series

The Wadsworth series consists of light-colored, somewhat poorly drained soils that are nearly level or gently sloping. These soils are on uplands, where they have formed in loamy glacial till that has a low content of lime. The till is of Wisconsin age.

In a typical profile of a Wadsworth soil in a wooded area, the surface layer is very dark brown and grayish-brown silt loam about 10 inches thick. The subsoil is mostly brownish clay loam. It contains contrasting grayish and brownish mottles and has grayish coatings on the surfaces of many of the peds. A substratum of dark grayish-brown coarse clay loam is at a depth of about 41 inches.

Wadsworth soils generally have a firm, dense layer, or fragipan, in about the center one-third of the subsoil, and this fragipan limits the penetration of roots and the movement of water. The mottling and grayish coatings throughout much of the profile indicate that these soils are naturally wet. These soils have a seasonal high water table. Mostly, they have a moderately deep to shallow root zone and medium to low available moisture capacity as a result of the firm layer in the subsoil.

Wadsworth soils are moderately well suited to crops, and about two-thirds of the acreage is in field crops. The rest of the acreage is about equally divided between pasture and use as woodland. Corn, wheat, and hay are the commonly grown crops.

Typical profile of Wadsworth silt loam, 2 to 6 percent slopes, in a woodlot in Goshen Township (sec. 2, T. 17 N., R. 4 W.; laboratory No. MH-35):

A1—0 to 2 inches, very dark brown (10YR 2/2) silt loam; weak, very fine, granular structure; friable when moist; many roots; very strongly acid; abrupt, wavy boundary.

A2—2 to 10 inches, grayish-brown (10YR 5/2) silt loam; many, medium, dark yellowish-brown (10YR 4/4) mottles; weak, very thick, platy structure breaking to moderate, fine, subangular blocky structure; friable when moist; many roots; 8 percent of horizon is pebbles; very strongly acid; abrupt, wavy boundary.

B1tg—10 to 16 inches, yellowish-brown (10YR 5/4) silt loam; many, medium, grayish-brown (10YR 5/2) mottles; moderate, medium, subangular blocky structure; friable when moist; common roots; many, moderately thick, degraded, grayish-brown (10YR 5/2) clay films on ped surfaces; many fine pores; 10 percent of horizon is pebbles; strongly acid; clear, wavy boundary.

Bx1g—16 to 24 inches, strong-brown (7.5YR 5/6) clay loam; many, medium, grayish-brown (2.5Y 5/2) mottles; weak fragipan, with weak, coarse, prismatic structure breaking to weak, coarse, angular blocky structure; firm when moist, slightly sticky when wet; common roots; continuous, thick, grayish-brown (2.5Y 5/2) clay films on ped surfaces; common, fine, black (N 2/0) stains of manganese; common medium and fine pores; 15 percent of horizon is pebbles; strongly acid; abrupt, wavy to irregular boundary.

Bx2g—24 to 35 inches, dark yellowish-brown (10YR 4/4) clay loam; many, medium, grayish-brown (10YR 5/2) mottles; strong fragipan, with weak, coarse, prismatic structure breaking to weak, fine and medium, angular blocky structure; firm when moist; few roots on ped surfaces; continuous, thick to thin, grayish-brown (10YR 5/2) clay films on ped surfaces; common, medium, black (N 2/0) stains of manganese; few medium pores; 10 percent of horizon is pebbles; neutral; clear, wavy boundary.

B3—35 to 41 inches, dark grayish-brown (10YR 4/2) coarse clay loam; weak, medium, platy structure; friable when moist; few, thick, gray (10YR 5/1) clay films; few fine pores; 10 percent of horizon is pebbles; neutral; gradual boundary.

C—41 to 60 inches, dark grayish-brown (10YR 4/2) coarse clay loam, with pockets about 2 inches in diameter, possibly krotovinas, that contain many gray (10YR 5/1) mottles; friable when moist; 15 percent of horizon is pebbles; mildly alkaline; common, soft, whitish, limy concretions that effervesce violently when dilute hydrochloric acid is added.

In areas that have not been disturbed, the A2 horizon ranges from light olive brown (2.5Y 5/4) to brown (10YR 5/3) or grayish brown (10YR 5/2) in color. The Ap horizon in cultivated areas ranges from very dark grayish brown (10YR 3/2) to brown (10YR 5/3). The B1tg horizon ranges from 1 to 6 inches in thickness and from brown (10YR 5/3) to yellowish brown (10YR 5/4) in color. Color of the matrix of the Bx horizons is generally strong brown (7.5YR 5/6) to dark grayish brown (10YR 4/2), but it is grayish brown (2.5Y 5/2) to dark gray (10YR 4/1) in some places and is mottled with brownish colors. The content of clay in the Bx horizons ranges from 30 to 35 percent. Depth to the fragipan ranges from 14 to 28 inches, and thickness of the fragipan ranges from 12 to 25 inches. The fragipan has a brownish color, contains grayish mottles and clay films, and has a texture of clay loam. Texture of the C horizon ranges from coarse clay loam to heavy loam. Reaction in the upper B horizons is strongly acid or very strongly acid, but it is slightly acid to neutral in the lower B horizons. Depth to neutral or calcareous material ranges from 22 to 50 inches. The solum is 40 to 60 inches thick, and about 9 percent of it, by volume, is glacial pebbles.

Wadsworth soils are in the same topographic sequence as the higher lying, moderately well drained Rittman soils and the lower lying, poorly drained Frenchtown and very poorly drained Marengo soils. They are more grayish and more mottled than the Rittman soils and are less grayish and less mottled than the Frenchtown soils. Wadsworth soils are lighter colored than the Marengo soils. They are similar to the Ravenna soils but are more clayey than those soils.

Wadsworth silt loam, 0 to 2 percent slopes (WaA).—This soil generally occupies rises on undulating till plains. Many of the areas are nearly oval and contain 5 to 10 acres. Included in most of the areas during mapping were areas of lower lying Frenchtown soils.

Runoff is slow, and water tends to pond on the surface in places. Wetness is a severe limitation to use of this soil for crops. (Capability unit IIIw-7; woodland suitability group 7)

Wadsworth silt loam, 2 to 6 percent slopes (WaB).—This soil has the profile described as typical for the series. It is mostly on broad side slopes of rises on the glacial till plain. Many areas have a nearly circular or crescent shape and contain 5 to 50 acres. In most places areas of lower lying Frenchtown soils in drainageways were included in mapping.

Wetness is a severe limitation to use of this Wadsworth soil for crops. Erosion is also a hazard because of the gentle slopes. (Capability unit IIIw-7; woodland suitability group 7)

Wadsworth-Urban land complex (WbB).—The soils in most areas of this complex have been disturbed in varying degrees by nonfarm construction and development. Most of the disturbance has resulted from grading and digging operations. Where the soils have not been disturbed, they have a profile similar to the one described as typical for the Wadsworth series. Most of the complex consists of fill or of borrow areas, but undisturbed areas of typical Wadsworth soils in undeveloped lots, on the back parts of developed lots, and in small patches of woodland were included.

Where these soils are used as fill, the soil material covers an undisturbed Wadsworth soil to a depth of 1 to 3 feet. The fill material is variable in characteristics and formerly was part of the subsoil or substratum of a Rittman soil or of other adjacent, higher lying soils. Borrow areas are places from which the subsoil and the substratum of Wadsworth soils have been removed. Both in fill and in borrow areas, the exposed soil material varies considerably in texture and reaction within short horizontal distances.

The present surface layer of the soils in this complex generally has a low content of organic matter. It tends to seal over, especially after rains, and as a result, the emergence of seedlings is restricted. The soils are in poor tilth and can be satisfactorily tilled only within a narrow range of moisture content.

Wetness is a severe limitation to use of these soils. Natural wetness is increased where provision is not made for adequate drainage when areas of these soils are developed and graded for nonfarm uses. Erosion is also a hazard. Gullying and sheet erosion occur, especially when the surface of scalped or filled areas is left bare during and after construction. The steep outer slopes of filled areas are particularly susceptible to erosion. Soil material washed away when gullying or sheet erosion occurs causes sedimentation. Addition of a large amount of organic matter or topsoil is necessary to make the areas suitable for landscaping. (Not placed in a capability unit or woodland suitability group)

Wayland Series

The Wayland series consists of deep, light-colored, poorly drained soils that are nearly level and are on flood plains. These soils have formed in medium-textured alluvium that is medium acid in reaction. The alluvium was washed from areas of acid soils that formed in Wisconsin age glacial till that has a low content of organic matter.

In a typical profile of a Wayland soil in a wooded area, the surface layer is very dark grayish-brown silt loam about 3 inches thick. The subsurface layer is gray silt loam about 2 inches thick. The subsoil of light brownish-gray silt loam is underlain by a substratum of grayish and brownish silt loam at a depth of about 17 inches. The subsoil and the substratum contain contrasting grayish or yellowish-brown to reddish-brown mottles. Normally, bedrock is at a depth of more than 8 feet.

Permeability is moderately slow, and the available moisture capacity is high. Both the grayish colors and the mottling in the subsoil and the substratum indicate that these soils are naturally wet. The water table is high during winter and spring, and flooding is a hazard unless these soils are protected.

The Wayland soils in Mahoning County are mostly in trees and pasture. A small acreage, where these soils are adjacent to soils more suitable for crops, has been drained and is farmed.

Typical profile of Wayland silt loam in a woodlot in Beaver Township (sec. 16, T. 13 N., R. 2 W.):

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; many, coarse, gray (10YR 6/1) and dark reddish-brown (5YR 3/4) mottles; moderate, fine, granular structure; friable when moist; many roots; medium acid; abrupt, smooth boundary.

A2g—3 to 5 inches, gray (10YR 5/1) silt loam; many, fine, dark reddish-brown (5YR 3/4) mottles; weak, medium, granular structure; friable when moist; many roots; medium acid; abrupt, smooth boundary.

B2g—5 to 17 inches, light brownish-gray (10YR 6/2) silt loam; about 35 percent of horizon is medium, yellowish-brown (10YR 5/6) mottles; very weak, fine, subangular blocky structure; friable when moist; common roots; medium acid; abrupt, wavy boundary.

C1g—17 to 30 inches, dark yellowish-brown (10YR 4/4) silt loam; many, coarse, gray (10YR 6/1) and common, medium, dark reddish-brown (5YR 3/4) mottles; massive; friable when moist; few roots; weak cementation around very porous ferromanganese concretions; slightly acid; gradual boundary.

C2g—30 to 43 inches, mottled dark-brown (7.5YR 4/4) and gray (10YR 5/1) silt loam; massive; friable when moist; no roots; neutral.

The A1 horizon ranges from 1 to 4 inches in thickness. Thickness of the A2g horizon, or of an Ap horizon in cultivated areas, ranges from 2 to 8 inches. Color of the matrix of that horizon ranges from dark grayish brown (10YR 4/2) to dark gray (10YR 4/1) or gray (10YR 5/1), with brown (10YR 4/3) to dark reddish-brown (5YR 3/4) mottles. Texture of the Cg horizons ranges from loam to silty clay loam. Color of the matrix of the C1g horizon ranges from light brownish gray (10YR 6/2) and dark yellowish brown (10YR 4/4) to gray (N 5/0). Color of the mottles in that horizon ranges from yellowish brown (10YR 5/6) to dark reddish brown (5YR 3/4). Color of the matrix in the C2g horizon ranges from dark brown (10YR 3/3 or 7.5YR 4/4) to dark reddish brown (5YR 3/3). Color of the mottles in the C2g horizon ranges from light gray (N 6/0) to dark gray (10YR 4/1). Reaction of the A and B horizons ranges from medium acid to strongly acid. Reaction of the C horizons ranges from slightly acid to neutral.

Wayland soils are adjacent to Lobdell, Orrville, Chagrin, and other soils of flood plains. They have a greater dominance of grayish colors than the Lobdell, Orrville, and Chagrin soils.

Wayland silt loam (0 to 2 percent slopes) (Wc).—This is the only Wayland soil mapped in Mahoning County. It mostly occupies long, narrow areas on flood plains along streams that have a nearly level streambed. Many of the areas were lakebeds and swamps during the glacial period. Size of the areas is generally 5 to 50 acres. Included with this soil in mapping were some areas in which the surface layer is silty clay loam.

This Wayland soil has a low content of organic matter. Wetness is a severe limitation to its use for crops, even though artificial drainage is provided. Flooding is also a hazard in areas that are not protected. (Capability unit IIIw-3; woodland suitability group 6)

Wooster Series

Light-colored, well-drained soils that are gently sloping to steep are in the Wooster series. These soils are on rolling till plains, where they have formed in loamy glacial till of Wisconsin age.

In a typical profile of a cultivated Wooster soil, the plow layer is dark grayish-brown silt loam about 9 inches thick. The subsurface layer, about 2 inches thick, is yellowish-brown silt loam. The subsoil consists of dark yellowish-brown and dark-brown loam that extends to a depth of about 56 inches. The subsoil is underlain by a loamy substratum that has a brownish color and is massive and friable.

Part of the subsoil is firm and brittle, and that part restricts the movement of water and the development of roots. Nevertheless, the root zone is deep. Within the root zone, the available moisture capacity is high.

Typical profile of Wooster silt loam, 2 to 6 percent slopes, in a cultivated field in Coitsville Township, near the intersection of New Castle and Hubbard Roads (T. 1 N., R. 1 W.):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; moderate to weak, fine, granular structure; friable when moist; many roots; 15 percent of horizon is pebbles; neutral (field limed); abrupt, smooth boundary.

A2—9 to 11 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium, granular structure; friable when moist; many roots; 15 percent of horizon is pebbles; neutral; abrupt, wavy to irregular boundary.

B1t—11 to 17 inches, dark yellowish-brown (10YR 4/4) loam; moderate, medium and fine, angular and subangular blocky structure; friable when moist, slightly sticky when wet; many roots; thin, continuous, dark-brown (7.5YR 4/4) and brown (10YR 5/3), degraded clay films on ped surfaces; many fine and medium pores; 15 percent of horizon is pebbles; neutral; gradual, smooth boundary.

B2t—17 to 23 inches, dark yellowish-brown (10YR 4/4) loam; moderate, medium and fine, angular blocky structure; friable when moist, sticky when wet; common roots; continuous, thin, dark-brown (7.5YR 4/4) clay films on ped surfaces; many fine and medium pores; 15 percent of horizon is pebbles; strongly acid; abrupt, wavy boundary.

Bx—23 to 36 inches, dark-brown (10YR 4/3) loam; weak fragipan, with weak, coarse, prismatic structure breaking to weak, medium, angular blocky structure; firm when moist, slightly sticky when wet; few roots; continuous, thin, dark reddish-brown (5YR 3/4), degraded clay films on ped surfaces and in pores; few, fine, black (N 2/0) stains of manganese; few fine pores; 20 percent of horizon is pebbles; very strongly acid; gradual, smooth boundary.

B3—36 to 56 inches, dark-brown (10YR 4/3) loam; weak, medium, angular blocky structure; friable when moist; many, thin, brown (10YR 5/3) silt and clay films on vertical surfaces of peds, and continuous dark yellowish-brown (10YR 4/4) clay films on horizontal surfaces; many fine to coarse pores; 20 percent of horizon is pebbles; very strongly acid; gradual boundary.

C—56 to 108 inches, dark-brown (10YR 4/3) loam grading to dark yellowish brown (10YR 3/4) with depth; weak angular blocky structure in upper part of horizon grading to massive with depth; friable when moist; common fine to medium pores; 20 percent of horizon is pebbles; strongly acid grading to mildly alkaline at a depth of about 95 inches.

In areas that have not been cultivated, the A1 horizon is dark colored and is 1 to 2 inches thick; color of the A2 horizon ranges from brown (10YR 5/3) to yellowish brown (10YR 5/4). In cultivated areas color of the Ap horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 5/3). In the B horizons, the color of the matrix ranges from yellowish brown (10YR 5/4) to dark brown (7.5YR 4/3). In places the profile contains some mottles; mottles at a depth of less than 30 inches are brownish and reddish but are not grayish. Depth from the surface to the top of the fragipan ranges from 20 to 30 inches, and the fragipan is 10 to 36 inches thick. A fragipan is in the subsoil of all the Wooster soils, but it is only weakly defined in most places and has weak blocky structure. The content of clay in the B2t and Bx horizons ranges from 21 to 27 percent. Reaction of the B horizons is very strongly acid to medium acid. The solum is 40 to 65 inches thick, and about 13 percent of it, by volume, is glacial pebbles. Depth to neutral or calcareous material ranges from 44 to 100 inches.

Wooster soils are in the same topographic sequence as the lower lying, moderately well drained Canfield, somewhat poorly drained Ravenna, poorly drained Frenchtown, and very poorly drained Marengo soils. They are more brownish and less grayish than these soils, and they are lighter colored than the Marengo soils.

Wooster loam, 25 to 50 percent slopes, moderately eroded (WrF2).—This soil has a profile similar to the one described as typical for the series. It has lost part of its original surface layer through erosion, however, and the present surface layer is a mixture of the remaining original surface soil and of material from the upper part of the subsoil. Also, the texture of the surface layer is loam, and the surface layer and the subsoil are thinner than those in the profile described.

This soil is on the sides of valleys in the rolling till plains, adjacent to Chili or Wayland soils in many places. The areas are generally long and narrow. Size of the areas is mostly 10 to 40 acres. Included with this soil in mapping were a few areas that are severely eroded.

This Wooster soil is mainly in trees or pasture. Runoff is very rapid, and further erosion is a very severe hazard unless a protective cover of plants is maintained. (Capability unit VIe-2; woodland suitability group 1)

Wooster silt loam, 2 to 6 percent slopes (WsB).—This soil has the profile described as typical for the series. It is on broad side slopes and ridgetops and has long, nearly uniform slopes in places. Size of the areas is mostly 5 to 25 acres. Included with this soil in mapping were some areas in which the surface layer is loam and other areas that are moderately eroded.

Where this soil is cultivated, its content of organic matter is medium. Runoff is moderate to rapid, especially when the surface is not protected by a cover of plants. Erosion is a moderate hazard if this soil is cultivated. (Capability unit IIe-1; woodland suitability group 1)

Wooster silt loam, 6 to 12 percent slopes, moderately eroded (WsC2).—This soil is on rather broad side slopes in areas that typically contain 5 to 25 acres. In some places it has long, uniform slopes. The profile is similar to the one described as typical for the series, except that part of the original surface layer has been lost through erosion. The present surface layer is a mixture of the remaining original surface soil and of material from the upper part of the subsoil. Included with this soil in mapping were a few areas that are mostly only slightly eroded.

The content of moisture within which this Wooster soil can be satisfactorily tilled is narrower than for a similar, but uneroded, Wooster soil. Runoff is rapid, especially when the surface is not protected by a cover of plants. Further erosion is a severe hazard if this soil is cultivated. (Capability unit IIIe-1; woodland suitability group 1)

Wooster silt loam, 12 to 18 percent slopes, moderately eroded (WsD2).—This soil is on rolling hills of the till plain. Areas are commonly nearly circular, but they are U-shaped where they extend around the upper end of a drainageway. Typically, they contain 5 to 25 acres. Because of erosion, the present surface layer is a mixture of material from the original surface layer and from the upper part of the subsoil. The overall thickness of the surface layer and the subsoil is less than that of an uneroded Wooster soil. Except for erosion and this difference in thickness of the surface layer and the subsoil, the profile is similar to the one described as typical for the series.

Further erosion is a very severe hazard if this soil is used for cultivated crops. (Capability unit IVe-1; woodland suitability group 1)

Wooster silt loam, 18 to 25 percent slopes, moderately eroded (WsE2).—This soil is on hillsides in rolling areas of the till plain, and it is adjacent to Chili or Wayland soils in places. The areas are commonly nearly circular, but they are U-shaped where they extend around the upper end of a drainageway. Typically, they contain 10 to 25 acres. Erosion has removed part of the original surface layer. As a result, the present surface layer is a mixture of material from the original surface layer and from the upper part of the subsoil. The overall thickness of the surface layer and the subsoil is less than that of an uneroded Wooster soil. Except for erosion and this difference in thickness of the surface layer and the subsoil, the profile is similar to the one described as typical for the series.

Commonly, this soil occupies small areas in fields that were farmed uphill and downhill with less steep soils. Further erosion is a very severe hazard unless a protective cover of plants is maintained. (Capability unit VIe-2; woodland suitability group 1)

Formation and Classification of Soils

This section lists the factors and some of the processes of soil formation and discusses the effects these factors have had on the formation of soils in Mahoning County. It also explains the current system of soil classification and places the soil series in higher categories. The soil series in this county and a profile representative of each series are described in the section "Descriptions of the Soils."

Factors of Soil Formation

The five factors of soil formation are climate, plant and animal life, parent material, topography, and time. These five factors interact in the formation of any soil. Climate and plant and animal life are the active factors in soil formation. Their effect on the parent material is influenced by topography and by the length of time the parent material has been in place. Normally, the interaction of all of the factors determines the kind of soil that develops in any given area, but the relative importance of each factor differs from place to place. In some places one factor may be dominant in the formation of a soil and determine most of the soil properties.

Climate

The effects of climate on the development of soils can be observed in several ways in Mahoning County. The county has a temperate, continental climate. Frequent rains foster a leaching process in which the basic mineral material and clay from the upper part of the soil profile are moved to the lower part and silica and coarser particles are left as a residuum. Generally, the eluviated clay is deposited in the subsoil. Some of the most extensive soils in the county, for example the Canfield, Rittman, and Mahoning, were formed by this process. Some of the much less extensive soils, such as those in the Dekalb and Muskingum series, were also formed by this same process, but in those soils any eluvial clay was removed from the entire profile.

Plant and animal life

Except for some minor soils that developed under grasses and sedges in swamps, all of the soils of this county have developed under hardwood forests. The composition of the hardwood forests ranges from beech and maple on the loamy soils in the southeastern part of the county to oak on the clay soils in the northwestern part. Damascus, Chili, and other soils of the same order in the current classification system (see table 9) occur beneath both kinds of forest. Dekalb, Muskingum, and Wayland soils occur where there are some stands of hemlock and black and yellow birch in deep gorges in the eastern part of the county. In those places sandstone bedrock crops out at the surface.

Plants affect the formation of soils by supplying organic matter to the soils. The litter from plants also assists in forming acids that help to weather soil material. The chemical composition of the litter varies according to the kind of plant from which the litter originated. Litter from maple, for example, contains more bases than litter from oak. Litter from hardwoods, in general, contains more bases than litter from softwoods, or conifers.

The roots of living plants also influence the formation of soils. They have the ability to exchange minerals from soil material and rocks, through exchange of the hydrogen cation, for basic plant nutrients in the minerals. Furthermore, some plants feed on silicon, and others feed on iron and aluminum. The translocation of some of these elements from the soil to the plant and then back to the soil surface layer, in the plant litter, affects the development of the soil.

Other organisms, for example bacteria and fungi, contribute to the weathering of a soil. Worms, ants, and burrowing animals transport a significant amount of material from the subsoil to the surface layer, and they transport organic litter into the mineral soil horizons (*9*).

Man also affects the development of soils. When a soil is cleared and is pastured or plowed, the morphology of the surface soil changes. If several inches of soil material is lost through erosion, and if material from the subsoil is plowed into the surface layer, the composition of the surface soil is changed. Lime and fertilizer, applied to the surface soil, increase the reaction, base status, and fertility. Generally, the reaction and base status of the surface layer (Ap horizon) in cultivated soils and in some places in the upper part of the subsoil are higher than those of a soil under forest.

The content of organic matter in a cultivated soil varies according to the amount of crop residue that has been returned to the soil and the amount of manure that has been added. Excessive cultivation causes more organic matter to be oxidized than is generally returned to the soil, and thus, the supply of organic matter can be depleted. In addition, the soil structure deteriorates if a soil is excessively cultivated, and the surface soil becomes hard and cloddy, is easily eroded, and is difficult to manage. A large amount of organic matter applied to such a soil improves the soil structure so that the surface layer becomes friable again. In some well-managed soils, the content of organic matter is greater than that in a soil that has not been cultivated.

Man has drained some wet soils and has thus made them well suited to crops. He has improved infertile sandy soils to the extent that they become well suited to vegetable crops. Some cultivated soils have lost all or nearly all of their original surface layer through erosion, but they have received lime, manure, commercial fertilizer, and organic matter in such large quantities that they are suitable for general farm crops. Muck in bogs has been drained to make it highly productive of crops. If accidentally burned the muck is destroyed. Through all of these processes, man has changed the course of formation of individual soils.

Parent material

The soils of Mahoning County have formed almost entirely in parent material deposited during the Late Wisconsin glaciation. Most of the county is covered by a rather thick deposit of glacial till and by material deposited by melt water from the glaciers. Sand and gravel deposited by streams of melt water is called glacial outwash; clay and silt deposited in lakes and other pools of slack water is called lacustrine material. Some soil material was eroded from the till plain and has been recently deposited on the flood plains of streams as alluvium. Material originating from glaciation consists mostly of local sedimentary rocks and of some Canadian rocks that were transported to this area by the glacial ice.

A few minor areas in the county are not covered by glacial drift, and the soils in those areas have formed in material that weathered from the underlying bedrock. As an example, the Muskingum soils have formed in material that weathered from siltstone and fine-grained sandstone, and the Dekalb soils have formed in material that weathered from coarse-grained sandstone. Differences in parent material are reflected in the texture of the Muskingum and Dekalb soils. In areas where the mantle of glacial till is loamy and is less than 3½ feet thick over sandstone and shale, Loudonville soils have formed. Where the mantle of till is thin and clayey, and where the underlying bedrock is shale, Hornell soils have formed.

Three kinds of glacial till, ranging from loamy to clayey in texture, were deposited during three substages of the Late Wisconsin glacial period (*20*). The loam till, called Kent till, was deposited earliest and is exposed in the southeastern third of the county. This layer of till is generally about 20 feet thick. It is the parent material of the Wooster, Canfield, Ravenna, and Frenchtown soils. A clay loam till, called Lavery till, was deposited over the Kent till in a layer generally only 4 to 7 feet thick. This till is exposed in a belt, 2 to 5 miles wide, that extends from Coitsville southwestward to Sebring. Rittman, Wadsworth, and Frenchtown soils have formed in Lavery till. The youngest till, the Hiram, has a texture of silty clay loam to clay. It was deposited in a layer 4 to 7 feet thick over the Lavery till in the northwestern third of the county. Ellsworth, Mahoning, and Trumbull soils have formed in the silty clay loam Hiram till, and Geeburg, Remsen, and Trumbull soils have formed in the clay or silty clay Hiram till.

Glacial outwash occurs throughout the county, along channels where glacial melt water formerly flowed. Conotton soils have formed where the outwash has a coarse texture, and Chili, Jimtown, Damascus, and Olmsted soils have formed where the uppermost 2 to 4 feet of outwash is medium textured.

Lacustrine material, deposited in slack water and in lakes, is mostly in small areas but is widespread throughout the county. Glenford, Fitchville, Sebring, and Luray soils have formed where the lacustrine material has a medium or moderately fine texture. Canadice and Lorain soils have formed where it has a fine texture.

Recent alluvium that is generally medium textured is deposited on the flood plains of modern streams throughout the county. Chagrin, Lobdell, Orrville, Wayland, and Papakating soils have formed in this recent alluvium.

Muck occupies a few areas in the county. It occurs in swamps where organic matter has accumulated. Carlisle soils have formed where the muck contains no layers of alluvial mineral soil material. Kerston soils have formed where the muck contains layers of mineral soil material.

Topography

Topography influences the development of soils through its effect on runoff, erosion, ponding, depth of water table, internal drainage, accumulation and removal of organic matter, and other phenomena. Nearly level and depressional soils are frequently wet because of a fluctuating water table and seepage from surrounding soils. The base status of poorly drained soils tends to be higher than that of well-drained soils because bases accumulate in poorly drained soils.

Soils having complex, gentle slopes generally show the greatest degree of horizon development because the soil is neither waterlogged nor droughty. Among these soils in Mahoning County are ones in the Wooster, Canfield, Glenford, Chili, Rittman, and Ravenna series. Steep soils of the Dekalb, Muskingum, and similar series tend to be shallow because the interrelationship between topography and parent material results in soil losses that nearly keep pace with soil development. Relief, by affecting microclimate, greatly influences the plant and animal life on and in the soil.

Time

The development of a soil profile varies according to the amount of time that chemical weathering has acted on the rock and unconsolidated material. The longer the period of time that chemical weathering has taken place, the greater the effect of the weathering and the more highly developed is the soil profile, depending on the characteristics of the parent material. Alluvial material on flood plains has not been in place long enough for well-defined horizons to have developed in the soil profile. The most obvious feature of these soils is the accumulation of organic matter in the surface layer. Soils formed in recent alluvium are the Chagrin, Lobdell, Orrville, Wayland, and Papakating.

In contrast to the soils formed in alluvium, soils that formed from glacial till are about 15,000 years old. This is enough time for these soils to have a well-developed profile. The various kinds of glacial till were deposited, with relatively little time lag between the periods of deposition. All the soils that formed from till, except the dark-colored ones, are mineral soils that contain horizons of clay accumulation and have a base saturation of more than 35 percent. The dark-colored soils are also mineral soils, but they have a thick, dark-colored surface layer and a base saturation of more than 50 percent.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus, in classification soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and applied in managing farms, fields, and woodlands; in developing rural areas; in performing engineering work; and in many other ways. They 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 (*16*) and later revised (*15*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. The current system is under continual study. Therefore, readers interested in developments of this sytem should search the latest literature (*13*), (*18*). In table 9 the soil series of Mahoning County are placed in the categories of the current system and in the great soil groups of the older system.

Some of the soils in this county do not fit in a series that has been recognized in the classification system, but recognition of a separate series would not serve a useful purpose. Such soils are named for the series they strongly resemble because they differ from those series in ways too small to be of consequence in interpreting their usefulness or behavior. Soil scientists designate such soils as taxadjuncts to the series for which they are named. In this survey soils named in the Bennington, Cardington, Chagrin, Condit, Hornell, and Wayland series are taxadjuncts to those series.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. These properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped together. The orders of the current system (as of 1969) are briefly defined in the following paragraphs.

Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic groupings of soils. Three exceptions, the Entisols, Inceptisols, and Histosols, occur in many different climates. Four of the soil orders are represented in Mahoning County. They are Alfisols, Inceptisols, Mollisols, and Histosols.

Alfisols are mineral soils that have horizons of clay accumulation and a base saturation of more than 35 percent.

Inceptisols are mineral soils in which horizons have started to develop, but these soils 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.

The order Histosols has not been completely defined, but in Mahoning County the Carlisle and Kerston mucks are Histosols. Histosols in this county have organic horizons that contain 20 percent or more organic matter and that are 16 inches or more in combined thickness.

TABLE 9.—*Soil series classified according to the current system of classification [1] and the 1938 system with its later revisions*

Soil series	Current classification			1938 classification
	Family	Subgroup	Order	
Bennington [2]	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Bogart	Fine-loamy, mixed, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Canadice	Fine, illitic, mesic	Typic Ochraqualfs	Alfisols	Low-Humic Gley soils.
Canfield	Fine-loamy, mixed, mesic	Aquic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils.
Cardington [2]	Fine, illitic, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Carlisle	Euic, mesic	Typic Medisaprists	Histosols	Organic soils.
Chagrin [2]	Fine-loamy, mixed, mesic	Dystric Fluventic Eutrochrepts.	Inceptisols	Alluvial soils.
Chili	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Condit [2]	Fine, illitic, mesic	Typic Ochraqualfs	Alfisols	Planosols intergrading towards Gray-Brown Podzolic soils.
Conotton	Loamy-skeletal, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Damascus	Fine-loamy, mixed, mesic	Typic Ochraqualfs	Alfisols	Low-Humic Gley soils.
Dekalb	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Ellsworth	Fine, illitic, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Fitchville	Fine-silty, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Frenchtown	Fine-loamy, mixed, mesic	Typic Fragiaqualfs	Alfisols	Low-Humic Gley soils.
Geeburg	Fine, illitic, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Glenford	Fine-silty, mixed, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Hornell [3]	Fine, illitic, acid, mesic	Aeric Haplaquepts	Inceptisols	Gray-Brown Podzolic soils.
Jimtown	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Kerston	Euic, mesic	Fluventic Medisaprists	Histosols	Organic soils.
Lobdell	Fine-loamy, mixed, mesic	Aquic Fluventic Eutrochrepts.	Inceptisols	Alluvial soils.
Lorain	Fine, illitic, mesic	Mollic Ochraqualfs	Alfisols	Humic Gley 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.
Mahoning	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Marengo	Fine-loamy, mixed, noncalcareous, mesic.	Typic Argiaquolls	Mollisols	Humic Gley soils.
Muskingum	Fine-loamy, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Olmsted	Fine-loamy, mixed, mesic	Mollic Ochraqualfs	Alfisols	Humic Gley soils.
Orrville	Fine-loamy, mixed, nonacid, mesic	Aeric Fluventic Haplaquepts.	Inceptisols	Alluvial soils.
Papakating	Fine-silty, mixed, nonacid, mesic	Fluventic Haplaquepts	Inceptisols	Humic Gley soils.
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.
Trumbull	Fine, illitic, mesic	Typic Ochraqualfs	Alfisols	Low-Humic Gley soils.
Wadsworth	Fine-silty, mixed, mesic	Aeric Fragiaqualfs	Alfisols	Gray-Brown Podzolic soils.
Wayland [4]	Fine-silty, mixed, nonacid, mesic	Fluventic Haplaquepts	Inceptisols	Low-Humic Gley soils.
Wooster	Fine-loamy, mixed, mesic	Typic Fragiaqualfs	Alfisols	Gray-Brown Podzolic soils.

[1] Placement of some soil series in the current system of classification (1969), especially in families, may change as more precise information becomes available.
[2] In this county the Bennington, Cardington, Chagrin, and Condit soils are coarser textured than soils of these series in other survey areas.
[3] In this county Hornell soils have a more developed B horizon than Hornell soils in other survey areas.
[4] In this county Wayland soils are more acid than Wayland soils in other survey areas.

Laboratory Data

Table 10 gives the results of laboratory analyses made of selected soils in Mahoning County by the Ohio Agricultural Research and Development Center, Ohio State University. Detailed descriptions of the selected soils, including location of these soils and the sample number, are given in alphabetic order in the section "Descriptions of the Soils."

In addition to the data given in table 10, the results of laboratory analyses for the Canfield, Chili, Dekalb, Frenchtown, Ravenna, and Wooster soils have been published in the soil survey for Columbiana County, Ohio. Unpublished results of mechanical analyses for the Geeburg, Lorain, Mahoning, Remsen, Rittman, Frenchtown, Trumbull, and Marengo series in Mahoning County, and for the Rittman, Canfield, Chili, Luray, Sebring, Wooster, Dekalb, and Muskingum series in Stark County, are on file at the Soils Department, Ohio State University; Ohio Department of Natural Resources, Division of Lands and Soil; or the State Office, Soil Conservation Service, Columbus, Ohio.

Laboratory Methods

Particle-size distribution data were obtained by pipette and sieve analyses as outlined by Steele and Bradfield (*14*), using sodium hexametaphosphate as the dispersing agent and a 10-gram soil sample. The percentage of organic matter was determined by a chromic acid-titration method (*10*). All measurements of pH were made with a glass electrode on a soil-water ratio of 1:1. The calcium carbonate equivalent was determined titrimetrically by the procedure of Hutchinson and MacLennan (*11*). Extractable acidity, which also includes titratable aluminum, was determined by the triethanolamine method (*10*). Exchangeable calcium and magnesium were determined by the EDTA method (*4*). Potassium was determined by flame photometry. The cation-exchange capacities were determined by the summation of exchangeable cations.

Additional Facts About the County

This section provides general information about Mahoning County. It discusses physiography, drainage, water supply, geology, and climate. It also gives facts about farming, recreational facilities, and other subjects of general interest. Figures about crops and numbers of livestock, as well as other facts about farms in the county, are from reports of the U.S. Bureau of the Census.

The first settlement in the area that is now Mahoning County was made in 1797 at Youngstown. The earliest settlers came mostly from Connecticut and Pennsylvania. Later, a large number of immigrants came from the central and southern parts of Europe. Mahoning County was organized in 1846. It was originally part of Trumbull County.

Physiography, Drainage, and Water Supply

Mahoning County is in the glaciated part of the Allegheny Plateau. The southern part is within the western foothills of the Appalachian Mountains. The northeastern part of the county contains some sloping to steep areas, mainly along the Mahoning River. The central and northern parts are mostly a nearly level plateau, where the average elevation is about 1,150 feet. The highest elevation in the county, 1,320 feet, is in Green Township in the southern part of the county. The lowest, 800 feet, is near Lowellville in the northeastern part of the county, where the Mahoning River flows into Pennsylvania.

Drainage throughout most of the county is eastward toward the Mahoning River. Drainage in small areas in the south-central and southeastern parts is southward toward the Middle and North Forks of Little Beaver Creek, which flows into the Ohio River. Because elevations are higher in the southern part than in the rest of the county, Meander Creek and Mill Creek, which have their headwaters in the southern part of the county, flow toward the north. They finally join the Mahoning River, which flows southeastward through Youngstown on its way to the Ohio River. Water drains southward only from a small area in the south-central part of the county near Salem.

Nearly all of the supplies of water for the county are obtained from reservoirs, but Sebring, Beloit, and Lowellville obtain their supplies from wells. Drilled wells are the main source of water for most farms. Manmade lakes in the county are Berlin Reservoir, Meander Creek Reservoir, Milton Reservoir, Pine Lake, Evans Lake, McKelvey Lake, and Lake Hamilton.

Geology

Several kinds of glacial drift cover Mahoning County, but only glacial drift of Wisconsin age is exposed at the surface. Glaciers apparently had crossed the county before the Wisconsin Glaciation, because deposits of Illinoian and of pre-Illinoian drifts are buried beneath the Wisconsin drift in Columbiana County, which is south of Mahoning County. The drifts of Wisconsin age were deposited during three substages of the Grand River Lobe of the Late Wisconsin glacial period. These three substages are discussed under the heading "Parent material" in the section "Formation and Classification of Soils."

The glacial drift is underlain by sedimentary rocks of the Pennsylvania, Allegheny, and Pottsville Formations. These rocks are composed of alternating thick and thin layers of shale, sandstone, limestone, and coal that dip slightly to the south and east. Some of the rocks are an important source of minerals, and all are mined for local use. Some natural gas is produced from the deeper formations.

Climate [6]

The climate of Mahoning County may be classified as continental because the county is in the interior part of the North American continent. Continental climate is characterized by a wide difference between summer and winter temperatures and by a moderate amount of precipitation that falls mainly during the warm parts of the year. The amount of precipitation increases with increases in elevation and roughness of terrain, especially on windward slopes. Because of the effects of elevation and air drainage, temperatures tend to be lower in hilly areas than in more nearly level places. Nights are generally colder and daytime temperatures are slightly higher on valley bottoms than on hilltops.

Because Mahoning County is in the northeastern part of Ohio, its climate is somewhat colder and drier than the climate for the State as a whole. Lake Erie has virtually no moderating effect on the temperature of the air in the county. Data on climate in Mahoning County, shown in tables 11 and 12, are considered to be reasonably representative for the entire county.

The mean annual temperature of Mahoning County is about 2.5 degrees lower than that for the rest of the State. This difference is especially noticeable in summer in that the county has an average of only 11 days per year in which the temperature reaches 90 degrees or higher.

[6] By L. P. Pierce, State climatologist, National Weather Service, Columbus, Ohio.

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TABLE 10.—*Laboratory*

[Analyses made by the Ohio Agricultural Research and Development

Soil and sample number	Horizon	Depth from surface	Particle-size distribution: Very coarse sand (2 to 1 mm.)	Coarse sand (1 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)	Very fine sand (0.10 to 0.05 mm.)	Total sand (2 to 0.05 mm.)
		In.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Bennington silt loam, MH–45.	Ap	0–8	1.8	4.2	5.2	8.3	17.1	26.6
	B1t	8–12	1.2	3.0	3.6	6.3	6.7	20.8
	B21tg	12–18	1.6	3.2	3.6	6.3	6.8	21.5
	B22tg	18–25	.8	1.9	2.6	4.7	4.9	14.9
	B23tg	25–29	.8	2.0	2.6	5.0	5.0	15.4
	B3tg	29–38	1.1	1.9	2.6	5.1	5.2	15.9
	C	38–50	.9	1.9	2.4	5.1	6.6	16.9
Bogart loam, MH–32.	Ap	0–7	2.7	4.1	5.2	11.4	8.5	31.9
	B1	7–14	3.5	5.2	4.6	9.1	6.8	29.2
	B21t	14–19	11.6	12.0	6.2	10.2	7.3	47.3
	B22t	19–26	19.5	21.2	5.9	5.5	3.7	55.8
	B3t	26–29	28.1	13.6	5.7	7.2	5.2	59.8
	B3tg	29–31	14.9	14.2	7.4	8.5	5.2	50.2
	C	31–36	27.6	27.5	7.5	6.3	2.8	71.8
	C	36–44	9.8	18.2	17.0	21.1	6.5	72.6
	C	44–63	10.8	18.9	15.5	17.5	5.3	68.0
Canfield silt loam, MH–26.	A1	0–1	1.5	2.5	4.0	6.2	8.1	22.3
	A2	1–6	2.5	2.7	4.0	7.6	9.0	25.8
	A2	6–11	.9	3.1	4.0	7.2	8.3	23.5
	Bt	11–15	1.5	3.9	4.5	8.1	9.1	27.1
	B2t	15–20	1.7	4.8	6.2	.8	20.8	34.3
	Bx1	20–27	2.1	4.7	6.4	2.4	22.4	38.0
	Bx1	27–35	2.3	4.8	6.0	1.4	21.3	35.8
	Bx1	35–41	1.3	4.4	6.3	2.0	22.3	36.3
	Bx2	41–50	1.7	4.6	6.5	12.6	13.0	38.4
	B3	50–70	2.2	5.0	6.4	1.7	22.6	37.9
	C	70–84	2.1	4.4	6.0	11.5	12.8	36.8
	C	84–124	1.9	5.3	6.2	11.9	13.2	38.3
Ellsworth silt loam, MH–34.	Ap	0–8	2.3	4.1	3.6	5.9	6.3	22.2
	B1t	8–11	1.5	2.5	2.1	3.7	5.3	15.1
	B21t	11–16	.9	1.4	1.6	3.0	5.2	12.1
	B22tg	16–25	.9	1.5	1.5	3.1	5.6	12.6
	B22tg	25–30	.7	1.5	1.6	3.3	5.9	13.0
	B22tg	30–37	.6	.7	1.8	3.4	5.8	12.3
	B3tg	37–45	1.1	1.7	1.7	3.3	5.9	13.7
	C	45–60	----	----	----	----	----	----
Fitchville silt loam, MH–44.	A1	0–2	.5	1.0	1.5	7.5	9.6	20.1
	A2	2–7	.8	1.7	1.6	7.6	9.7	21.4
	B1	7–13	.4	1.2	1.6	9.0	10.7	22.9
	B21tg	13–19	.3	1.0	1.4	10.8	12.4	25.9
	B21tg	19–25	.3	1.1	1.5	11.5	14.4	28.8
	B22tg	25–31	.2	1.0	1.2	11.0	12.2	25.6
	B22tg	31–37	.2	.8	1.1	12.6	17.0	31.7
	C1	37–44	.6	1.2	2.7	21.3	21.1	46.9
	C2	44–52	1.9	4.2	5.5	9.6	11.6	32.8
Frenchtown silt loam, MH–31.	Ap	0–10	.8	2.7	3.1	5.1	4.9	16.6
	B1g	10–15	1.0	3.2	3.0	4.9	4.1	16.2
	B2tg	15–19	1.6	4.5	4.9	6.9	5.1	22.1
	Bx1g	19–30	3.5	11.3	5.2	10.5	6.7	37.2
	Bx1g	30–37	2.4	9.1	4.5	8.5	6.0	30.5
	Bx2g	37–46	2.1	8.5	4.6	11.2	9.6	36.0
	B3g	46–59	1.3	7.4	6.5	13.4	10.0	38.6
	C	59–77	1.2	7.6	5.7	12.6	9.9	37.0
	C	77–92	1.3	6.8	6.8	13.1	9.9	37.9
	C	92–102	1.5	6.5	6.4	11.9	9.8	36.1
	C	102–132	1.9	8.0	5.4	11.7	10.0	37.0
Geeburg silt loam, MH–13.	A1	0–2	1.5	2.9	4.2	4.7	4.6	17.9
	A2	2–6	3.7	3.9	5.2	5.6	4.9	23.2
	B1	6–9	1.8	2.7	3.5	4.0	4.2	16.2
	B21	9–17	.9	1.1	2.3	3.0	3.5	10.8
	B31	17–22	1.2	1.5	2.1	2.8	2.6	10.2
	B32	22–27	.7	1.4	2.1	2.9	2.6	9.7
	B32	27–34	.9	1.6	2.2	2.8	2.7	10.2
	B3	34–54	.8	1.4	1.9	2.5	2.4	9.0
	C	54–61	.3	.8	.9	1.2	.6	3.8

analyses of selected soils

Center. Dashes indicate no determination was made]

Particle-size distribution—Con.			Reaction (1:1)	Organic matter	$CaCO_3$ equivalent	Exchangeable cations (milliequivalents per 100 grams of soil)						Base saturation
Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)	Fine clay (less than 0.0002 mm.)				H [1]	Ca	Mg	K	Sum of exchangeable cations	Total bases	
Pct.	Pct.	Pct.	pH	Pct.	Pct.							Pct.
60.3	13.1	0.5	7.1	2.6	0.0	2.4	12.3	0.6	0.2	15.5	13.1	85
54.9	24.3	5.7	5.4	.6	0	5.7	6.0	.4	.1	12.2	6.5	53
51.5	27.0	7.8	4.5	.5	0	10.0	4.5	.9	.2	15.6	5.6	36
49.6	35.5	10.6	4.4	.4	0	11.2	4.7	2.4	.2	18.5	7.3	39
51.2	33.4	9.1	5.9	0	0	4.7	8.1	5.0	.2	18.0	13.3	74
50.4	33.7	8.0	6.6	0	0	2.9	7.4	4.3	.2	14.8	11.9	80
51.2	31.9	9.5	7.5	0	.4	----	----	----	----	----	----	----
53.9	14.2	1.7	6.0	2.5	0	5.6	4.3	2.2	.2	12.3	6.7	54
56.7	14.1	2.1	5.0	.4	0	4.8	2.2	1.3	.1	8.4	3.6	43
36.8	15.9	3.2	5.0	.2	0	4.7	3.1	2.0	.1	9.9	5.2	53
24.3	19.9	4.3	5.1	.1	0	4.7	4.1	2.4	.2	11.4	6.7	59
28.2	12.0	1.0	5.4	0	0	2.9	3.5	1.8	.2	8.4	5.5	65
30.5	19.3	4.5	5.5	0	0	4.8	5.1	2.2	.2	12.3	7.5	61
18.3	9.9	3.0	5.5	0	0	2.8	3.1	1.5	.1	7.5	4.7	63
17.2	10.2	3.7	5.3	0	0	3.0	3.3	1.6	.2	8.1	5.1	63
18.9	13.1	6.4	5.9	0	0	2.6	5.3	1.8	.2	9.9	7.3	74
63.2	14.5	3.2	4.6	7.2	0	15.5	2.1	.9	.4	18.9	3.4	18
62.4	11.8	1.9	4.5	3.5	0	11.3	.7	.5	.3	12.8	1.5	12
62.4	14.1	2.1	4.7	1.8	0	8.9	1.4	.7	.2	11.2	2.3	21
55.1	17.8	5.4	5.0	.1	0	4.7	2.8	1.3	.2	9.0	4.3	48
46.2	19.5	6.5	5.3	.3	0	6.4	3.2	1.6	.2	11.4	5.0	44
39.8	22.2	8.9	4.7	0	0	7.9	2.4	1.6	.2	12.2	4.2	35
41.6	22.6	7.3	4.5	0	0	8.4	1.7	1.8	.2	12.1	3.7	31
42.0	21.7	6.6	4.5	0	0	7.9	1.8	2.0	.1	11.8	3.9	33
42.6	19.0	5.7	4.7	0	0	6.3	2.5	2.3	.1	11.2	4.9	44
43.8	18.3	5.0	5.7	0	0	2.9	4.6	3.0	.1	10.6	7.7	73
46.6	16.6	4.6	6.3	0	0	2.4	4.5	2.3	.1	9.3	6.9	74
44.8	16.9	4.8	7.5	0	2.5	----	----	----	----	----	----	----
60.1	17.7	4.0	4.6	1.6	0	9.2	2.5	1.2	.1	13.0	3.8	29
56.9	28.0	10.5	4.6	.8	0	10.8	3.2	1.4	.2	15.6	4.8	31
51.9	36.0	15.2	4.4	.5	0	12.6	3.7	2.2	.3	18.8	6.2	33
49.0	38.4	16.1	4.5	.4	0	12.4	4.6	3.3	.3	20.6	8.2	40
49.0	38.0	12.4	5.2	0	0	5.8	7.6	4.7	.2	18.3	12.5	68
49.5	38.2	12.8	6.7	0	0	2.7	8.8	4.9	.2	16.6	13.9	84
50.9	35.4	10.4	7.8	0	4.9	----	----	----	----	----	----	----
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60.0	19.9	2.9	4.4	14.7	0	26.0	4.8	1.4	.5	32.7	6.7	20
61.1	17.5	3.6	4.2	2.0	0	14.6	.3	.1	.2	15.2	.6	4
55.5	21.6	6.4	4.2	.8	0	13.2	.5	.2	.2	14.1	.9	6
52.4	21.7	6.6	4.3	.5	0	12.1	.8	.6	.2	13.7	1.6	12
50.9	20.3	7.2	4.6	.3	0	10.7	1.6	1.6	.1	14.0	3.3	24
53.3	21.1	8.0	5.0	0	0	6.8	4.4	4.5	.2	15.9	9.1	57
48.3	20.0	8.1	5.7	0	0	4.2	5.9	5.1	.2	15.4	11.2	73
36.6	16.5	4.0	5.9	0	0	3.6	4.9	3.8	.1	12.4	8.8	71
49.3	17.9	5.0	6.6	0	0	2.6	5.3	3.4	.1	11.4	8.8	77
64.9	18.5	5.6	5.8	3.5	0	7.9	8.4	.9	.4	17.6	9.7	55
62.1	21.7	5.2	4.6	.8	0	7.3	3.7	.8	.2	12.0	4.7	39
51.6	26.3	10.3	4.3	.5	0	10.6	3.8	1.1	.2	15.7	5.1	32
40.3	22.5	8.6	4.5	.2	0	9.9	2.6	2.2	.2	14.9	5.0	34
52.0	17.5	5.6	4.6	0	0	8.6	2.2	2.2	.2	13.2	4.6	35
45.7	18.3	6.0	4.7	0	0	7.7	2.9	2.4	.2	13.2	5.5	42
45.2	16.2	4.7	5.2	0	0	4.5	4.3	2.8	.1	11.7	7.2	62
46.4	16.6	4.6	6.0	0	0	2.7	5.5	2.7	.1	11.0	8.2	75
46.6	15.5	2.8	6.5	0	0	2.4	5.2	1.4	.3	9.3	6.9	74
48.7	15.2	3.1	7.6	0	.8	----	----	----	----	----	----	----
47.0	16.0	3.9	7.9	0	4.0	----	----	----	----	----	----	----
60.5	21.6	4.2	4.8	9.7	0	19.7	2.5	1.2	.4	23.8	4.1	17
56.0	20.8	3.3	4.8	3.0	0	11.2	1.7	1.1	.3	14.3	3.1	22
49.6	34.2	8.9	5.1	.8	0	10.0	2.5	2.5	.2	15.2	5.2	34
40.0	49.2	18.7	4.9	.6	0	14.0	2.8	4.6	.3	21.7	7.7	36
38.5	51.3	19.2	5.3	.3	0	9.5	3.6	7.9	.3	21.3	11.8	55
39.8	50.5	18.2	6.8	.3	0	3.1	5.4	10.1	.3	18.9	15.8	84
39.6	50.2	17.3	7.5	0	3.0	----	----	----	----	----	----	----
40.5	50.5	14.3	7.9	0	10.4	----	----	----	----	----	----	----
33.6	62.6	12.9	7.5	0	2.1	----	----	----	----	----	----	----

TABLE 10.—*Laboratory*

Soil and sample number	Horizon	Depth from surface	Particle-size distribution: Very coarse sand (2 to 1 mm.)	Coarse sand (1 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)	Very fine sand (0.10 to 0.05 mm.)	Total sand (2 to 0.05 mm.)
		In.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Jimtown silt loam, MH–33.	A1	0–1	1.6	3.7	4.6	9.7	7.1	26.7
	A2	1–9	2.5	5.6	6.1	11.1	6.9	32.2
	B1	9–12	14.3	12.2	7.4	8.9	7.0	49.8
	B21tg	12–14	20.8	15.4	8.5	9.1	5.9	59.7
	B22tg	14–19	21.2	20.9	11.4	9.3	5.2	68.0
	B22tg	19–24	12.2	22.2	13.5	12.1	5.6	65.6
	B23tg	24–30	5.2	13.4	7.0	10.3	6.7	42.6
Lorain silty clay loam, MH–40.	Ap	0–7	.8	.2	.2	.4	1.0	2.6
	A1	7–10	.3	.1	.1	.2	.7	1.4
	B21tg	10–16	.1	.1	.1	.2	1.3	1.8
	B22tg	16–26	.1	.1	.1	.4	2.2	2.9
	B23tg	26–32	.1	.2	.2	.4	2.2	3.1
	B3tg	32–41	.1	.2	.2	.4	2.5	3.4
	C	41–60	.1	.2	.2	.5	2.6	3.6
Mahoning silt loam, MH–30.	Ap	0–8	3.0	4.0	3.5	6.0	6.8	23.3
	B1tg	8–11	1.5	2.5	2.6	5.1	5.3	17.0
	B21tg	11–15	1.4	2.3	2.4	4.9	5.6	16.6
	B21tg	15–19	1.1	2.3	2.5	4.9	5.4	16.2
	B21tg	19–23	1.6	2.6	2.5	4.9	4.8	16.4
	B22tg	23–29	.8	2.0	2.2	5.2	5.4	15.6
	B22tg	29–32	1.5	3.3	3.0	7.3	6.8	21.9
	B3tg	32–43	1.1	1.7	1.9	4.4	4.6	13.7
	B3tg	43–48	1.5	2.7	2.5	5.0	4.8	16.5
	C1g	48–69	1.7	3.5	2.9	----	----	----
Remsen silt loam, MH–39.	A1	0–1	3.2	4.6	6.1	10.1	5.1	29.1
	A2	1–10	2.0	4.6	5.6	9.6	4.7	26.5
	B1t	10–12	1.5	3.5	4.7	7.8	4.0	21.5
	B21tg	12–18	.7	1.2	1.7	3.0	2.0	8.6
	B21tg	18–23	.5	1.1	1.4	2.5	2.1	7.6
	B22tg	23–29	.4	1.0	1.2	2.1	1.9	7.6
	B22tg	29–35	.5	1.1	1.3	2.5	2.3	7.7
	B3tg	35–48	.6	1.2	1.5	2.7	2.5	8.5
	C	48–72	.4	.9	1.1	1.9	1.8	6.1
Sebring silt loam, MH–41.	A1	0–1	1.4	.7	.7	2.2	5.0	10.0
	A2g	1–10	.3	.4	.5	1.8	4.5	7.5
	B1tg	10–16	.1	.2	.2	.8	3.1	4.4
	B21tg	16–24	.3	.9	1.7	4.7	6.7	14.3
	B22tg	24–30	.2	.7	1.0	3.1	5.9	10.9
	B3tg	30–36	.1	.5	.5	1.6	4.7	7.4
	C1g	36–47	.1	.4	.4	.9	4.1	5.9
	C2g	47–59	.1	.4	.5	.9	3.7	5.6
Wadsworth silt loam, MH–35.	A1	0–2	1.1	1.3	1.9	3.9	5.7	13.9
	A2	2–10	.5	1.9	2.2	4.3	6.0	14.9
	B1tg	10–16	.4	1.4	2.1	4.7	6.8	15.4
	Bx1g	16–24	3.7	6.1	7.9	13.9	10.0	41.6
	Bx2g	24–30	1.5	3.4	3.4	6.8	6.2	21.3
	Bx2g	30–35	1.5	3.5	3.7	7.4	7.2	23.3
	B3	35–41	3.2	4.6	5.3	9.8	8.6	31.5
	C1	41–50	3.2	5.0	4.9	9.7	9.4	32.2
	C1	50–56	2.4	4.7	5.0	9.6	10.4	32.1

[1] Extractable acidity.
[2] Trace.

analyses of selected soils (Con.)

Particle-size distribution—Con.			Reaction (1:1)	Organic matter	$CaCO_3$ equivalent	Exchangeable cations (milliequivalents per 100 grams of soil)						Base saturation
Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)	Fine clay (less than 0.0002 mm.)				H [1]	Ca	Mg	K	Sum of exchangeable cations	Total bases	
Pct.	*Pct.*	*Pct.*	*pH*	*Pct.*	*Pct.*							*Pct.*
57.3	16.0	4.4	4.5	10.3	0	23.4	2.2	1.0	.6	27.2	3.8	14
53.5	14.3	2.1	4.2	2.1	0	10.4	(2)	.7	.1	11.2	.8	7
39.6	10.6	.3	5.2	3.5	0	4.0	1.7	1.1	.1	6.9	2.9	42
30.9	9.4	2.2	4.8	.5	0	4.8	1.8	.9	.2	7.7	2.9	38
21.5	10.5	1.8	4.8	.2	0	4.5	1.5	.6	.2	6.8	2.3	34
18.4	16.0	3.4	4.7	0	0	6.0	2.1	1.1	.2	9.4	3.4	36
23.5	33.9	14.0	4.7	0	0	9.2	5.6	2.9	.5	18.2	9.0	49
49.3	48.1	18.6	5.5	9.2	0	19.5	21.7	4.8	.7	46.7	27.2	58
51.3	47.3	25.5	6.0	3.3	0	8.1	24.0	7.7	.4	40.2	32.1	80
60.4	37.8	16.7	6.7	.9	0	2.9	20.0	7.4	.4	30.7	27.8	91
63.0	34.1	13.9	7.2	.8	(2)	2.0	14.7	5.5	.3	22.5	20.5	91
64.3	32.6	12.5	7.3	0	(2)	----	----	----	----	----	----	----
67.0	29.6	10.5	7.5	0	1.0	----	----	----	----	----	----	----
67.7	28.7	8.4	7.6	0	3.6	----	----	----	----	----	----	----
64.3	12.4	1.8	6.4	2.6	0	6.0	7.6	1.3	.2	15.1	9.1	60
58.3	24.7	5.7	4.7	.7	0	9.4	3.6	1.1	.2	14.3	4.9	34
51.3	32.1	14.5	4.5	.4	0	13.4	3.6	2.0	.2	19.2	5.8	30
46.3	37.5	13.8	4.4	0	0	16.0	3.2	3.4	.3	22.9	6.9	30
46.7	36.9	13.0	4.5	0	0	13.6	3.4	4.8	.2	22.0	8.4	38
49.8	34.6	11.2	5.1	0	0	9.9	5.3	7.4	.3	22.9	13.0	57
47.4	30.7	11.6	6.5	0	0	3.8	6.3	8.3	.2	18.6	14.8	80
47.2	39.1	10.9	7.1	0	0	3.6	7.7	8.8	.2	20.3	16.7	82
48.0	35.5	8.8	7.7	0	4.0	----	----	----	----	----	----	----
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52.2	18.7	4.1	4.3	10.6	0	14.6	1.0	.4	.3	16.3	1.7	10
55.8	17.7	3.7	4.2	3.0	0	13.6	.3	.6	.2	14.7	1.1	7
53.8	24.7	4.6	4.4	1.4	0	12.9	.9	1.0	.2	15.0	2.1	14
40.9	50.5	20.4	4.3	1.0	0	18.4	2.4	2.8	.3	23.9	5.5	28
41.8	50.6	19.8	4.4	.6	0	16.5	2.4	4.3	.3	23.5	7.0	30
43.6	48.8	16.5	4.8	0	0	8.5	2.8	7.5	.3	19.1	10.6	55
44.9	47.4	15.3	6.4	0	0	2.8	3.3	9.3	.2	15.6	12.8	82
45.8	45.7	13.5	7.7	0	1.8	----	----	----	----	----	----	----
44.0	49.9	9.5	7.5	0	1.7	----	----	----	----	----	----	----
65.5	24.5	9.8	4.1	18.0	0	31.1	2.5	1.7	.6	35.9	4.8	13
68.7	23.9	7.6	4.5	1.5	0	9.9	2.3	1.5	.2	13,9	4.0	29
61.6	34.0	14.7	4.5	.7	0	11.7	4.0	2.5	.2	18.4	6.7	36
54.6	31.1	14.5	4.5	.6	0	10.5	4.4	3.1	.3	18.3	7.8	43
59.3	29.8	11.6	4.7	0	0	9.1	6.2	4.9	.2	20.4	11.3	55
59.0	33.6	12.2	5.0	0	0	6.9	8.6	6.2	.2	21.9	15.0	68
67.6	26.5	8.9	6.0	0	0	3.1	7.9	5.9	.1	17.0	13.9	82
69.0	25.4	7.7	6.7	0	0	2.1	8.0	5.3	.1	15.5	13.4	86
68.6	17.5	5.1	4.0	8.9	0	21.6	.9	1.2	.3	24.0	2.4	10
69.8	15.3	2.9	4.2	1.3	0	9.8	.3	.7	.1	10.9	1.1	10
65.7	18.9	4.9	4.1	.7	0	10.1	.6	.7	.1	11.5	1.4	12
29.7	28.7	15.9	4.3	.4	0	13.3	2.9	3.2	.3	19.7	6.4	32
43.1	35.6	13.7	6.2	0	0	3.5	8.7	7.9	.2	20.3	16.8	83
44.6	32.1	9.7	6.6	0	0	1.9	7.4	6.1	.1	15.5	13.6	88
43.6	24.9	7.8	7.6	0	2.3	----	----	----	----	----	----	----
48.9	18.9	6.4	7.6	0	5.2	----	----	----	----	----	----	----
51.3	16.6	5.0	7.7	0	2.6	----	----	----	----	----	----	----

TABLE 11.—*Temperature and precipitation for Mahoning County*

[Based on records obtained in Canfield]

Month	Temperature					Precipitation					
				2 years in 10 will have at least 4 days with [2]—			1 year in 10 wil have [4]—				
	Average daily maximum [1]	Average daily minimum [1]	Average [1]	Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than	Average total [3]	Less than—	More than—	Average snowfall [5]	Average number of days with measurable snow on ground [6]	Average depth of snow on days with snow on ground [6]
	°F.	°F.	°F.	°F.	°F.	In.	In.	In.	In.		In.
January	35.7	20.1	27.4	54.6	−1.3	2.54	1.05	4.50	9.5	16	2.9
February	37.7	22.0	29.0	55.0	2.2	1.95	.75	3.20	5.8	11	2.8
March	47.3	26.6	37.1	67.2	11.5	2.92	1.38	4.85	4.0	8	2.3
April	59.5	38.1	47.7	77.3	22.8	3.06	1.12	4.70	1.7	1	.9
May	70.3	46.4	58.0	83.3	32.8	3.85	1.60	5.80	(7)	0	0
June	79.1	55.3	67.2	89.7	41.6	3.84	1.65	5.90	0	0	0
July	83.2	59.3	71.1	90.7	45.6	3.73	2.03	6.62	0	0	0
August	81.7	58.0	69.4	91.1	44.6	3.10	1.13	5.40	0	0	0
September	75.8	51.3	63.5	89.6	36.1	2.45	1.05	4.63	0	0	0
October	63.9	41.0	52.4	80.5	28.5	2.49	.50	4.95	.5	(8)	(7)
November	49.2	31.7	40.5	66.5	16.9	2.23	1.04	4.33	2.9	3	3.0
December	38.1	23.0	30.4	57.0	3.2	2.09	.91	3.80	5.8	14	3.1
Year	60.1	39.4	49.5	---	----	34.25	26.19	40.76	30.2	53	---

[1] Period of record: 1919–60.
[2] Period of record: 1945–64.
[3] Period of record: 1931–60.
[4] Period of record: 1916–63.
[5] Period of record: 1938–52.
[6] Data from nearest comparable station that recorded snowfall.
[7] Trace.
[8] Less than 1 day.

TABLE 12.—*Probabilities of last freezing temperature in spring and first in fall for Mahoning County*

[Based on records obtained in Canfield]

Probability	Dates for given probability and temperature					
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower	36° F. or lower
Spring:						
1 year in 10 later than	April 8	April 19	May 2	May 18	May 31	June 13
2 years in 10 later than	April 3	April 14	April 27	May 12	May 26	June 8
5 years in 10 later than	March 23	April 3	April 16	May 1	May 15	May 28
Fall:						
1 year in 10 earlier than than.	November 8	October 27	October 15	October 2	September 19	September 7
2 years in 10 earlier than.	November 13	November 2	October 20	October 7	September 24	September 12
5 years in 10 earlier than.	November 23	November 12	October 31	October 17	October 4	September 22

Topography tends to influence precipitation more than it does the air temperature of Mahoning County. More precipitation falls on the windward sides of hills or mountains than on the leeward sides. Because most moisture-producing clouds in this area blow in from a southerly direction, the air has to cross high terrain before it reaches this county. The county, therefore, is in a rain shadow and receives an average of only 34.25 inches of precipitation per year, according to records obtained at Canfield. Millport, in Columbiana County, receives an average of 37.58 inches per year, or slightly more precipitation than Mahoning County. The annual difference is minimal in summer, as both Mahoning and Columbiana Counties receive a tenth of an inch or more of rain on each of 14 days during July and August. A measurable amount of precipitation falls on about 150 days per year, and a snowfall of 1 inch or more occurs on about 16 days each winter. In a given location in the county, there are some 40 thunderstorms each year.

Tornadoes rarely occur in this county. The frequency of tornadoes is less in Mahoning County than it is in the central and western parts of Ohio.

Relative humidity fluctuates every day, as does air temperature, but in contrast to air temperature, humidity is generally highest in the morning and lowest in the afternoon. The average high morning humidity in winter and summer is about 85 percent. The average afternoon low is about 55 percent. During periods of fair weather in summer, humidity reaches a low of between 30 and 40 percent, or sometimes it may be as low as 20 percent. In a normal year, there are 79 clear, 104 partly cloudy, and 182 cloudy days.

The content of moisture in soils is important to farmers, for the success of crops depends, to a great extent, on the supply of moisture. The temperature of the soils is important also, especially in spring.

The amount of moisture in a soil varies widely during the year. Most soils are saturated with water at the start of the growing season. During the growing season, part of this water is used by plants, and part is lost through evaporation and transpiration. The amount of moisture in the soil at any given time during the growing season depends on the balance between the amount of water received as rain and that lost through transpiration and evaporation. The content of available moisture in the soils is lowest about the end of September. Then, if the amount of moisture received through precipitation exceeds that lost through evaporation, the supply is gradually replenished during the cold months.

Small grains and plants in pastures and meadows require a large amount of moisture in April and May. If little or no rain falls during those months, these crops will have used all or nearly all of the available soil moisture by the end of June. Spring-planted row crops, on the other hand, require most of their supply of water during July and August, because that is the period in which they make their most rapid growth. If the supply of soil moisture during July and August is not adequate to meet the needs of these row crops, the crops are damaged.

Soil temperature has a seasonal cycle in which fluctuations in the temperature of the topmost several inches of soil material parallel those of the air. The temperature of a soil generally does not fall much below the freezing point, except where the surface of the soil is bare during the coldest part of winter. As a rule in Mahoning County, a soil does not freeze below a depth of 15 to 20 inches. During mild periods, temperature of the soil rises rapidly. The soil then thaws completely in 10 to 14 days, even if it is frozen to its maximum depth. Soils warm up in spring more rapidly than is generally believed possible. For this reason, farmers need not delay planting in spring because of a cold soil unless the soil contains excess water.

Farming

Approximately 39 percent of Mahoning County was in farms in 1964. The average size of farm was 98.4 acres. Of the total number of farms, 215 were dairy farms, 88 were livestock farms, 54 were cash-grain farms, 44 were poultry farms, and the rest were general farms or were miscellaneous and unclassified. Most of the farm operators own their farms. In 1964 more than half the total number of farm operators worked at least 100 days off the farm.

Dairying, the raising of livestock and poultry, and the production of general farm crops are the most important kinds of farming in the county. In 1964 dairy products accounted for about 29 percent of the total income derived from the sale of farm products; poultry and poultry products accounted for about 17 percent; and livestock and livestock products other than dairy and poultry products accounted for about 14 percent. Field crops accounted for about 16 percent. Income from the sale of nursery and greenhouse products has increased during the past few years.

The principal kinds of livestock on farms in Mahoning County in 1964 were as follows:

	Number
Cattle and calves	16,082
Milk cows	6,109
Hogs and pigs	3,839
Sheep and lambs	2,452
Chickens (4 months old and over)	164,571

Acreages of the principal crops harvested in 1964 were as follows:

	Acres
Corn (all purposes)	12,310
Oats (for grain)	6,228
Wheat	6,100
Barley	342
Hay:	
Alfalfa and alfalfa mixtures	12,722
Clover and timothy	9,757
Potatoes	467
Strawberries (harvested for sale)	146
Vegetables (excluding potatoes)	1,141

Recreational Facilities

Outdoor recreational facilities in Mahoning County include Mill Creek Park in Youngstown. This park is wooded, and it occupies about 3 square miles. It contains three lakes, a golf course, an amusement park, and facilities for picnicking. Several smaller parks are in the county, and the county also contains four large reservoirs that together occupy 3,000 acres. There are also smaller lakes and numerous farm ponds. The reservoirs and lakes offer facilities for fishing and boating, and they are near facilities for picnicking and camping. Several camps for boys and girls are located in the county.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster, such as a clod, crumb, block, or prism.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available moisture capacity. The difference between the amount of water in a soil at field capacity and the amount in the same soil at the permanent wilting point of plants. Commonly expressed as inches of water per inch depth of soil.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, magnesium, sodium, potassium, and hydrogen.

Cation-exchange capacity. A measure of the total amount of exchangeable cations that can be held by the soil. It is expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7) or at some other stated pH value. The term as applied to soils is synonymous with base exchange capacity but is more precise in its meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A mapping unit consisting of different kinds of soils that occur in such small individual areas or in such an intricate pattern that they cannot be shown separately on a publishable soil map.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; will not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Delineation. Refers to any one area enclosed by a line on the soil survey map. Each delineation contains a symbol.

Drainage, natural. Refers to the drainage that existed during the development of the soil. Does not refer to drainage resulting from artificial removal of water from the soil. In this survey the following terms are used to express natural drainage.

Well drained.—Water is removed readily, but not rapidly, from the soil. A soil that is well drained is free or nearly free of mottling and commonly has intermediate texture.

Moderately well drained.—Water is removed from the soil somewhat slowly so that the profile is wet for a small, but significant, part of the time. A moderately well drained soil commonly has a slowly permeable layer in or immediately beneath the solum. It has uniform color in the A and upper B horizons and has mottling in the lower B and the C horizons.

Somewhat poorly drained.—Water is removed slowly enough to leave the soil wet for significant periods, but not all of the time. Such soils commonly have mottling below the A horizon and in the B and C horizons.

Poorly drained.—Water is removed so slowly that the soil remains wet much of the time. The water table is commonly at or near the surface during a large part of the year. Poorly drained soils are light gray and are generally mottled from the surface downward, though mottling may be absent or nearly so in some soils.

Very poorly drained.—Water is removed from the soil so slowly that the water table remains at or above the surface the greater part of the time. Soils of this class are frequently ponded. Very poorly drained soils 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.

Eluviation. The movement of material from one place to another within the soil, either in true solution or colloidal suspension. Soil horizons that have lost material through eluviation are said to be eluvial; those that have received material are illuvial.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. Nearly level land, consisting of stream sediment, that borders a stream and is subject to flooding unless artificially protected.

Fragipan. A loamy, brittle, subsurface horizon that is very low in content of organic matter and clay but is rich in silt or very fine sand. The layer is seemingly cemented when dry, has a hard or very hard consistence, and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur 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 melting glaciers.

Glacial outwash. Crossbedded gravel, sand, and silt deposited by melt water as it flowed from glacial ice.

Glacial till. Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gravelly soil. From 15 to 50 percent of material, by volume, consists of rounded or angular rock fragments that are not prominently flattened and are up to 3 inches in diameter.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residue.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active, and it is therefore marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused by accumulation of clay, sesquioxides, humus, or some combination of these; prismatic or blocky structure; redder or stronger colors; or some combination of these characteristics. The combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. This layer, commonly called the soil parent material, is presumed to be like that from which the overlying horizons were formed in most soils.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Roman numerals are prefixed to the master horizon or layer designations (O, A, B, C, R) to indicate lithologic discontinuities either within or below the solum. The first, or uppermost, material is not numbered, for the Roman numeral I is understood; the second, or contrasting, material is numbered II; and others are numbered III, IV, and so on, consecutively downward. Thus for example, a sequence from the surface downward might be A2, B1, IIB2, IIB3, IIC1, IIC2.

Following are the symbols used in this soil survey with those letters that designate the master horizons:

g—strong gleying.
p—plow layer.
t—illuvial clay.

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. Since part of the fine clay in the B horizon (or subsoil) of many soils has moved into the B horizon from the A horizon above, the B horizon is called an illuvial horizon.

Inclusion. A kind of soil that has been included in mapping a soil of a different kind because the area was too small to be mapped separately on a map of the scale used.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Kame. An irregular, short ridge, or hill, of stratified glacial drift.

Lacustrine. Material deposited in lake water and exposed by lowering of the water level or elevation of the land.

Leaching, soil. The removal of material in solution by percolating water.

Mapping unit. Any soil, miscellaneous land type, soil complex, or undifferentiated soil group shown on the detailed soil map and identified by a letter symbol.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size— *fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Muck. An organic soil consisting of fairly well decomposed organic material that is relatively high in mineral content, finely divided, and dark in color.

Parent material. The horizon of weathered rock or partly weathered soil material from which soil has formed; horizon C in the soil profile.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality of a soil horizon that enables water or air to move through the soil material. Terms used to describe permeability, and permeability rates, given in inches of water movement per hour, follow. These reflect hydraulic conductivity commonly used in soil survey testing procedure. *Very slow* (less than 0.063 inch per hour); *slow* (0.063 to 0.2 inch per hour); *moderately slow* (0.2 to 0.63 inch per hour); *moderate* (0.63 inch to 2.0 inches per hour); *moderately rapid* (2.0 to 6.3 inches per hour); *rapid* (greater than 6.3 inches per hour).

pH. See Reaction, soil.

Phase, soil. A subdivision of a soil type, series, or other unit in the soil classification system made because of differences in the soil that affect its management but do not affect its classification in the natural landscape. A soil type, for example, may be divided into phases because of differences in slope, stoniness, thickness, or some other characteristic that affects management.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	below 4.5	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

Root zone. The depth to which commonly grown annual crops penetrate a soil. Among the soil properties that tend to limit the depth to which roots penetrate are coarse texture of the soil material, a fragipan, a layer of clay, and wetness.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Silt. Individual mineral particles in a soil that range from the upper limit of clay (0.002 millimeter) in diameter to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soils includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stony. Used to describe soils that contain stones in numbers that interfere with or prevent tillage.

Stratified. Composed of, or arranged in, strata, or layers, such as stratified alluvium. The term is confined to geological material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer lying beneath the solum, or true soil; the C or D horizon.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. (See also Clay, Sand, and Silt.) The basic textural classes, in order of increasing proportions of fine particles, are as follows: Sand, loamy sand, sandy loam, loam, silt loam, silty clay loam, clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." The three broad general terms of "clayey," "loamy," and "sandy" are often used to describe soil texture. The term "clayey" is used to describe sandy clays, silty clays, and clays; the term "loamy" is used to describe sandy loams, fine sandy loams, very fine sandy loams, loams, silt loams, silts, clay loams, sandy clay loams, and silty clay loams; and the term "sandy" is used to describe sands and loamy sands.

Till. See Glacial till.

Till plain. A level or undulating land surface that was formed when glaciers deposited their till.

Topographic sequence. A sequence of soils that are commonly adjacent to each other and that have properties, such as natural drainage and steepness of slope, that are related to the topography.

Topsoil. A presumed fertile soil or soil material, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Type, soil. A subdivision of the soil series that is made on the basis of differences in the texture of the surface layer.

Upland (geology). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

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.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the description of the soil series to which the mapping unit belongs. Other information is given in tables as follows:

Estimated yields, table 1, page 17.
Potential productivity of trees, table 2, page 19.
Wildlife habitat and kinds of wildlife, table 3, page 24.
Engineering uses of soils, tables 4, 5, and 6, pages 26 through 49.
Nonfarm uses of soils, table 7, page 52.
Acreage and extent of soils, table 8, page 65.

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group
			Symbol	Page	Number
BeB	Bennington silt loam, 2 to 6 percent slopes	67	IIw-2	9	7
BgB	Bogart loam, 2 to 6 percent slopes	68	IIe-2	8	1
BgC	Bogart loam, 6 to 12 percent slopes	68	IIIe-4	11	1
BtB	Bogart loam, till substratum, 2 to 6 percent slopes	68	IIe-1	8	1
BtC2	Bogart loam, till substratum, 6 to 12 percent slopes, moderately eroded	68	IIIe-1	10	1
Ca	Canadice silty clay loam	69	IVw-1	15	5
CdB	Canfield silt loam, 2 to 6 percent slopes	71	IIe-5	9	1
CdC	Canfield silt loam, 6 to 12 percent slopes	71	IIIe-6	12	1
CdC2	Canfield silt loam, 6 to 12 percent slopes, moderately eroded	71	IIIe-6	12	1
CeB	Canfield-Urban land complex	71	None	--	None
CgB	Cardington silt loam, 2 to 6 percent slopes	72	IIe-1	8	1
CgC2	Cardington silt loam, 6 to 12 percent slopes, moderately eroded	72	IIIe-1	10	1
Ch	Carlisle muck	73	IIIw-4	12	8
Ck	Chagrin loam	73	IIw-4	10	1
ClB	Chili gravelly loam, 2 to 6 percent slopes	74	IIe-2	8	1
ClC	Chili gravelly loam, 6 to 12 percent slopes	74	IIIe-4	11	1
ClD	Chili gravelly loam, 12 to 18 percent slopes	74	IVe-1	14	1
CmB	Chili loam, 2 to 6 percent slopes	74	IIe-2	8	1
CmC	Chili loam, 6 to 12 percent slopes	74	IIIe-4	11	1
CnE	Chili and Conotton gravelly soils, 18 to 25 percent slopes	75	VIe-2	15	3
CnF	Chili and Conotton gravelly soils, 25 to 50 percent slopes	75	VIIe-1	16	3
CoB	Chili-Urban land complex, undulating	75	None	--	None
CoC	Chili-Urban land complex, rolling	75	None	--	None
Ct	Condit silt loam	76	IIIw-2	12	5
Da	Damascus loam	78	IIIw-2	12	5
Dc	Damascus loam, till substratum	78	IIIw-2	12	5
DkC	Dekalb very stony loam, 2 to 12 percent slopes	78	VIs-1	16	4
DkE	Dekalb very stony loam, 12 to 25 percent slopes	78	VIe-2	15	4
DkF	Dekalb very stony loam, 25 to 50 percent slopes	78	VIIe-1	16	4
ElB	Ellsworth silt loam, 2 to 6 percent slopes	79	IIIe-5	11	2
ElC	Ellsworth silt loam, 6 to 12 percent slopes	79	IVe-3	15	2
ElC2	Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded	79	IVe-3	15	2
ElD2	Ellsworth silt loam, 12 to 18 percent slopes, moderately eroded	80	VIe-1	15	2
ElE2	Ellsworth silt loam, 18 to 25 percent slopes, moderately eroded	80	VIe-1	15	2
ElF	Ellsworth silt loam, 25 to 50 percent slopes	80	VIIe-2	16	2
EsF3	Ellsworth silty clay loam, 25 to 50 percent slopes, severely eroded	80	VIIe-2	16	2
EuB	Ellsworth-Urban land complex	80	None	--	None
FcA	Fitchville silt loam, 0 to 2 percent slopes	81	IIw-2	9	7
FcB	Fitchville silt loam, 2 to 6 percent slopes	81	IIw-2	9	7
FhB	Fitchville silt loam, till substratum, 2 to 6 percent slopes	81	IIw-2	9	7
FlB	Fitchville-Urban land complex	81	None	--	None

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Map symbol	Mapping unit	Described on page	Capability unit Symbol	Capability unit Page	Woodland suitability group Number
Fr	Frenchtown silt loam	83	IIIw-8	14	5
GbB	Geeburg silt loam, 2 to 6 percent slopes	84	IIIe-5	11	2
GbB2	Geeburg silt loam, 2 to 6 percent slopes, moderately eroded	84	IIIe-5	11	2
GbC	Geeburg silt loam, 6 to 12 percent slopes	84	IVe-3	15	2
GbD	Geeburg silt loam, 12 to 18 percent slopes	84	VIe-1	15	2
GeC2	Geeburg silty clay loam, 6 to 12 percent slopes, moderately eroded	84	IVe-3	15	2
GeC3	Geeburg silty clay loam, 6 to 12 percent slopes, severely eroded	84	VIe-1	15	2
GeD2	Geeburg silty clay loam, 12 to 18 percent slopes, moderately eroded	85	VIe-1	15	2
GeE2	Geeburg silty clay loam, 18 to 25 percent slopes, moderately eroded	85	VIIe-2	16	2
GfB	Glenford silt loam, 2 to 6 percent slopes	86	IIe-1	8	1
GfC2	Glenford silt loam, 6 to 12 percent slopes, moderately eroded	86	IIIe-1	10	1
Gp	Gravel pits	86	None	--	None
HoB	Hornell silt loam, 2 to 6 percent slopes	87	IIIw-5	13	2
JtA	Jimtown loam, 0 to 2 percent slopes	88	IIw-2	9	7
JtB	Jimtown loam, 2 to 6 percent slopes	88	IIw-2	9	7
JuB	Jimtown loam, till substratum, 2 to 6 percent slopes	88	IIw-2	9	7
JwB	Jimtown-Urban land complex	88	None	--	None
Km	Kerston muck	89	IIIw-4	12	8
Lb	Lobdell loam	89	IIw-4	10	1
Lc	Lorain silty clay loam	90	IIIw-6	14	6
LdB	Loudonville loam, 2 to 6 percent slopes	91	IIe-3	8	1
LdC2	Loudonville loam, 6 to 12 percent slopes, moderately eroded	91	IIIe-3	11	1
LdD2	Loudonville loam, 12 to 18 percent slopes, moderately eroded	91	IVe-2	15	1
LdE2	Loudonville loam, 18 to 25 percent slopes, moderately eroded	91	IVe-2	15	1
LrB	Loudonville-Urban land complex, undulating	91	None	--	None
LrC	Loudonville-Urban land complex, rolling	91	None	--	None
Ls	Luray silt loam	92	IIw-1	9	6
Ly	Luray silty clay loam	92	IIw-1	9	6
Ma	Made land	93	None	--	None
MgA	Mahoning silt loam, 0 to 2 percent slopes	94	IIIw-5	13	2
MgB	Mahoning silt loam, 2 to 6 percent slopes	94	IIIw-5	13	2
MhB	Mahoning-Urban land complex	94	None	--	None
Mn	Marengo silty clay loam	95	IIw-1	9	6
MsB	Muskingum channery silt loam, 2 to 6 percent slopes	96	IIe-3	8	3
MsC2	Muskingum channery silt loam, 6 to 12 percent slopes, moderately eroded	96	IIIe-3	11	3
MsD2	Muskingum channery silt loam, 12 to 18 percent slopes, moderately eroded	96	IVe-2	15	3
MsE2	Muskingum channery silt loam, 18 to 25 percent slopes, moderately eroded	96	IVe-2	15	3
MsF2	Muskingum channery silt loam, 25 to 50 percent slopes, moderately eroded	96	VIe-2	15	3
Od	Olmsted loam	97	IIw-1	9	6
Ov	Orrville silt loam	98	IIw-3	10	5
Pa	Papakating silt loam	98	IIIw-1	12	6
Pc	Papakating silty clay loam	98	IIIw-1	12	6
Qu	Quarries	98	None	--	None
RaA	Ravenna silt loam, 0 to 2 percent slopes	99	IIw-5	10	7
RaB	Ravenna silt loam, 2 to 6 percent slopes	100	IIw-5	10	7
ReA	Remsen silt loam, 0 to 2 percent slopes	101	IIIw-5	13	2
ReB	Remsen silt loam, 2 to 6 percent slopes	101	IIIw-5	13	2

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group
			Symbol	Page	Number
RmB	Remsen-Urban land complex	101	None	--	None
RsB	Rittman silt loam, 2 to 6 percent slopes	102	IIe-4	9	2
RsC	Rittman silt loam, 6 to 12 percent slopes	102	IIIe-2	11	2
RsC2	Rittman silt loam, 6 to 12 percent slopes, moderately eroded	102	IIIe-2	11	2
RsD2	Rittman silt loam, 12 to 18 percent slopes, moderately eroded	103	IVe-4	15	2
RuB	Rittman-Urban land complex	103	None	--	None
Sb	Sebring silt loam	104	IIIw-2	12	5
Se	Sebring silt loam, till substratum	104	IIIw-8	14	5
Sg	Sebring-Urban land complex	104	None	--	None
SsB	Strip mine spoils, shale and sandstone materials, undulating	105	VIs-1	16	9
SsC	Strip mine spoils, shale and sandstone materials, rolling	106	VIs-1	16	9
SsF	Strip mine spoils, shale and sandstone materials, steep	106	VIIs-1	16	9
StB	Strip mine spoils, loamy till materials, undulating	106	VIs-1	16	9
StC	Strip mine spoils, loamy till materials, rolling	106	VIs-1	16	9
StF	Strip mine spoils, loamy till materials, steep	106	VIIs-1	16	9
SuB	Strip mine spoils, clayey till materials, undulating	106	VIs-1	16	9
TrA	Trumbull silt loam, 0 to 2 percent slopes	107	IVw-1	15	5
TrB	Trumbull silt loam, 2 to 6 percent slopes	107	IVw-1	15	5
Tu	Trumbull-Urban land complex	107	None	--	None
WaA	Wadsworth silt loam, 0 to 2 percent slopes	108	IIIw-7	14	7
WaB	Wadsworth silt loam, 2 to 6 percent slopes	108	IIIw-7	14	7
WbB	Wadsworth-Urban land complex	109	None	--	None
Wc	Wayland silt loam	109	IIIw-3	12	6
WrF2	Wooster loam, 25 to 50 percent slopes, moderately eroded	110	VIe-2	15	1
WsB	Wooster silt loam, 2 to 6 percent slopes	110	IIe-1	8	1
WsC2	Wooster silt loam, 6 to 12 percent slopes, moderately eroded	110	IIIe-1	10	1
WsD2	Wooster silt loam, 12 to 18 percent slopes, moderately eroded	111	IVe-1	14	1
WsE2	Wooster silt loam, 18 to 25 percent slopes, moderately eroded	111	VIe-2	15	1

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