SOIL SURVEY OF

Lorain County, Ohio

United States Department of Agriculture
Soil Conservation Service
In cooperation with
Ohio Department of Natural Resources
Division of Lands and Soil
and the
Ohio Agricultural Research and Development Center

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in the period 1960–70. Soil names and descriptions were approved in 1972. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1970. This survey was made cooperatively by the Soil Conservation Service; Ohio Department of Natural Resources, Division of Lands and Soil; and the Ohio Agricultural Research and Development Center. It is part of the technical assistance furnished to the Lorain County Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

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

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

Finding and Using Information

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

Individual colored maps that show the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those that have a moderate limitation can be colored yellow, and those that have 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 and the woodland suitability groups.

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

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

Community planners and others can read about soil properties that affect the choice of sites for dwellings, commercial and industrial buildings, and recreation areas in the section "Town and Country Planning."

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

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

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

Cover: Area of a Mahoning silt loam in southern part of Lorain County. This soil is suited to grain and forage plants.

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SOIL SURVEY OF LORAIN COUNTY, OHIO

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LORAIN COUNTY is in the north-central part of Ohio (fig. 1). Lake Erie forms its northern boundary. The county has a total land area of 495 square miles, or 316,800 acres. Elyria, the county seat, is in the north-central part of the county. In 1970 the population of the county was 256,843. Of this total about 85.7 percent resides in urban areas and about 14.3 percent in rural areas.

Lorain County is divided into two physiographic areas. The northern third of the county is a lake plain, and the southern two-thirds is a till plain. The entire county was covered by the Late Wisconsin Glacier. As the glacier retreated from the county, a glacial lake was formed in the northern part.

The lake plain is characterized by level or nearly level expanses broken by sand ridges, by high areas underlain by sandstone or shale bedrock, and by breaks along rivers and streams.

The till plain is characterized by large, nearly level to gently rolling areas underlain by silty clay loam to clay loam glacial till, by sandstone or shale bedrock highs, and by breaks along rivers and streams.

At the southern edge of the county, the topography becomes rolling because of the presence of the Defiance Moraine.

Much of Lorain County is used for farming. Dairying is the major farm enterprise. Corn, soybeans, wheat, oats, hay, and pasture are the main crops. Nursery, small fruit, and greenhouse crops are important, mainly on the sandier soils on beach ridges.

In 1967 approximately 49,600 acres was wooded. Much of the woodland is suited to nature trails, parks, camps, campgrounds, hunting areas, and many other recreational facilities. Some woodlands are used to supplement the income of farmers and part-time farmers.

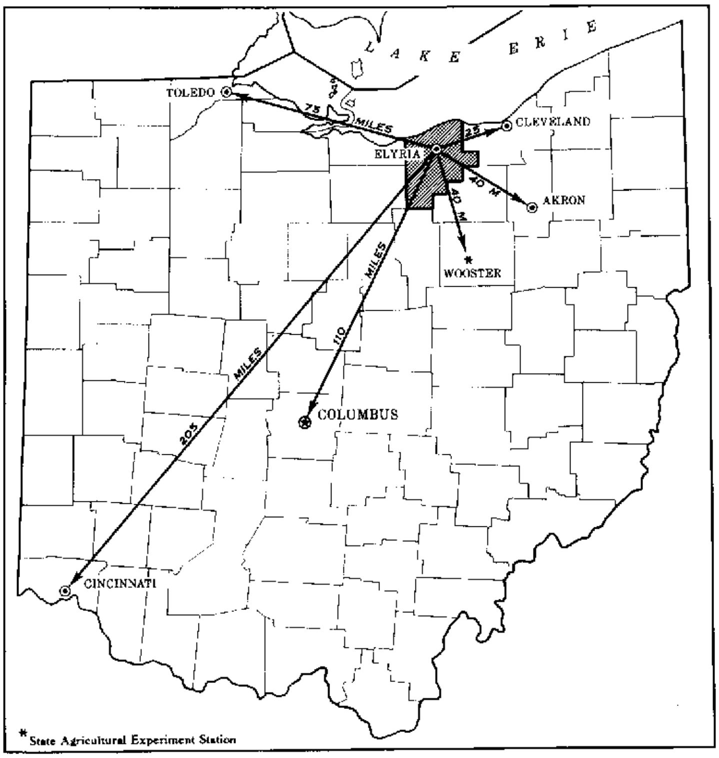

Figure 1.—Location of Lorain County in Ohio.

How This Survey Was Made

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

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer,

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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 geographic feature near the place where a soil of that series was first observed and mapped. Mahoning and Trumbull, for example, are the names of two soil series. All the soils in the United States that have the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Ellsworth silt loam, 2 to 6 percent slopes, is one of several phases in the Ellsworth series.

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

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

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

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Mahoning-Tiro silt loams, 0 to 2 percent slopes, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, so severely eroded, or so variable that it has not been classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Cut and fill land is an example.

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

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or to a high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil, and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current 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 Lorain 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 that shows soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The six soil associations in Lorain County are described in the following pages.

1. Mahoning-Trumbull-Ellsworth association

Deep, nearly level to moderately steep, mainly somewhat poorly drained soils on the till plain

This association is commonly on broad flats and in gently sloping areas on uplands in the southern two-thirds of the county. The major soils of this association formed mainly in moderately fine textured glacial till that is low in content of lime.

This association covers about 60 percent of the county. It is about 55 percent Mahoning soils, 9 percent Trumbull soils, 8 percent Ellsworth soils, and 28 percent less extensive soils.

Mahoning soils are somewhat poorly drained and are on large, broad flats. Trumbull soils are poorly drained and are in depressions in the uplands and along drainageways. Ellsworth soils are moderately well drained. They are gently sloping to moderately steep soils on escarpments along streams and drainageways.

Less extensive soils are the Miner, Fulton, Lorain, Fitchville, Luray, Jimtown, Bogart, Tiro, and Chili soils.

The soils in this association are used mainly for general crops. Wetness is the main limitation. If artificial drainage is adequate and improved management is practiced, crops respond well to regular applications of lime and fertilizer. Recently, the soils have been used to an increasing extent for urban development. Wetness and slow or very slow permeability of the major soils limit many nonfarm uses.

2. *Orrville-Lobdell-Chagrin association*

Deep, nearly level, somewhat poorly drained to well drained soils on bottom lands

This association is mainly on bottom lands along the streams. The soils formed in sediment eroded from the uplands and deposited on the bottoms along the streams.

This association covers about 5 percent of the county. It is about 45 percent Orrville soils, 30 percent Lobdell soils, 19 percent Chagrin soils, and 6 percent less extensive soils.

Orrville soils are somewhat poorly drained, Lobdell soils are moderately well drained, and Chagrin soils are well drained.

Less extensive soils are the Holly, Tioga, and Fitchville, low terrace, soils.

Most of the soils in this association are used for permanent pasture or are left in natural vegetation. Periodic flooding is a severe limitation for many nonfarm uses.

3. *Fitchville-Luray-Sebring association*

Deep, nearly level somewhat poorly drained to very poorly drained soils on the lake plain

This association is mainly on nearly level areas between the beach ridges on the lake plain in the northern part of the county. The major soils of this association formed in silty lacustrine sediment.

This association covers about 6 percent of the county. It is about 45 percent Fitchville soils, 24 percent Luray soils, 15 percent Sebring soils, and 16 percent less extensive soils.

Fitchville soils are light-colored, somewhat poorly drained, nearly level soils. Luray soils are dark-colored, very poorly drained soils. They are in depressions and at the base of the sandy beach ridges. Sebring soils are light-colored, poorly drained soils that are in nearly level to depressional areas.

Less extensive soils are the Mentor, Fulton, Haskins, and Miner soils.

The soils in this association are used mainly for general crops. They are also used to some extent for nursery crops. Wetness is the main limitation for farm and nonfarm uses.

4. *Allis-Mitiwanga-Miner, shale substratum, association*

Moderately deep and deep, nearly level to gently sloping, somewhat poorly drained to very poorly drained soils underlain by bedrock at a depth of 2 to 5 feet; on uplands

This association is on broad flat areas or sandstone highs, mostly in the northern part of the county. Bedrock is at a depth of 2 to 5 feet.

This association covers about 8 percent of the county. It is about 35 percent Allis soils, 30 percent Mitiwanga soils, 13 percent Miner, shale substratum, soils, and 22 percent less extensive soils.

Allis soils are somewhat poorly drained and poorly drained. They are mainly nearly level soils that are underlain by shale bedrock at a depth of 2 to 3 feet. Mitiwanga soils are somewhat poorly drained. They are nearly level to gently sloping soils that are underlain by sandstone bedrock at a depth of 2 to 3 feet. The Miner, shale substratum, soils are dark colored and very poorly drained. They are nearly level to depressional soils that are underlain by shale bedrock at a depth of 3 to 5 feet.

Less extensive soils are the Hornell, Weikert, Dekalb, Mahoning, and Ellsworth soils.

Much of this association is not used for farming. The sloping areas around the sandstone highs are used to some extent for fruit orchards. The Allis soils and the Miner, shale substratum, soils were once used extensively for grapes. The moderate depth to bedrock, poor natural drainage, stoniness, and strong acidity are the main limitations for farm and nonfarm uses.

5. *Haskins-Jimtown-Oshtemo association*

Deep, somewhat poorly drained and well drained, nearly level to gently sloping soils on beach ridges, outwash plains, and stream terraces

This association is mainly on elongated beach ridges that are oriented mostly in an east-west direction, on stream terraces, and on sandy and gravelly outwash plains, mainly in the northern part of the county. The major soils of this association formed in loamy material underlain by fine-textured material or sand and gravel at a depth of 2 to 3 feet.

This association covers about 9 percent of the county. It is about 30 percent Haskins soils, 20 percent Jimtown soils, 7 percent Oshtemo soils, and 43 percent less extensive soils.

Haskins soils are somewhat poorly drained. They are nearly level to gently sloping loamy soils that are underlain by fine textured material. Jimtown soils are somewhat poorly drained. They are nearly level to gently sloping loamy soils that are underlain by sand and gravel. Oshtemo soils are nearly level to gently sloping soils that formed in sandy material.

Less extensive soils are the Tyner, Elnora, and Stafford soils, which formed in sandy material; the Bogart and Olmsted soils, which formed in gravelly material; the Rawson and Mermill soils, which formed in loamy material that is underlain by fine-textured material at a depth of about 2 to 3 feet; and small areas of soils that formed in glacial till.

The soils in this association are used mainly for truck crops and general farm crops. If the soils are used for crops, wetness is the main limitation on the Haskins and Jimtown soils and droughtiness is the main limitation on the Oshtemo soils. Many areas are being developed for nonfarm uses. The wetness on the

Jimtown and Haskins soils and the sandy texture and moderately rapid permeability of the Oshtemo soils are the main limitations for some nonfarm uses.

6. Mahoning-Miner association

Deep, nearly level to gently sloping, somewhat poorly drained and very poorly drained soils on the till plain and the lake plain

This association is mainly on broad flats and in gently sloping areas in the northern part of the county. The major soils of this association formed in glacial till or in lacustrine sediment.

This association covers about 12 percent of the county. It is about 60 percent Mahoning soils, 30 percent Miner soils, and 10 percent less extensive soils.

Mahoning soils are somewhat poorly drained. They are nearly level to gently sloping soils that formed in glacial till. Miner soils are very poorly drained. They are nearly level to depressional soils that formed in lacustrine sediment and in glacial till.

Less extensive soils are the Fulton, Lorain, Fitchville, Luray, and Jimtown soils.

Wetness is the main limitation on the soils of this association. Because runoff is slow in the nearly level areas, water commonly ponds for an extended period after heavy rain. Where the soils are drained, they are used for general farm crops. The soils have been used increasingly for urban development. Wetness and the slow or very slow permeability of the major soils in this association are limitations for many nonfarm uses.

Use and Management of the Soils

This section discusses the use and management of the soils in Lorain County for farming, woodland, wildlife, engineering, and town and country planning. The subsection that describes use and management of the soils for farming furnishes information related to special crops, orchards, and vineyards. It also gives estimated yields of the principal crops. The properties and soil features that affect engineering practices and the limitations that affect land use planning are considered mainly in the tables.

Farming

In Lorain County farming includes the use and management of the soils for cultivated crops, pasture, and special crops. Information concerning suitable crop varieties, erosion control practices, and other management practices can be obtained from the local office of the Soil Conservation Service or from the Cooperative Extension Service.

Cultivated crops and pasture

Some principles of management are general enough to apply to all soils suitable for farm crops and pasture throughout the county, although an individual soil or group of soils may need a specified kind of management. The general principles of management are discussed in the following paragraphs.

Many soils in Lorain County need lime or fertilizer, or both. The amounts needed depend on the natural fertility of the soil and on the content of lime; on the needs of the crop; and on the level of yield desired. Only general suggestions for application of lime and fertilizer are given in this publication.

Most of the soils in the county never contained a high amount of organic matter, and it is not economically feasible to build up the content to a high level. It is important, however, to return organic matter to the soil by adding farm manure, leaving plant residue on the surface, and growing sod crops, cover crops, and green-manure crops.

Tillage tends to break down tilth. To help protect tilth, tillage should be kept to the minimum needed to prepare a seedbed and control weeds. Maintaining the organic-matter content of the plow layer also helps to protect tilth (fig. 2).

On wet soils, such as Sebring silt loam, yields of cultivated crops can be increased by open-ditch drainage or subsurface drainage. Subsurface drains are costly to install, but they generally provide better drainage than open ditches.

All of the gently sloping and steeper soils that are cultivated are subject to erosion. Runoff and erosion occur mostly while the cultivated crop is growing or soon after it has been harvested. On erodible soils, such as Ellsworth silt loam, 2 to 6 percent slopes, a cropping system that controls runoff and erosion is needed, in combination with other erosion control practices. As used here, "cropping system" refers to the sequence of crops grown and to management methods, including minimum tillage, mulch planting, managing crop residue, growing cover crops and green-manure crops, and adding lime and fertilizer. Other practices that help to control and reduce erosion on sloping land are cultivating on the contour, terracing,

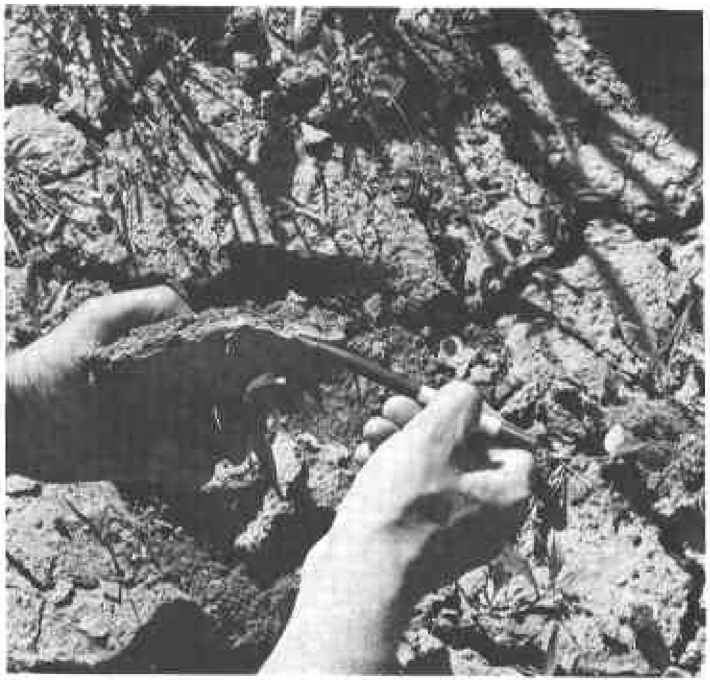

***Figure 2.*—Surface crusting on a Mahoning silt loam. Managing residue and tilling at optimum moisture content are necessary to maintain good tilth and to avoid crusting.**

contour stripcropping, diverting runoff, and constructing grassed waterways. The effectiveness of a particular combination of these practices differs from one soil to another, but different combinations can be equally effective on the same soil. The local representatives of the Soil Conservation Service will assist in planning an effective combination of practices.

Pasture is effective in controlling erosion on all but a few of the soils that are subject to erosion. A high level of pasture management is needed on some soils to provide enough ground cover to keep the soil from eroding. A high level of pasture management includes fertilization, control of grazing, selection of pasture mixtures, and use of other practices that help to maintain good ground cover and forage for grazing. Grazing is controlled by rotating the livestock from one pasture to another and by providing rest periods for pastures after each grazing period to allow for regrowth of the plants. It is important on some soils that plant mixtures be selected that require the least amount of renovation to maintain good ground cover and good forage for grazing.

Truck crops

High-value truck crops for markets in the Cleveland area are produced on several farms in Lorain County. Chili, Oshtemo, Bogart, Jimtown, and Haskins soils are the major soils in the county that have been used most successfully for truck crops. To maintain top yields of truck crops, the application of generous amounts of commercial fertilizer and organic matter in the form of manure, crop residue, and green manure is vital.

Yields of vegetables are greatly affected by disease and damaging insects. Information on disease-resistant plants and other information about the control of disease and insects is provided by the Cooperative Extension Service.

Fruits

The presence of Lake Erie is important to fruit producers in Lorain County, because the lake reduces the spring frost hazard to fruit buds.

Apples and peaches are grown mostly in areas on sandstone highs and east-west ridges in the north-central and northwestern parts of the county. These areas are principally Mitiwanga, Conotton, Dekalb, Tyner, Chili, and Bogart soils.

Grapes are grown mostly on the nearly level soils that are shallow over shale. These soils, in the northeastern part of the county, are principally the Allis soils and Miner, shale substratum, soils.

Sustained high yields from orchards and vineyards require that soil fertility be maintained, that good tilth be preserved despite compaction by heavy equipment, and that other conditions favoring growth and fruitfulness be maintained.

Capability grouping

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

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

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

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

- Class I soils have few limitations that restrict their use.
- Class II soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.
- Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
- Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, woodland, or wildlife habitat. (There are no class V soils in Lorain County.)
- Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture, woodland, or wildlife habitat.
- Class VII soils have very severe limitations that make them unsuited to cultivation and restrict their use largely to pasture, woodland, or wildlife habitat.
- Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, water supply, or esthetic purposes. (There are no class VIII soils in Lorain 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, although 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 Lorain County, shows that the main 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 the subclasses indicated by *w*, *s*, and *c*, because the soils in Class V are subject to little or no erosion, although they have other limitations that restrict their use largely to pasture, range, woodland, wildlife habitat, or recreation.

Wetness is the main limitation on about 90 percent of the soils in the county, erosion is the main limitation on about 8 percent, and droughtiness or shallowness is the main limitation on about 2 percent.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol; for example, IIe–3 or IIIe–2. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraphs; and the Arabic numeral specifically identifies the capability unit within each subclass.

In the following pages the capability units in Lorain County are described, and suggestions for the use and management of the soils are given. The descriptions of the capability units give the general characteristics, properties, and qualities of the soils within the unit. In some units there may be one or two soils that differ slightly from the rest of the soils in the group. These soils have a small acreage, which does not justify a separate capability unit description, or they are similar in many important properties to the other soils in the unit. The exceptions are noted if they have a relationship to use and management.

No specific recommendations are given for overcoming limitations of soils, because, for example, many different methods or combinations of practices are suitable for controlling erosion or achieving drainage on any given kind of soil.

CAPABILITY UNIT I–1

This unit consists only of Rawson loam, 0 to 2 percent slopes. This is a light-colored, moderately well drained soil that is medium textured or moderately coarse textured in the surface layer and upper part of the subsoil. Typically, the lower part of the subsoil is moderately fine textured below a depth of about 25 inches. This soil is on the lake plain and along some of the major streams. It has a deep root zone. Available water capacity is medium.

No soil feature limits the use of this soil for field crops or pasture. Tilth is good, and the soil is easy to till. No layer restricts plant roots in the upper 36 inches. Deterioration of tilth can be prevented by using crops that supply a large amount of residue. In order to supplement crops that supply a small amount of crop residue, such as soybeans, cover crops or sod crops should be used.

This soil is suited to all of the field crops and hay and pasture plants commonly grown in the county. It is also suited to continuous use for cultivated crops if intensive management is used.

CAPABILITY UNIT IIe–1

This unit consists of gently sloping, light-colored, well drained or moderately well drained soils of the Bogart and Chili series. These soils formed in loamy material and are underlain by sand and gravel. The soils in this unit are on stream terraces, outwash plains, and crests of beach ridges. During extended wet periods the Bogart soils can become saturated and temporarily waterlogged. The sand and gravel in the Chili soils typically extend below a depth of 5 feet. All the soils have a deep root zone. Permeability is moderate or moderately rapid, and the available water capacity is medium to low. The root zone is acid unless the soils have been limed.

The major limitation in farming is the hazard of erosion. During dry years these soils are damaged by drought earlier than most of the nearby, more poorly drained soils. Artificial drainage is generally not needed, except to drain some small wet areas that are generally close to Bogart soils.

The soils in this unit are excellent for truck crops. They are well suited to crops that mature before dry periods late in summer. The soils are well suited to irrigation. They can also be frequently used for row crops if intensive management is applied. Erosion, however, is difficult to control if row crops are grown continuously.

CAPABILITY UNIT IIe–2

This unit consists of gently sloping, light-colored, well drained to moderately well drained soils of the Mentor, Rawson, and Shinrock series. The Mentor and Shinrock soils formed in lake-deposited material, which is commonly high in content of silt. The Rawson soil formed in a thin layer of sandy and gravelly material over moderately fine textured material. The Mentor and Shinrock soils are on the crests of knolls that lie mainly on the lake plain. The Shinrock soil is generally along the Lake Erie escarpment in the northwestern part of the county. The Rawson soil is also on knolls that lie along the major streams and on the lake plain. All the soils have a deep root zone. Permeability is slow to moderate, and the available water capacity is medium. Mottled gray colors start at a depth of about 15 inches in the Shinrock and Rawson soils, but impeded drainage does not appreciably limit the growth of plants.

If these soils are used for row crops, the hazard of erosion is moderate. Also, random tile may be needed in some small, local wet areas, but in most places artificial drainage is not needed. The Mentor and Rawson soils commonly dry out and warm up earlier in spring than the Shinrock soil. Maintaining fertility, good tilth, and the organic-matter content is a concern if these soils are cultivated. Surface crusting is common on the Mentor and Shinrock soils.

The soils in this unit are suited to truck crops and general farm crops. Intensive management is needed, however, if such specialty crops as tomatoes or other crops that require frequent cultivation are grown. A high level of management is needed to control erosion and maintain fertility if these soils are kept continuously in row crops.

CAPABILITY UNIT IIe–3

This unit consists only of Dekalb very channery loam, 1 to 6 percent slopes. This is a well-drained soil that formed in residuum weathered from sandstone bedrock, which is at a depth of 20 to 40 inches. This nearly level to gently sloping soil occupies uplands in the northern part of the county and typically occurs in small areas. Sandstone channers are common throughout. This soil has a moderately deep root zone and low available water capacity. Typically, the root zone is acid.

The major limitation in farming is the moderate hazard of erosion in cultivated areas. Also, droughtiness is a moderate hazard, particularly where the depth to bedrock is less than 3 feet or where the content of channers is high. Maintaining fertility, tilth, and organic-matter content is also a concern of management in frequently cultivated areas.

The soil in this unit is used mainly for field crops and hay and pasture plants. In the few, small, scattered areas that have a high content of channers in the surface layer, the soil is not well suited to cultivated crops. Fruit trees generally do well on this soil. Specialty crops are not commonly grown, although they could be if intensive management were used.

CAPABILITY UNIT IIs-1

This unit consists of nearly level, well drained or moderately well drained soils of the Bogart, Chili, and Shinrock series. The Bogart and Chili soils formed in loamy material and are underlain by sand and gravel. The Shinrock soil formed in lacustrine material. It is siltier than the Bogart and Chili soils. The soils in this unit are on stream terraces, outwash plains, and beach ridges. They have a deep root zone. Permeability is moderately slow in the Shinrock soil and moderate in the Bogart and Chili soils. Available water capacity is low or medium. The root zone is acid unless the soils have been limed.

A limitation in farming is droughtiness, especially in the Chili soils. The soils warm up and dry out relatively early in spring. The well-drained Chili soil dries out before the moderately well drained Bogart and Shinrock soils. Water erosion is not a hazard on these soils, but some soil blowing occurs on the soils that have a sandy loam surface layer. Surface crusting is more likely on the Shinrock soil than on the other soils in this unit. Plant nutrients tend to leach readily from these soils.

The soils in this unit are used mainly for field crops and hay and pasture plants. They are better suited to crops that are planted early in spring than to other row crops. They are also well suited to irrigation. The soils can be cropped year after year if intensive management is used.

CAPABILITY UNIT IIw-1

This unit consists of nearly level, light-colored and well drained, moderately well drained, or somewhat poorly drained soils of the Chagrin, Lobdell, Orrville, Senecaville, and Tioga series. These soils formed in alluvium and are medium textured. They are on low-lying flood plains and are subject to flooding, particularly during winter and spring. The soils have a deep root zone. Available water capacity is medium or high. The root zone is medium acid to neutral, and the soils rarely require lime.

Seasonal flooding is the major limitation to use of these soils. In addition, most of the soils are subject to some siltation. The soils in this unit are subject to little or no hazard of erosion.

The soils in this unit are used mainly for pasture, because in most areas flooding and siltation are not adequately controlled. Winter wheat is seldom grown, and alfalfa is subject to severe frost heave. If the hazards of flooding and siltation are controlled, the soils are well suited to general farm crops. Row crops can be grown year after year with little or no soil damage if improved or intensive management is used. However, the acreage of these soils is limited and fields are generally small in size. Many areas of this unit are subject to frequent flooding and, therefore, are better suited to trees or grass than to row crops.

CAPABILITY UNIT IIw-2

This unit consists of nearly level or gently sloping, light-colored, somewhat poorly drained soils of the Del Rey, Fitchville, and Haskins series. These soils are on terraces and kames throughout the county. They formed in water-deposited, medium-textured material. If the soils are drained, they have a deep root zone and medium available water capacity. Permeability generally is moderately slow to very slow, but it is moderate in the upper 20 to 30 inches of the Haskins soil. The root zone is acid unless the soils have been limed.

Wetness is the major limitation to use of these soils. The water table is at or near the surface during part part of the year. Ponding is also common in winter and spring and after heavy rain. Some deposition of silt occurs in areas subject to ponding. Fitchville soils on low terraces are also subject to occasional flooding. There is a hazard of erosion in some areas of the gently sloping soils. In some places diversion terraces can be used to reduce runoff from adjacent higher lying areas. Surface and subsurface drainage systems should be used to remove excess water.

These soils are used mainly for general farm crops. They are suited to continuous use if improved or intensive management is used.

CAPABILITY UNIT IIw-3

This unit consists of nearly level to gently sloping, light-colored, somewhat poorly drained soils of the Jimtown and Stafford series. These soils formed in sandy and gravelly outwash. They are on beach ridges, outwash plains, and stream terraces. The Jimtown soil contains more gravel and a slightly higher amount of clay than the more sandy Stafford soil. All the soils have a deep root zone. Permeability is moderate or rapid, and the available water capacity is medium to low. The root zone is generally acid.

Wetness is the major limitation to use of these soils. Maintaining the soil structure is important. Water commonly ponds during winter and spring, especially in areas that receive seep or runoff water from adjacent areas. Erosion is a hazard on the gently sloping soils. Where the surface layer is sandy loam, soil blowing is a severe hazard and the low available water capacity is a limitation. Crusting may be a limitation where the surface layer is silt loam.

If the soils in this unit are adequately drained, they are suited to most of the field crops commonly grown in the county. Adequate drainage generally requires the use of subsurface drains where outlets are available.

Installing diversions at the base of adjacent slopes and constructing shallow ditches help to remove surface water. The soils are suited to continuous use for cultivated crops if improved or intensive management is used. Controlling erosion is important in management of the gently sloping soils.

CAPABILITY UNIT IIw-4

This unit consists of nearly level, dark-colored, very poorly drained soils of the Luray, Mermill, and Olmsted series. These soils typically are in depressions adjacent to beach ridges and in the low, narrow swales that typically lie along natural drainageways. They have a seasonal high water table. Undrained areas are slow to dry out in spring. In drained areas the root zone is deep. Permeability is moderately rapid to moderately slow, and the available water capacity is medium or high. Because the content of organic matter is high in the surface layer, crusting is not likely. However, these soils can be worked within only a narrow range of moisture content.

Very poor natural drainage and the resulting wetness are major limitations to use of these soils. They typically receive runoff water from adjacent higher areas. Water commonly ponds during the wet part of the year. Some deposition, or silting, occurs in areas subject to ponding. There is little or no hazard of erosion on these soils under intensive or improved management.

Row crops can be grown continuously if drainage is adequate and if management is at a high level. Undrained areas of the soils in this unit are not well suited to row crops. Surface and subsurface drains should be used to remove excess water. In some cases subsurface outlets may not be available. Also, bedrock may be within the tiling zone in some of the Olmsted sandstone substratum soils. In some places diversion terraces can be used to reduce runoff from adjacent higher areas.

CAPABILITY UNIT IIIe-1

This unit consists of sloping to moderately steep, light-colored, well-drained soils of the Chili, Conotton, and Oshtemo series. The soils are on ridges and hills. They formed in sandy and gravelly material. The Oshtemo soil is more sandy and does not contain the gravel that is common in both Conotton and Chili soils. The landscape typically is short slopes that are irregular or choppy, but the beach ridges are narrow and long. Permeability is moderately rapid or rapid, and the available water capacity is low. The root zone is deep and is acid unless the soils have been limed.

A severe hazard of erosion is the major limitation to use of these soils. Maintaining fertility, tilth, and the organic-matter content is also a concern in management in frequently cultivated areas. The soils are also droughty in dry periods.

The use of these soils for row crops is limited, but most row crops commonly grown in the county are suited. Also suited are hay and pasture plants, nursery and vegetable crops, berries, and fruit trees. Because these soils tend to be droughty, crops that mature early in the growing season are better suited than other crops, unless irrigation is provided. Close-growing crops, grasses, legumes, and crops that produce a large amount of residue that can be returned to the soil are needed to help to control erosion. The soils can be frequently cultivated if intensive management is used.

CAPABILITY UNIT IIIe-2

This unit consists of gently sloping and sloping, light-colored, well drained or moderately well drained soils of the Ellsworth, Mentor, Rawson, and Upshur series. These soils are on uplands and terraces throughout the county. In some areas they are moderately eroded. The soils have a moderately deep or deep root zone. Permeability ranges from very slow to moderate, and the available water capacity is medium.

The major limitation to use of these soils is the hazard of erosion. Maintaining fertility, soil structure, and the organic-matter content is also a concern in management.

The soils in this unit are used mainly for general farm crops and are suited to adapted hay and pasture plants. If erosion is controlled, row crops can be grown frequently. Erosion is reduced in frequently cultivated areas by using such intensive management practices as planting close-growing crops, grasses, and legumes and crops that produce a large amount of residue that can be returned to the soil.

CAPABILITY UNIT IIIs-1

This unit consists of nearly level to gently sloping, light-colored, well drained or moderately well drained sandy or gravelly soils in the Conotton, Elnora, and Oshtemo series. These soils are mainly on beach ridges on the lake plain, but the Oshtemo soil also is on terraces south of the lake plain. All the soils formed in fairly deep deposits of acid sandy material. Except in the Conotton soil, the content of gravel is very low. All the soils have a deep root zone. Permeability is moderately rapid or rapid, and the available water capacity is low.

Droughtiness is the major limitation in farming on these soils, which warm up and dry out early in spring. Erosion is a hazard on the gently sloping soils in this unit. Soil blowing can be severe for the soils that have a surface layer of sandy loam. Blowing sand from these soils damages early vegetable plants. Strips of rye and other cover crops can be used to protect the vegetable plants. Plant nutrients tend to leach readily from these soils.

These soils are suited to all the field crops and hay and pasture plants commonly grown in the county (fig. 3). The soils in this unit are better suited to winter grain crops or crops that are planted early in spring than to summer row crops, unless irrigation is provided. These soils can be cropped year after year if intensive management is used.

CAPABILITY UNIT IIIw-1

This unit consists only of Holly silt loam. This soil is nearly level and poorly drained. It is on flood plains. A large part of the acreage is in old oxbows or in low depressions on first bottoms. It formed in recently deposited alluvial material. In most places the surface layer is silt loam, but the texture varies over a short distance. The texture is normally variable thoughout the profile. Typically, the silty material is moderately deep to deep over fine sand and gravel. The soil in this

***Figure 3.*—Conotton gravelly loam, 2 to 6 percent slopes, is well suited to specialized crops.**

unit has a deep root zone. Permeability is moderate, and the available water capacity is medium.

Controlling water is the major concern in management. The soil is subject to flooding, and it remains ponded for a long period after the floodwater has receded. Also, surface water and seepage from the adjacent soil areas commonly drain to this soil. In most places tile drains, diversions, and open ditches are needed to lower the water table; however, obtaining an adequate outlet for tile drainage systems is difficult in many areas. The hazard of flooding and the seasonal high water table are also limitations for most nonfarm uses.

This soil is used mainly for permanent pasture. If the soil is adequately drained and is not subject to frequent flooding or ponding, it is suitable for row crops. It is generally not suited to winter grain, because of the hazard of flooding. Where the surface layer dries out, the soil is suitable for summer pasture.

CAPABILITY UNIT IIIw-2

This unit consists of nearly level to gently sloping, light-colored, somewhat poorly drained or moderately well drained soils of the Hornell, Lockport, and Mitiwanga series. Most of these soils are underlain by shale bedrock at a depth of 20 to 40 inches. The Mitiwanga soils are typically underlain by sandstone bedrock. The soils in this unit are mainly on the lake plain. The Lockport soil has a reddish clayey subsoil, and the other soils have a grayish subsoil. The content of clay is slightly lower in the Mitiwanga soils than in the clayey Hornell soil. The Hornell soil is the only moderately well drained soil in this unit. All the soils have a moderately deep root zone. Permeability ranges from very slow to moderate, and the available water capacity is medium to low, depending on the depth to bedrock. The root zone is acid unless the soils have been limed.

The major limitation in farming is the seasonal high water table. This is caused by the underlying bedrock, which tends to slow the downward movement of water. These soils dry out slowly in spring even if they are artificially drained. They can be artifically drained by subsurface drains; this method, however, is not so suitable on these soils as on others, because permeability is moderate to very slow. Also, in places bedrock has to be removed to obtain the desired depth. The gently sloping soils are also subject to runoff and erosion. Erosion is a serious hazard on these soils because the surface layer is relatively thin.

Unless drained, the soils in this unit are not well suited to the commonly grown field crops. They are used mainly for pasture and meadow plants that can tolerate wetness. Alfalfa is poorly suited to these soils because they are shallow over bedrock and are medium acid to strongly acid. Pasturing these soils when they are wet should be avoided because they compact easily.

CAPABILITY UNIT IIIw-3

This unit consists of nearly level to gently sloping, light-colored, somewhat poorly drained or poorly drained soils of the Fulton, Mahoning, Sebring, and Tiro series. The Mahoning and Tiro soils are two of the major soils on the till plain. The Fulton soil is on the lake plain, and the Sebring soil is on silty terraces. These soils have a surface layer of silt loam. Their subsoil is generally clayey, but in the Sebring soil it is mainly silty clay loam. These soils have a moderately deep or deep root zone in areas where they are artificially drained. Permeability is moderately slow to very slow, and the available water capacity is medium or high.

The major limitation to use of the soils in this unit is excessive wetness. During spring and winter, the seasonal high water table is at or near the surface. Ponding is common, particularly on the Sebring soil, which commonly receives a large amount of runoff from adjacent higher soils. All the soils in this unit are slow to warm up and dry out in spring, even where they are artificially drained. Drainage is necessary if optimum crop growth is to be obtained. However, the Mahoning and Fulton soils are not well suited to subsurface drainage, because their subsoil is tight and clayey. Also, some of the soils have bedrock within a depth of about 40 inches, which could interfere with the installation of subsurface drains. Where applicable, both surface and subsurface drains should be used. In some areas these soils have enough slope so that control of erosion is needed, in addition to drainage.

If these soils are drained, they are suited to most of the commonly grown field crops and to hay and pasture plants that tolerate wetness. Maintaining good tilth is necessary if the soils are to be cropped intensively. Working these soils when they are wet or allowing the supply of organic matter to be depleted damages tilth and lowers crop yields. Specialty crops are generally not well suited to these soils.

CAPABILITY UNIT IIIw-4

This unit consists of nearly level, dark-colored, very poorly drained soils of the Lorain and Miner series. These soils have a clayey subsoil. They are on broad flats, in small basinlike areas, and in long, narrow strips along intermittent drainageways. The soils in this unit have a deep root zone. Permeability is slow, and the available water capacity is high. The soils are sticky and plastic when wet. As they dry out, they become hard and firm and have a tendency to shrink and crack. The Miner, shale substratum, soil is underlain by shale bedrock at a depth of about 3½ feet.

Wetness is the major limitation to use of these soils both for cropping and nonfarm purposes. During winter and for an extended period in spring, water is at or near the surface. Ponding is common in areas that serve as sluggish, intermittent drainageways for adjacent soils. Runoff is slow. Cultivation and preparation of a suitable seedbed are difficult on these soils because they are slow to warm up and dry out in spring. A combination of subsurface and surface drains is commonly needed to satisfactorily drain these soils. In places suitable drainage outlets are difficult to obtain.

The soils in this unit are used mainly for general farm crops and hay or pasture plants. They are suited to cropping year after year if intensive management is used. Frost heaving of crops and lodging of small grain are common. Pasturing these soils when they are wet should be avoided. Specialty crops can be grown if water management is good.

CAPABILITY UNIT IIIw-5

This unit consists only of Carlisle mucky silt loam. This soil is level and very poorly drained. It contains organic layers more than 4 feet thick. It is in basinlike or depressional areas that are in old filled lakes and ponds. The areas are small and scattered in the southern part of the county. If the soil is drained, it has a deep root zone. Permeability is moderately rapid, and the available water capacity is high.

Wetness is the major limitation to use of this soil. The water table is at or near the surface most of the time. The construction and maintenance of an adequate drainage system is difficult, particularly if a controlled water level is desired. In many places natural drainage outlets are not available. During dry periods when the water table is lowered, the soil can be seriously damaged by fire and soil blowing. Because this is a low-lying mucky soil, it is more subject to frost than soils on higher areas.

Most areas of this soil are not cultivated, but if the soil is adequately drained it is suited to truck crops and general farm crops, except wheat. Wheat is not suited, because it has a high degree of lodging on organic soils. The soil can be cropped year after year if intensive management is used. Because part of such management is drainage, which enables the upper part of this soil to dry out, irrigation is commonly needed. In addition to supplying water for plant growth, irrigation helps to control soil blowing. Undrained areas of this soil can be used for low-grade pasture during the dry summer months. The soil is poorly suited to woodland, but adapted plants can be grown to improve the areas as wildlife habitat.

CAPABILITY UNIT IVe-1

This unit consists of sloping to steep, well drained or moderately well drained soils of the Ellsworth and Mentor series. These soils formed in medium-textured to moderately heavy textured lacustrine material or in moderately heavy textured glacial till. The Mentor soil typically is on short, steep breaks that separate the higher lying terrace land from the lower lying bottom lands. The Ellsworth soil is on the sloping uplands that are adjacent to entrenched waterways. The subsoil of the Ellsworth soil is sticky and plastic when wet, but as it dries out it becomes hard and shrinks and cracks. The shrinking and cracking are less severe in the Mentor soil because it has a less clayey subsoil. Both soils have a deep root zone. Permeability is very slow in the Ellsworth soils and moderate in the Mentor soil. Available water capacity is medium.

Severe erosion is the major limitation in farming. Runoff is rapid because of slope and because of slow internal drainage in the Ellsworth soil. The soils in this unit are moderately eroded, and the present surface layer is a mixture of material from the subsoil and the original surface layer. Maintaining fertility, tilth, and the organic-matter content is difficult if these soils are cultivated more than occasionally. Soil slippage and gully erosion are common in some areas.

The soils in this unit are used mainly for general farm crops. Row crops can be grown on these soils only occasionally and only if management is intensive. Most cultivated fields are in areas dominated by more gently sloping soils. Special erosion control practices are necessary in large cultivated areas. Commonly, these practices include growing a good cover crop, such as hay or other pasture crops. These soils are also suited to trees and to other vegetation grown for wildlife habitat.

CAPABILITY UNIT IVs-1

This unit consists of nearly level to moderately steep, well-drained, sandy soils of the Tyner series (fig. 4). These soils are on steep sand ridges on the lake plain. They have a deep root zone. Available water capacity is low unless the soils are irrigated.

The lack of available water is a severe limitation to use of these soils. Water moves rapidly through the soils, and they are dry much of the time. In most years, the moisture supply is not adequate for crops. The soil areas that have slopes of more than 6 percent are not well suited to irrigation.

Controlling water erosion is not a major concern on the soils in this unit, because runoff is commonly slow. Soil blowing can be a severe hazard. The ridges on which these soils occur protrude above the surrounding soils and are exposed to the wind. Blowing sand can damage crops, especially early vegetables, in nearby areas. Fertility also is a concern because the content of organic matter and the supply of plant nutrients are low.

Most areas of these soils are not farmed, because the soils are poorly suited to crops. Where hay or pasture crops are grown, only one cutting of hay can be expected, and pasture production is low late in summer and in fall. These soils are a potential source of molding sand. If molding sand is taken out, the surface layer can be removed first, stockpiled, and later replaced in the leveled area. Observation indicates that productivity improves after the upper layer of sand has been removed and the original topsoil returned.

CAPABILITY UNIT IVw-1

This unit consists of nearly level, poorly drained or somewhat poorly drained soils of the Allis and Trumbull series. These soils have a clayey subsoil. They are on uplands. The Allis soil is mainly on the lake plain. This soil is underlain by shale at a depth of 20 to 40 inches. The Trumbull soil is in the glacial till area south of the lake plain. This soil is mainly in low swales along intermittent drainageways. All the soils have a moderately deep or deep root zone where they are drained. Permeability is slow, and the available water capacity is medium.

The major limitation to use of these soils is wetness. The water table is at or near the surface for extended periods, and in some areas water ponds on the surface. Internal drainage and runoff are slow because of nearly level slopes, a clayey subsoil, and poor movement of water in the underlying glacial till and shale. Surface water can generally be removed by ditches. Runoff from adjacent, higher areas in many places can be intercepted and diverted from these soils. The removal of internal water is difficult because the lateral movement of water is slow; therefore, the soils are not well suited to subsurface drainage. Also, in places drainage outlets are difficult to establish. Maintaining tilth and an adequate fertility level is another concern of management. Cultivating or grazing some of these soils when they are too wet contributes to cloddiness and compaction as well as deterioration of tilth. The soils in this unit, except Allis loam, are sticky and plastic when wet, and they are slow to dry out and warm up in spring. The Allis loam soil has a surface layer that is easier to till than that of the other soils in this unit. It tends to dry out and warm up earlier in the growing season, particularly where it is drained.

These soils are used for general farm crops but not for winter wheat. They are poorly suited to specialty crops. Intensive management is needed if the soils are cultivated. Forage plants grown on them should be able to tolerate wetness. Where it is not feasible to drain these soils, they can be used for late-summer pasture or wildlife habitat. The cost of producing crops is high for both soils, but the cost is generally higher on Allis soils because they are more acid. Applying enough lime to make the acid Allis soils suitable for alfalfa is generally not practical. Grapes can be grown successfully on Allis soils, but the acreage in vineyards is declining.

CAPABILITY UNIT VIe-1

This unit consists only of Ellsworth silt loam, 12 to 18 percent slopes, moderately eroded. This soil is moderately well drained. It formed in moderately heavy textured glacial till. It is on the sides of valleys. The soil has a dense, clayey subsoil that slows the downward movement of water. Also, it is underlain by dense

Figure 4.—**Commercial nursery on a Tyner loamy sand. This soil is suited to specialized farming.**

glacial till that restricts the downward movement of water. The soil has a deep root zone. Permeability is very slow, and the available water capacity is medium.

Severe erosion is the major limitation in farming. Runoff is rapid because of the slope and slow internal drainage. The present surface layer is a mixture of material from the original surface layer and from the subsoil. It contains more clay than the noneroded silt loam surface layer. It often becomes hard when it dries, and it is sticky, plastic, and cloddy when wet. Maintaining fertility, tilth, and the organic-matter content is difficult if this soil is cultivated more than occasionally.

This soil is generally not suitable for cultivation, but small areas in fields along with less sloping soils are cultivated. Many such areas are not large enough to warrant use of special erosion control practices, and continuing erosion is therefore a hazard. The larger areas of this soil are used for permanent pasture and woodland. Occasional plowing or disking and reseeding of pasture areas is feasible. Moreover, adequate plant cover must be maintained on pasture and hayland to help to control erosion.

CAPABILITY UNIT VIs-1

This unit consists only of shallow, well-drained Weikert channery fine sandy loam, 1 to 6 percent slopes. Sandstone bedrock is at a depth of 10 to 20 inches. The layer above the bedrock typically contains about 40 percent sandstone channers, which are thin, flat pieces of sandstone that are mainly less than 6 inches long. The soil has a shallow root zone. Permeability is moderately rapid, and the available water capacity is low.

The shallowness to bedrock is the major limitation in farming. The underlying bedrock restricts the growth of roots and the downward movement of water, although water seeps into cracks within a short time after a rain. Erosion is minor on this gently sloping soil. However, the loss of even a small amount of soil material through erosion is serious because there is so little soil material.

Cultivation of this soil is not practical, and most areas are in permanent pasture or have reverted to natural vegetation. The pastured areas dry out quickly in summer and produce little forage. Weeds and small scrub trees occupy many of the areas that are no longer farmed.

CAPABILITY UNIT VIIe-1

This unit consists of steep to very steep, moderately well drained or well drained soils of the Ellsworth and Upshur series. The soils in this unit are on the more rugged valley walls that separate the main waterways from the higher upland levels. They have a surface layer of silt loam and a clayey subsoil. The red Upshur soil formed in material weathered from shale. The Ellsworth soil formed in glacial till. Both soils have a moderately deep or deep root zone. Permeability is slow or very slow, and the available water capacity is medium.

Erosion is the major limitation in farming. Steepness limits the use of machinery. Pasture and forage crops in many places are difficult to establish and maintain. In places, soil slippage is severe. As the soils become dry in summer, they shrink and form small, mostly vertical cracks about 1 inch wide and 2 to 5 feet deep.

These soils are used mainly for woodland. They can also be used for general farm crops, pasture, and hay. Maintaining an adequate vegetative cover is the main concern in management. Usefulness of these soils for forestry is limited because in some areas the soils tend to shift or slip, causing deformation of tree trunks.

Estimated yields

Table 1 shows the estimated average yields per acre of principal crops for most of the soils in the county. The yields are the averages of those expected over a period of several years under two levels of management. Some of the soils are not listed because they are not suited to the crops rated. Also excluded are land types, such as Cut and fill land.

In table 1 yields in columns A are obtained under improved management, and those in columns B are obtained under optimum management.

Under an optimum level of management, practices are used that increase the intake of water and the available water capacity of the soils and excess water is disposed of by appropriate means; practices are used that help to control erosion; suitable methods of plowing, preparing the seedbed, and cultivation are used; weeds, diseases, and insects are controlled; fertility is maintained at the highest level, lime and fertilizer are applied according to needs of the soil and crop, and the fertilizer contains trace elements, such as zinc, cobalt, manganese, and copper, if they are needed; crop varieties that are suited to the soil are selected; and all farming operations are done at the proper time and in the proper way.

Under an improved level of management, the farmer uses some, but not all, of the practices listed under optimum management, or the practices used are not adequate for the needs of the crops.

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 vary from year to year. These yields are intended only as a guide to show the relative productivity of the soils, the response of soils to management, and the relationship of soils to each other. Although the general level of crop yields may change as new methods and new crop varieties are developed, the relationship of the soils to each other is not likely to change.

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

Irrigation

Generally, Lorain County receives sufficient rainfall for most crops. However, intervals commonly occur in which rainfall is less than optimum. During these dry periods supplemental irrigation benefits crops and pasture. At present, only a small acreage is irrigated in the county.

Soils that are best suited to sprinkler irrigation are level to gently sloping, have a deep root zone and favorable permeability and available water capacity, and are easy to maintain in good tilth. Soil features that influence suitability include natural drainage, texture of the surface layer, movement of air and water in the subsoil, and natural fertility. Some soils may be conditioned to increase productivity by irrigating. Conditioning may include smoothing to the desired grade or providing artificial drainage before irrigation water is applied.

The soils in Lorain County vary greatly in suitability for irrigation.

Bogart, Chili, Mentor, and Oshtemo soils that have slopes of 6 percent or less are well suited to irrigation. The other soils in the county are less suited to irrigation because of such characteristics as excessive slope, slow water intake rate, crusting, limited available water capacity, flooding hazard, or somewhat poor, poor, or very poor natural drainage.

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

[Yields in columns A are obtained in the county under improved management; those in columns B are expected under optimum management. Absence of a yield figure indicates that the crop is not commonly grown at the level of management indicated or that the soil is not suited to the crop. Soils and land types not considered suitable for crops are not listed in the table.]

Soil	Corn		Wheat		Soybeans		Mixed hay (legume-grass)	
	A	B	A	B	A	B	A	B
	Bu	*Bu*	*Bu*	*Bu*	*Bu*	*Bu*	*Tons*	*Tons*
Allis loam, 0 to 2 percent slopes	60	85	30	36	22	30	2.0	3.0
Allis silty clay loam, 0 to 2 percent slopes	60	80	28	34	20	26	2.0	3.0
Bogart sandy loam, 0 to 2 percent slopes	80	100	34	42	24	30	2.6	3.6
Bogart loam, 0 to 2 percent slopes	85	100	36	46	26	32	2.8	3.8
Bogart loam, 2 to 6 percent slopes	85	100	36	46	26	32	2.8	3.8
Carlisle mucky silt loam	85	125	—	—	30	40	—	—
Chagrin silt loam	90	120	—	—	32	42	2.8	4.4
Chili loam, 0 to 2 percent slopes	60	90	28	38	26	34	3.0	3.8
Chili loam, 2 to 6 percent slopes	60	90	26	36	24	32	2.8	3.6
Chili loam, 6 to 18 percent slopes, moderately eroded	60	85	22	32	22	28	2.6	3.2
Conotton gravelly loam, 2 to 6 percent slopes	60	85	24	34	20	30	2.4	3.2
Conotton gravelly loam, 6 to 12 percent slopes	55	80	22	32	18	28	2.2	3.0
Dekalb very channery loam, 1 to 6 percent slopes	—	—	20	34	20	30	2.6	3.0
Del Rey silt loam, 1 to 4 percent slopes	80	105	32	44	26	36	2.6	4.6
Ellsworth silt loam, 2 to 6 percent slopes	80	105	36	48	26	34	2.8	4.4
Ellsworth silt loam, 2 to 6 percent slopes, moderately eroded	80	100	34	46	24	32	2.6	4.2
Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded	75	95	28	42	20	28	2.4	4.0
Ellsworth silt loam, 12 to 18 percent slopes, moderately eroded	—	—	20	30	—	—	2.2	3.8
Elnora loamy fine sand, 1 to 3 percent slopes	55	75	28	36	22	28	1.8	2.8
Fitchville silt loam, 0 to 2 percent slopes	75	95	30	40	26	34	2.2	3.2
Fitchville silt loam, 2 to 6 percent slopes	75	95	30	40	26	34	2.2	3.2
Fitchville silt loam, low terrace, 0 to 2 percent slopes	75	95	30	40	26	34	2.2	3.2
Fulton silt loam, 0 to 2 percent slopes	75	95	32	40	28	36	2.6	4.0
Fulton silt loam, 2 to 6 percent slopes	80	100	34	42	28	36	2.6	4.0
Fulton silt loam, sandy substratum, 0 to 2 percent slopes	75	95	32	40	28	36	2.6	4.0
Haskins loam, 0 to 2 percent slopes	85	110	32	46	28	42	3.2	4.4
Haskins loam, 2 to 6 percent slopes	85	110	32	46	28	42	3.2	4.4
Holly silt loam	70	90	—	—	26	32	2.2	3.2
Hornell silt loam, 0 to 2 percent slopes	70	85	28	38	22	30	1.8	2.8
Hornell silt loam, 2 to 6 percent slopes	70	90	28	38	22	30	1.8	2.8
Jimtown sandy loam, 0 to 2 percent slopes	70	95	30	34	22	30	2.0	3.0
Jimtown loam, 0 to 2 percent slopes	75	95	32	36	24	32	2.2	3.2
Jimtown loam, 2 to 6 percent slopes	75	100	32	38	24	34	2.2	3.2
Lobdell silt loam	90	110	—	—	28	36	3.0	4.6
Lockport silty clay loam, 1 to 4 percent slopes	70	90	26	32	24	30	2.6	3.6
Lorain silty clay loam	85	110	30	42	26	38	2.8	4.6
Lorain silty clay loam, sandy substratum	85	110	30	42	26	38	2.8	4.6
Luray silty clay loam	80	110	30	42	26	38	2.8	4.6
Mahoning silt loam, 0 to 2 percent slopes	70	90	30	40	24	32	2.4	3.6
Mahoning silt loam, 2 to 6 percent slopes	70	90	30	40	24	32	2.4	3.6
Mahoning silt loam, 2 to 6 percent slopes, moderately eroded	70	85	28	36	22	28	2.2	3.4
Mahoning silt loam, sandstone substratum, 0 to 2 percent slopes	70	90	30	40	24	32	2.4	3.6
Mahoning-Tiro silt loams, 0 to 2 percent slopes	70	90	32	42	26	34	2.6	3.8
Mahoning-Tiro silt loams, 2 to 6 percent slopes	75	90	32	42	26	34	2.6	3.8
Mentor silt loam, 2 to 6 percent slopes	85	120	34	44	26	34	3.0	4.6
Mentor silt loam, 6 to 12 percent slopes	80	100	28	38	22	28	2.6	4.0
Mentor silt loam, 12 to 25 percent slopes	—	—	22	30	—	—	2.6	3.6
Mermill loam	80	120	30	46	28	42	3.0	5.0
Miner silty clay loam	70	100	30	46	26	36	2.6	4.0
Miner silty clay loam, shale substratum	60	90	24	42	22	32	2.6	3.8
Mitiwanga silt loam, 0 to 2 percent slopes	75	90	30	40	24	30	3.2	4.0
Mitiwanga silt loam, 2 to 6 percent slopes	70	85	28	36	22	26	3.0	3.6
Mitiwanga channery loam, 1 to 4 percent slopes	70	80	26	34	20	24	2.8	3.4
Olmsted fine sandy loam	90	125	32	46	26	40	3.0	4.8
Olmsted loam, sandstone substratum	90	125	28	46	26	40	3.0	4.8
Orrville silt loam	85	105	30	40	24	32	2.8	4.4
Oshtemo sandy loam, 0 to 2 percent slopes	65	85	24	36	22	30	2.6	3.6
Oshtemo sandy loam, 2 to 6 percent slopes	60	80	22	34	22	26	2.6	3.6
Oshtemo sandy loam, 6 to 12 percent slopes	55	75	20	32	18	22	2.2	3.2

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

Soil	Corn		Wheat		Soybeans		Mixed hay (legume-grass)	
	A	B	A	B	A	B	A	B
	Bu	*Bu*	*Bu*	*Bu*	*Bu*	*Bu*	*Tons*	*Tons*
Rawson loam, 0 to 2 percent slopes	85	110	34	48	28	40	3.0	4.4
Rawson loam, 2 to 6 percent slopes	85	110	34	48	28	40	3.0	4.4
Rawson loam, 6 to 12 percent slopes, moderately eroded	70	90	26	40	22	30	2.6	3.6
Sebring silt loam	65	90	28	34	24	30	2.0	3.0
Sebring silt loam, sandstone substratum	65	90	28	34	24	30	2.0	3.0
Senecaville silt loam	85	110	36	46	28	34	3.0	4.6
Shinrock silt loam, 0 to 2 percent slopes	90	110	40	54	30	38	3.0	4.6
Shinrock silt loam, 2 to 6 percent slopes	85	110	38	52	28	36	3.0	4.6
Stafford fine sandy loam	75	90	34	46	24	30	2.6	3.8
Tioga fine sandy loam	80	110	36	46	28	36	3.0	4.6
Trumbull silty clay loam, 0 to 2 percent slopes	65	85	24	36	22	30	2.0	3.0
Tyner loamy sand, 1 to 6 percent slopes	55	70	26	32	20	26	2.0	3.0
Tyner loamy sand, 6 to 12 percent slopes	50	65	22	28	16	22	2.0	3.0
Upshur silt loam, 2 to 8 percent slopes	60	85	22	34	20	26	2.6	3.8
Weikert channery fine sandy loam, 1 to 6 percent slopes			16	32	14	22	2.0	3.0

Woodland[2]

Originally, nearly all of Lorain County was covered with mixed hardwood forest. Most of the forest has now been cleared. In 1967, woodland occupied 49,656 acres, or about 13 percent of the land area of the county.

At the present time, most of the woodland is in small farm woodlots. These are mainly on soils that are naturally wet and undrained and on other soils that are not presently farmed or that are not well suited to crops. For example, about 15 percent of the 49,656 acres is on soils on flood plains; about 59 percent is on wet, nearly level to gently sloping soils on uplands and terraces; about 18 percent is on moderately well drained to well drained, gently sloping to moderately steep soils on uplands and terraces; and about 8 percent is on steep to very steep soils on uplands.

Woodlots are a source of fuel, of rough construction lumber for use on the farm, and of food in the form of nuts and maple syrup. Only a small amount of maple syrup is produced. Fireplace wood is in increasing demand and is becoming a more important source of income. Other important uses include recreation, esthetic value, and wildlife habitat.

The soils of Lorain County have been placed in woodland suitability groups to assist owners in planning the use of their soils for woodland. The woodland suitability groups and other factors important in managing woodlands are shown in table 2. Each woodland suitability group is made up of soils that are suited to the same kinds of trees, that need about the same management where the vegetation on them is similar, and that have the same potential production.

Each woodland group is identified by a three-part symbol such as 1o1, 2w2, or 3c1. The potential productivity of the soils in the group is indicated by the first number in the symbol: *1* and *2* mean good, *3* means fair, and *4* and *5* mean poor. These ratings are based on field measuements of average tree site index for principal soils in each group. Site index of a given soil is the height, in feet, that the dominant and codominant trees of a given species reach in a natural, undisturbed stand in 50 years (*3, 4, 5, 6*).[3]

The second part of the symbol identifying a woodland suitability group is a small letter. The small letter indicates an important soil property that imposes a hazard or limitation in managing the soils of the group for trees. The letter *o* shows that the soils have few limitations that restrict their use for trees. The letter *w* means excessive wetness, either seasonal or all year; the soils have restricted drainage, have a high water table, or are subject to flooding. The letter *c* stands for clayey soils; these soils are moderately restricted to severely restricted for woodland use. The letter *r* shows that the main limitation is steep slopes and that there is hazard of erosion and possible limitation to use of equipment. The letter *d* shows that the main limitation is restricted root depth; in these soils bedrock occurs within 1 foot to 2 feet of the surface. The letter *f* shows that the soils have limited available water capacity because of a large amount of coarse fragments within the soil profile; the fragments are more than 2 millimeters and less than 10 inches in size. The letter *s* stands for sandy soils.

The last part of the symbol is a number that differentiates woodland suitability groups that have identical first and second parts in their identifying symbol. Soils in woodland group 2w1, for example, require somewhat different management than soils in group 2w2.

In table 2 each woodland suitability group in the county is rated for various management hazards or limitations. These ratings are slight, moderate, or severe, and they are described in the following paragraphs.

Erosion hazard refers to the potential hazard of soil

[2] A. NORRIS QUAM, woodland conservationist, Soil Conservation Service, helped to prepare this section.

[3] Italic numbers in parenthesis refer to Literature Cited, p. 97.

TABLE 2.—*Woodland suitability groups*

[Cut and fill land (Cz), Quarries (Qu), and complexes that include Urban land (AmA, CnB, FeA, HtA, JuA,

Woodland suitability group, soil series, and map symbols	Species	Estimated site index [1]	Site quality	Erosion hazard
Group 1o1: Chagrin (Ch). Lobdell (Lb). Mentor (MnB, MnC). Senecaville (Se). Tioga (Tg).	Upland oaks Yellow-poplar Sugar maple	85+ 95+ 85+	Good	Slight
Group 1r1: Mentor (MnE).	Upland oaks	85–95	Good	Moderate
Group 2o1: Bogart (BsA, BtA, BtB). Chili (ClA, ClB, ClD2). Rawson (RdA, RdB, RdC2). Shinrock (SkA, SkB).	Upland oaks	75–85	Good	Slight
Group 2w1: Allis (AkA, AlA). Del Rey (DsB). Holly (Hy). Lorain (Ln, Ls). Luray (Ly). Miner (Mr, Ms). Olmsted (Om, On). Orrville (Or). Sebring (Sb, Sd). Trumbull (TrA).	Upland oaks Yellow-poplar Sugar maple White pine	75–85 85–95 75–85 85–95	Good	Slight
Group 2w2: Fitchville (FcA, FcB, FdA). Haskins (HsA, HsB). Hornell (HzA, HzB). Jimtown (JsA, JtA, JtB). Mahoning (MgA, MgB, MgB2, MhA, MkA, MkB). Mermill (Mo). Stafford (Sw).	Upland oaks Yellow-poplar Sugar maple White pine	75–85 85–95 75–85 85–95	Good	Moderate
Group 3o1: Dekalb (DkB). Ellsworth (ElB, ElB2, ElC2).	Upland oaks Yellow-poplar White pine	65–75 75–85 75–85	Fair	Slight
Group 3r1: Ellsworth (ElD2, ElF2).	Upland oaks	65–75	Fair	Moderate
Group 3c1: Upshur (UpC).	Upland oaks	65–75	Fair	Slight
Group 3w1: Fulton (FuA, FuB, FvA). Lockport (LcB). Mitiwanga (MtA, MtB, MvB).	Upland oaks	65–75	Fair	Slight
Group 3f1: Conotton (CoB, CoC).	Upland oaks	65–75	Fair	Slight

and factors in management

MmA, and MxB) are not placed in a woodland suitability group because their properties are too variable]

Hazards and limitations affecting management					Preferred species	
Equipment limitations	Seedling mortality	Plant competition for— Conifers	Plant competition for— Hardwoods	Windthrow hazard	To favor in existing stands	For planting
Slight	Slight	Severe	Moderate	Slight	Upland oaks, yellow-poplar, black walnut, sugar maple, white ash.	Eastern white pine, black walnut, yellow-poplar, white ash, Norway spruce.
Moderate	Slight	Severe	Moderate	Slight	Yellow-poplar, upland oaks, black walnut.	Eastern white pine, yellow-poplar, black walnut.
Slight	Slight	Severe	Moderate	Slight	Yellow-poplar, black walnut, red oak, white oak.	Eastern white pine, black walnut, yellow-poplar.
Severe	Severe	Severe	Severe	Severe	Red oak, black oak, yellow-poplar, white ash, sugar maple, red maple, pin oak.	Natural seeding.
Moderate	Moderate	Severe	Severe	Moderate	Red oak, black oak, yellow-poplar, white ash, sugar maple, black walnut, red maple.	Eastern white pine, yellow-poplar.
Slight	Slight	Moderate	Slight	Slight	Red oak, white oak, yellow-poplar, black walnut.	Eastern white pine, yellow-poplar.
Moderate	Slight	Moderate	Slight	Slight	Red oak, white oak, yellow-poplar, black walnut, chestnut oak.	Eastern white pine, yellow-poplar.
Moderate	Slight	Moderate	Slight	Slight	Red oak, white oak, black oak, yellow-poplar, black walnut.	Eastern white pine, yellow-poplar.
Moderate	Slight	Moderate	Slight	Slight	Red oak, white oak, black oak, yellow-poplar, black walnut, red maple.	Eastern white pine.
Slight	Moderate	Moderate	Slight	Slight	Red oak, white oak, black oak, yellow-poplar, black walnut.	Eastern white pine, Virginia pine, yellow-poplar.

TABLE 2.—*Woodland suitability groups*

Woodland suitability group, soil series, and map symbols	Species	Estimated site index [1]	Site quality	
Group 3s1: Elnora (EnA). Oshtemo (OtA, OtB, OtC). Tyner (TyB, TyC).	Upland oaks	65–75	Fair	Slight
Group 4d1: Weikert (WeB).	Upland oaks	55–65	Poor	Slight
Group 4c1: Upshur (UpF).	Upland oaks	55–65	Poor	Severe
Group 5w1: Carlisle (Cg). Not suited to trees.				

[1] Site index estimates are based upon data obtained for similar soils in other counties of Ohio and in adjoining States. Site

loss in well-managed woodland. The hazard is *slight* if expected soil losses are small; *moderate* if some soil losses are expected and care is needed during logging and contruction to reduce losses; and *severe* if special methods of operation are necessary for preventing excessive soil losses.

Equipment limitations depend on soil characteristics that restrict or prohibit the use of mechanical equipment, either seasonally or continually. *Slight* means that there are no restrictions on the kind of equipment or time of year it is used; *moderate* means that use of equipment is restricted for 3 months of the year or less; and *severe* means that special equipment is needed and that its use is severely restricted for more than 3 months of the year.

Seedling mortality refers to mortality of naturally occurring or planted tree seedlings, as influenced by kind of soil or topographic conditions. Plant competition is disregarded. *Slight* means a loss of less than 25 percent of the seedlings; *moderate* means a loss of 25 to 50 percent; and *severe* means a loss of more than 50 percent. It is assumed that seed supplies are adequate.

Plant competition is the degree to which undesired plants invade under new openings in the tree canopy. Considered in the ratings are available water capacity, fertility, drainage, and degree of erosion. Conifers and hardwoods are rated separately. *Slight* means that plant competition does not prevent adequate natural regeneration or early growth, nor does it interfere with seedling development; *moderate* means that competition delays natural or artificial establishment and growth rate, but does not prevent the development of fully stocked normal stands; and *severe* means that competition prevents adequate natural or artificial regeneration unless the site receives unusual preliminary preparation practices and continued early maintenance.

Windthrow hazard depends on the soil characteristics that enable trees to resist being blown by wind. *Slight* means that most trees withstand the wind; *moderate* means that some trees are expected to blow down during excessive wetness and high wind; and *severe* means that many trees are expected to blow down when the soil is wet and winds are moderate or high.

Table 2 lists preferred species to favor in existing stands and for planting.

Wildlife

The welfare of any kind of wildlife depends largely on the amount and distribution of food, shelter, and water (*2*). If any of these elements is missing, inadequate, or inaccessible, the animal is absent or scarce. The kinds of wildlife that live in a given area and the number of each kind are closely related to such factors as land use, the resulting kinds and patterns of vegetation, and the supply and distribution of water. These factors, in turn, are generally related to the kinds of soil.

Habitat for wildlife normally can be created or improved by planting suitable vegetation, by properly managing the existing plant cover, by fostering the natural establishment of desirable plants, or by using a combination of these measures.

This section can be used as an aid in—

1. Planning the broad use of parks, refuges, nature-study areas, and other recreational developments for wildlife.
2. Selecting the better soils for creating, improving, or maintaining specific kinds of wildlife habitat elements.
3. Determining the relative intensity of management needed for individual habitat elements.
4. Eliminating sites that would be difficult or not feasible to manage for specific kinds of wildlife.
5. Determining areas that are suitable for acquisition for use by wildlife.

Table 3 lists the soils in the county and rates their suitability for seven elements of wildlife habitat and

and factors in management—Continued

Hazards and limitations affecting management					Preferred species	
Equipment limitations	Seedling mortality	Plant competition for—		Windthrow hazard	To favor in existing stands	For planting
		Conifers	Hardwoods			
Slight	Moderate	Moderate	Slight	Slight	White oak, red oak, black oak.	Eastern white pine, red pine.
Slight	Severe	Slight	Slight	Moderate	Red oak, white oak, chestnut oak.	Eastern white pine, eastern redcedar.
Severe	Moderate	Slight	Slight	Slight	Red oak, black oak.	Eastern white pine.

index represents the height that the trees will attain at age 50 years.

for three classes, or kinds, of wildlife. The ratings in table 3 are well suited, suited, poorly suited, and not suited. Soils that are *well suited* have few limitations; those that are *suited* have moderate limitations, and those that are *poorly suited* have severe limitations. Not considered in the ratings are present land use, the location of a soil in relation to other soils, and the mobility of wildlife. Areas that are artificially drained are seldom used for development of wildlife habitat.

In the following paragraphs the elements of wildlife habitat rated in table 3 are briefly described.

Grain and seed crops include such seed-producing annuals as corn, sorghum, wheat, barley, oats, millet, buckwheat, cowpeas, and other plants commonly grown for grain or for seed. The major soil properties affecting this habitat element are effective root depth, available water capacity, natural drainage, slope, surface stoniness, hazard of flooding, and texture of the surface layer and subsoil.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are established by planting and that furnish wildlife cover and food. Among the plants are bluegrass, fescue, brome, timothy, orchardgrass, reed canarygrass, clover, and alfalfa. The major soil properties affecting this habitat element are effective root depth, available water capacity, natural drainage, slope, surface stoniness, hazard of flooding, and texture of the surface layer and subsoil.

Wild herbaceous plants are native or introduced perennial grasses and weeds that generally are established naturally. They include bluestem, quackgrass, panicgrass, goldenrod, wild carrot, nightshade, and dandelion. They provide food and cover principally to upland wildlife. The major soil properties affecting this habitat element are effective root depth, available water capacity, natural drainage, surface stoniness, hazard of flooding or ponding, and texture of the surface layer and subsoil.

Hardwood plants are nonconiferous trees, shrubs, and woody vines that produce nuts or other fruits, buds, catkins, twigs, or foliage that wildlife eat. They are generally established naturally but may be planted. Among the native kinds are oak, cherry, maple, poplar, apple, hawthorn, dogwood, sumac, sassafras, hazelnut, black walnut, hickory, sweetgum, bayberry, blueberry, huckleberry, blackhaw, virburnum, grape, and briers. The major soil properties affecting this habitat element are effective root depth, available water capacity, natural drainage, and surface stoniness or rockiness. Also in this group are several varieties of fruiting shrubs that are raised commercially for planting. Autumn-olive, Amur honeysuckle, Tatarian honeysuckle, crabapple, multiflora rose, highbush cranberry, and silky dogwood are some of the shrubs that generally are available and can be planted on soils that are rated well suited. Hardwoods that are not available commercially can commonly be transplanted successfully.

Coniferous plants are cone-bearing evergreen trees and shrubs that are used by wildlife primarily as cover, although they also provide browse and seeds or fruitlike cones. Among them are Norway spruce, white pine, Austrian pine, shortleaf pine, hemlock, Scotch pine, redcedar, and northern white-cedar. Generally, the plants are established naturally in areas where cover of weeds and sod is thin, but they may also be planted. The major soil properties affecting this habitat element are effective root depth, available water capacity, natural drainage, surface stoniness or rockiness, and texture of the surface layer and subsoil.

Wetland plants are wild, herbaceous, annual and perennial plants that grow on moist to wet sites. Submerged or floating aquatics are not included. Wetland plants produce food and cover extensively used, mainly by wetland forms of wildlife. They include smartweed, wild millet, bulrush, sedges, barnyard grass, duckmillet, arrow-arum, pickerelweed, waterwillow, wetland grasses, wildrice, and cattails. The major soil properties affecting this habitat element are natural drainage, surface stoniness, frequency of flooding or ponding, slope, and texture of the surface layer and subsoil.

TABLE 3.—*Suitability of soils for elements*

[Not rated because their properties are too variable are Cut and fill land (Cz), Quarries

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood plants
Allis: AkA, AlA	Suited	Well suited	Well suited	Well suited
Bogart:				
BsA, BtA	Well suited	Well suited	Well suited	Well suited
BtB	Well suited	Well suited	Well suited	Well suited
Carlisle: Cg	Not suited	Poorly suited	Not suited	Not suited
Chagrin: Ch	Well suited	Well suited	Well suited	Well suited
Chili:				
ClA, ClB	Well suited	Well suited	Well suited	Well suited
ClD2	Suited	Well suited	Well suited	Well suited
Conotton: CoB, CoC	Suited	Well suited	Suited	Suited
Dekalb: DkB	Suited	Well suited	Suited	Suited
Del Ray: DsB	Suited	Well suited	Well suited	Well suited
Ellsworth:				
ElB, ElB2	Well suited	Well suited	Well suited	Well suited
ElC2	Suited	Well suited	Well suited	Well suited
ElD2	Poorly suited	Suited	Well suited	Well suited
ElF2	Not suited	Suited	Well suited	Well suited
Elnora: EnA	Suited	Well suited	Well suited	Well suited
Fitchville:				
FcA, FdA	Suited	Well suited	Well suited	Well suited
FcB	Suited	Well suited	Well suited	Well suited
Fulton:				
FuA, FvA	Suited	Well suited	Well suited	Well suited
FuB	Suited	Well suited	Well suited	Well suited
Haskins:				
HsA	Suited	Well suited	Well suited	Well suited
HsB	Suited	Well suited	Well suited	Well suited
Holly: Hy	Poorly suited	Suited	Suited	Suited
Hornell: HzA, HzB	Suited	Well suited	Well suited	Well suited
Jimtown:				
JsA, JtA	Suited	Well suited	Well suited	Well suited
JtB	Suited	Well suited	Well suited	Well suited
Lobdell: Lb	Well suited	Well suited	Well suited	Well suited
Lockport: LcB	Suited	Well suited	Well suited	Well suited
Lorain: Ln, Ls	Not suited	Poorly suited	Poorly suited	Poorly suited
Luray: Ly	Not suited	Poorly suited	Poorly suited	Poorly suited
Mahoning:				
MgA, MkA, MhA	Suited	Well suited	Well suited	Well suited
MgB, MgB2, MkB	Suited	Well suited	Well suited	Well suited
Mentor:				
MnB	Well suited	Well suited	Well suited	Well suited
MnC	Suited	Well suited	Well suited	Well suited
MnE	Poorly suited	Suited	Well suited	Well suited
Mermill: Mo	Not suited	Poorly suited	Poorly suited	Poorly suited
Miner: Mr, Ms	Not suited	Poorly suited	Poorly suited	Poorly suited

of wildlife habitat and kinds of wildlife

(Qu), and the complexes that include Urban land (AmA, CnB, FeA, HtA, JuA, MnA, and MxB)]

Elements of wildlife habitat—Continued			Kinds of wildlife		
Coniferous plants	Wetland plants	Shallow-water areas	Open-land	Woodland	Wetland
Well suited	Suited	Suited	Well suited	Well suited	Suited.
Well suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Well suited	Poorly suited	Not suited	Well suited	Well suited	Not suited.
Not suited	Well suited	Well suited	Not suited	Not suited	Well suited.
Well suited	Poorly suited	Not suited	Well suited	Well suited	Not suited.
Well suited	Not suited	Not suited	Well suited	Well suited	Not suited.
Well suited	Not suited	Not suited	Well suited	Well suited	Not suited.
Suited	Not suited	Not suited	Suited	Suited	Not suited.
Suited	Not suited	Not suited	Suited	Suited	Not suited.
Well suited	Suited	Poorly suited	Well suited	Well suited	Poorly suited.
Well suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Well suited	Not suited	Not suited	Well suited	Well suited	Not suited.
Well suited	Not suited	Not suited	Suited	Well suited	Not suited.
Well suited	Not suited	Not suited	Suited	Well suited	Not suited.
Well suited	Poorly suited	Not suited	Well suited	Well suited	Not suited.
Well suited	Suited	Suited	Well suited	Well suited	Suited.
Well suited	Poorly suited	Poorly suited	Well suited	Well suited	Suited.
Well suited	Suited	Suited	Well suited	Well suited	Suited.
Well suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Well suited	Suited	Suited	Well suited	Well suited	Suited.
Well suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Suited	Well suited	Suited	Suited	Suited	Suited.
Well suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Well suited	Suited	Suited	Well suited	Well suited	Suited.
Well suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Well suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Well suited	Suited	Suited	Well suited	Well suited	Suited.
Poorly suited	Well suited	Well suited	Poorly suited	Poorly suited	Well suited.
Poorly suited	Well suited	Suited	Poorly suited	Poorly suited	Suited.
Well suited	Suited	Suited	Well suited	Well suited	Suited
Well suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Well suited	Poorly suited	Not suited	Well suited	Well suited	Not suited.
Well suited	Not suited	Not suited	Well suited	Well suited	Not suited.
Well suited	Not suited	Not suited	Well suited	Well suited	Not suited.
Poorly suited	Well suited	Well suited	Poorly suited	Poorly suited	Well suited.
Poorly suited	Well suited	Well suited	Poorly suited	Poorly suited	Well suited.

TABLE 3.—*Suitability of soils for elements of*

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood plants
Mitiwanga:				
MtA	Suited	Well suited	Well suited	Well suited
MtB, MvB	Suited	Well suited	Well suited	Well suited
Olmsted: Om, On	Not suited	Poorly suited	Poorly suited	Poorly suited
Orrville: Or	Suited	Well suited	Well suited	Well suited
Oshtemo: OtA, OtB, OtC	Suited	Well suited	Well suited	Suited
Rawson:				
RdA	Well suited	Well suited	Well suited	Well suited
RdB	Well suited	Well suited	Well suited	Well suited
RdC2	Suited	Well suited	Well suited	Well suited
Sebring: Sb, Sd	Poorly suited	Suited	Suited	Suited
Senecaville: Se	Suited	Well suited	Well suited	Well suited
Shinrock:				
SkA	Well suited	Well suited	Well suited	Well suited
SkB	Well suited	Well suited	Well suited	Well suited
Stafford: Sw	Suited	Well suited	Well suited	Well suited
Tioga: Tg	Well suited	Well suited	Well suited	Well suited
Trumbull: TrA	Poorly suited	Suited	Suited	Suited
Tyner: TyB, TyC	Poorly suited	Suited	Suited	Poorly suited
Upshur:				
UpC	Suited	Well suited	Suited	Poorly suited
UpF	Not suited	Poorly suited	Suited	Poorly suited
Weikert: WeB	Poorly suited	Suited	Suited	Suited

Shallow-water areas are impoundments or excavations that provide areas of shallow water, generally no more than 5 feet deep, near food and cover for wetland wildlife. Examples of such developments are shallow dugouts, level ditches, and devices that keep the water 6 to 24 inches deep in marshes. The major soil properties affecting this habitat element are depth to bedrock, natural drainage, slope, hazard of flooding, and surface stoniness.

In the following paragraphs the kinds of wildlife rated in table 3 are briefly described.

Open-land wildlife includes quail, pheasant, meadowlark, field sparrow, dove, cottontail rabbit, red fox, and woodchuck. These birds and mammals normally make their home in areas of cropland, pasture, meadow, and lawns and in areas that are overgrown with grasses, herbs, and shrubs. The rating is based on the ratings shown for grain and seed crops, grasses and legumes, wild herbaceous plants, hardwood plants, and coniferous plants.

Woodland wildlife includes woodcock, thrush, vireo, scarlet tanager, gray and red squirrel, gray fox, white-tailed deer, raccoon, and opossum. These birds and mammals obtain food and cover in stands of hardwoods, coniferous trees, shrubs, or a mixture of these plants. The rating is based on the ratings listed for grasses and legumes, wild herbaceous plants, hardwood plants, and coniferous plants.

Wetland wildlife includes ducks, geese, rails, herons, shore birds, and muskrat. These birds and mammals normally make their home in wet areas, such as ponds, marshes, and swamps. The rating is based on the ratings shown for wetland plants and shallow-water areas.

Engineering Uses of the Soils[4]

This section is useful to those who need information about soils used as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, strength, compaction characteristics, soil drainage condition, shrink-swell potential, grain size, plasticity, and soil reaction. Also important are depth to the water table, depth to bedrock, and soil slope. These properties, in various degrees and combinations, affect construction and maintenance of roads (fig. 5), airports, pipelines, foun-

[4] LLOYD GILLOGLY, construction engineer, Soil Conservation Service, reviewed this section.

wildlife habitat and kinds of wildlife—Continued

Elements of wildlife habitat—Continued			Kinds of wildlife		
Coniferous plants	Wetland plants	Shallow-water areas	Open-land	Woodland	Wetland
Well suited Well suited	Suited Poorly suited	Suited Poorly suited	Well suited Well suited	Well suited Well suited	Suited. Poorly suited.
Poorly suited	Well suited	Poorly suited	Poorly suited	Poorly suited	Suited.
Well suited	Suited	Suited	Well suited	Well suited	Suited.
Suited	Not suited	Not suited	Well suited	Suited	Not suited.
Well suited Well suited Well suited	Poorly suited Poorly suited Not suited	Poorly suited Not suited Not suited	Well suited Well suited Well suited	Well suited Well suited Well suited	Poorly suited. Not suited. Not suited.
Suited	Well suited	Suited	Suited	Suited	Suited.
Well suited	Suited	Suited	Well suited	Well suited	Suited.
Well suited Well suited	Poorly suited Poorly suited	Poorly suited Not suited	Well suited Well suited	Well suited Well suited	Poorly suited. Not suited.
Well suited	Suited	Not suited	Well suited	Well suited	Poorly suited.
Well suited	Poorly suited	Not suited	Well suited	Well suited	Not suited.
Suited	Well suited	Well suited	Suited	Suited	Well suited.
Poorly suited	Not suited	Not suited	Suited	Poorly suited	Not suited.
Poorly suited Poorly suited	Poorly suited Not suited	Not suited Not suited	Suited Poorly suited	Suited Poorly suited	Not suited. Not suited.
Suited	Not suited	Not suited	Suited	Suited	Not suited.

dations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information in this section of the soil survey can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the kinds of soil on which they are built, for the purpose of predicting performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 4, 5, and 6, which show, respectively, results of engineering laboratory tests on soil samples, several estimated soil properties significant in engineering, and interpretations for various engineering uses.

This information, along with the soil map and other parts of this publication, can be used to make interpretations in addition to those in tables 6 and 7, and it also can be used to make other useful maps.

This information, however, does not eliminate the need for further investigations at sites selected for engineering works, especially works that involve heavy loads or that require excavations to depths greater than those shown in the tables, generally depths of more than 6 feet. Also, inspection of sites, especially of small ones, is needed because many delineated areas of a given soil mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some of the terms used in this soil survey have special meaning to soil scientists that is not known to all engineers. The Glossary defines many of these terms as they are commonly used in soil science.

Engineering classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system

Figure 5.—**Soil slip along road cut. Seepage areas in the substratum of Haskins soils result in instability.**

(*13*), used by the Soil Conservation Service, the Department of Defense, and other agencies, and the AASHTO system (*1*), adopted by the American Association of State Highway and Transportation Officials.

In the Unified system soils are classified according to particle-size distribution, plasticity, liquid limit, and organic-matter content. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, ML–CL.

The AASHTO system is used to classify soils according to those properties that affect use in highway construction and maintenance. In this system a soil is placed in one of seven basic groups that range from A–1 to A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A–7, are clay soils that have low strength when wet and that are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b; A–2–4, A–2–5, A–2–6, A–2–7; and A–7–5, A–7–6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The AASHTO classification for tested soils, with group index numbers in parentheses, is shown in table 4; the estimated classification, without group index numbers, is shown in table 5 for all soils mapped in the county.

Engineering test data

Samples of six soils in Lorain County were tested according to standard AASHTO procedures to help evaluate the soils for engineering purposes. Only selected layers of each soil were sampled. The results of these tests are shown in table 4.

Table 4 contains moisture-density data for some of the tested soils. If a soil material is compacted at increasing moisture content, assuming that the compaction effort remains constant, the density of the compacted material increases until the *optimum moisture* *content* is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed the *maximum dry density*. Moisture-density data are important in earthwork because, as a rule, maximum stability is obtained if the soil is compacted to the maximum dry density when it is at approximately the optimum moisture content.

The mechanical analyses were made by using a combination of the sieve and hydrometer methods. Percentages of clay obtained by the hydrometer method should not be used in naming the textural class for soil.

Tests for plastic limit and liquid 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 is further increased, the material changes from a plastic state to a liquid state. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The *liquid limit* is the moisture content at which the material passes from a plastic to a liquid state. The *plasticity index* is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which the soil material is in a plastic condition. Some silty and sandy soils are nonplastic. They do not become plastic at any moisture content.

Soil properties significant in engineering

Several estimated soil properties significant in engineering are shown in table 5. These estimates are made for typical soil profiles, by layers sufficiently different to have different significance for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. Following are explanations of some of the columns in table 5.

Depth to seasonal high water table is distance from the surface of the soil to the highest level that ground water reaches in the soil in most years.

Depth to bedrock is distance from the surface of the soil to the upper surface of the rock layer.

Soil texture is described in table 5 in the standard terms used by the Department of Agriculture. These terms take into account the relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added, as for example, "gravelly loamy sand." "Sand," "silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary.

Permeability is that quality of a soil that enables it to transmit water or air. It is estimated on the basis of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 5 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Available water capacity is the ability of soil to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

Reaction is the degree of acidity or alkalinity of a soil, expressed as pH. The pH value and terms used to describe soil reaction are explained in the Glossary.

Shrink-swell potential is the relative change in volume to be expected of soil material with changes in moisture content; that is, the extent to which the soil shrinks as it dries out or swells when it gets wet. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A *high* shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with material that has this rating.

Corrosivity, as used in table 5, pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. Rate of corrosion of uncoated steel is related to such soil properties as drainage, texture, total acidity, and electrical conductivity of the soil material. Ratings of soils for corrosivity to concrete are based mainly on soil texture and acidity. Installations that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations made entirely in one kind of soil or in one soil horizon. A corrosivity rating of *low* means that there is a low probability of soil-induced corrosion damage. A rating of *high* means that there is a high probability of damage, so that protective measures for steel and more resistant concrete should be used to avoid or minimize damage.

Engineering interpretations of the soils

The interpretations in table 6 are based on the estimated engineering properties of soils shown in table 5, on test data for soils in this county and others nearby or adjoining, and on the experience of engineers and soil scientists with the soils of Lorain County. Table 6 lists soil features not to be overlooked in planning, installation, and maintenance of highway location, pipelines, pond reservoir areas and embankments, drainage for crops and pasture, irrigation, and waterways.

Soils most susceptible to damaging frost action are silt loams and fine sandy loams that are wet or saturated most of the winter. Such soils are rated *high*.

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, as for preparing a seedbed; natural fertility of the material, or the response of plants when fertilizer is applied; and absence of substances toxic to plants. Texture of the soil material and its content of stone fragments affect suitability. Also considered in the ratings is damage that results at the area from which topsoil is taken.

Sand and gravel are used in great quantities in many kinds of construction. The ratings in table 6 provide guidance about where to look for probable sources. A soil rated as a *good* or *fair* source of sand or gravel generally has a layer at least 3 feet thick, the top of which is within a depth of 6 feet. The ratings do not take into account thickness of overburden, location of

TABLE 4.—*Engineering*

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

Soil name and location	Parent material	Ohio report No.	Depth	Moisture-density [1]	
				Maximum dry density	Optimum moisture
			In	*Lb per cu ft*	*Pct*
Allis silty clay loam: City of Avon: 255 feet S. of Chester Road and ⅝ mile W. of Jaycox Road along E. boundary of orchard. Modal.	Glacial till over shale bedrock.	82648	0–8		
		82649	10–19		
Fitchville silt loam: Carlisle Township: ¼ mile N. of East River Road, S. of Chestnut Ridge Road, and ⅜ mile E. of Dewhurst Road. Modal.	Lacustrine sediment.	82650	0–7		
		82651	26–42		
		82652	55–65		
Mahoning silt loam: Eaton Township: 305 feet W. of Hawke Road and 1,500 feet S. of Cooley Road. Modal.	Glacial till.	700	0–7	97	23
		701	14–20	105	18
		702	42–46	107	17
Mermill loam: Avon Township, City of Avon: 300 feet E. of Jaycox Road at a point ¼ mile S. of Riegelsberger Road. Modal.	Lacustrine sediment.	711	0–9		
		712	14–32		
		713	32–42		
Miner silty clay loam: Ridgeville Township, City of North Ridgeville: 200 feet E. of Jaycox Road and 300 feet S. of Mills Road. Modal.	Lacustrine sediment.	708	0–9	86	30
		709	18–25	108	22
		710	56–80	114	16
Miner silty clay loam, shale substratum: City of Avon Lake: 450 feet S. of Electric Boulevard and 600 feet W. of Lear-Nagle Road. Modal.	Lacustrine sediment over shale bedrock.	82645	0–6		
		82646	9–17		
		82647	29–43		

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

[2] Mechanical analysis according to the AASHTO Designation T 88–57 (*1*). Results by this procedure may differ somewhat from the results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes of soil.

the water table, or other factors that affect mining of the material, and neither do they indicate quality of the deposit.

Road fill is soil material used in embankments for roads. The suitability ratings reflect the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage. The ratings also reflect the relative ease of excavating the material at borrow areas.

Soil properties that most affect highway location are load-supporting capacity and stability of the subgrade and the workability and quantity of available cut and fill material. The AASHTO and Unified classifications of the soil material, and also the shrink-swell potential, indicate traffic-supporting capacity. Wetness and flooding affect stability of the material. Slope, depth to hard rock, content of stones and rocks, and wetness affect ease of excavation and amount of cut and fill needed to form an even grade.

Soil features that commonly affect pipeline construction and maintenance are depth to hard bedrock, flooding, soil texture, corrosivity, slope, rock stability, and natural drainage.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for pond reservoir areas have low seepage, which is related to their permeability and depth to fractured or permeable bedrock or other permeable material.

Embankments and dikes require soil material that is resistant to seepage and piping and of favorable stability, shrink-swell potential, shear strength, and compactibility. Presence of stones or organic material in a soil are among the unfavorable factors.

Drainage for crops and pasture is affected by such soil properties as permeability, texture, and structure;

test data

of the American Association of State Highway and Transportation Officials (AASHTO) (*1*)]

Mechanical analysis[2]							Liquid limit	Plasticity index	Classification		
Percentage passing sieve—						Percentage smaller than 0.005 mm			AASHTO[3]	Unified[4]	Ohio[5]
¾ in	⅜ in	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)						
							Pct				
--------	--------	--------	100	99	94	59	43	13	A–7–5(10)	ML	A–7–5
--------	--------	100	100	99	95	69	54	21	A–7–5(15)	MH	A–7–5
--------	--------	100	100	99	88	45	36	12	A–6(9)	ML–CL	A–6a
--------	--------	100	100	98	90	50	42	18	A–7–6(12)	ML–CL	A–7–6
--------	--------	100	100	94	86	22	33	11	A–6(8)	ML–CL	A–6a
--------	--------	100	100	98	87	47	35	11	A–6(8)	ML–CL	A–6a
--------	--------	100	95	92	83	60	41	24	A–7–6(14)	CL	A–7–6
--------	100	97	87	82	73	44	36	16	A–6(10)	CL	A–6b
--------	--------	100	100	96	56	38	--------	[6] NP	A–4(4)	ML	A–4a
--------	--------	100	92	81	54	32	24	8	A–4(4)	CL	A–4a
--------	--------	100	100	99	90	79	46	24	A–7–6(15)	CL	A–7–6
--------	--------	100	100	98	90	60	51	15	A–7–5(12)	MH	A–7–5
--------	--------	99	93	91	84	60	48	24	A–7–6(15)	CL	A–7–6
100	95	88	81	74	65	39	32	16	A–6(8)	CL	A–6b
--------	--------	100	100	97	91	58	55	21	A–7–5(15)	MH	A–7–5
--------	--------	100	100	100	99	73	56	25	A–7–5(17)	MH–CH	A–7–5
--------	--------	100	100	100	100	67	45	19	A–7–6(13)	ML–CL	A–7–6

[3] Based on AASHTO Designation M 145–49 (*1*).
[4] Based on the Unified soil classification system (*13*).
[5] Based on Classification of Soils, Ohio State Highway Testing Laboratory, February 1, 1955.
[6] NP = nonplastic.

depth to rock or other layers that influence rate of water movement; depth to the water table; slope; stability in ditchbanks; susceptibility to stream overflow; alkalinity; and availability of outlets for drainage (fig. 6).

Irrigation of a soil is affected by such features as slope; susceptibility to stream overflow, water erosion, or soil blowing; texture; content of stones; depth of root zone; rate of water intake at the surface; permeability of soil layers below the surface layer and in other layers that restrict movement of water; amount of water held available to plants; and need for drainage, or depth to water table or bedrock.

Layout and construction of waterways are affected by such soil properties as texture, depth, and erodibility of the soil material; presence of stones or rock outcrops; and slope. Other factors that affect waterways are seepage, natural soil drainage, available water capacity, susceptibility to siltation, and the ease of establishing and maintaining vegetation.

Town and Country Planning

Most of Lorain County has been used for farming in the past, but an increasingly large acreage is being taken out of farming and is being used for transportation or for residential, commercial, industrial, and recreational facilities. The shift to these other uses has been going on at a progressively increasing rate. A large acreage in the county is presently idle or in nonfarm uses. This is partly a result of the trend for land to be used for purposes other than farming.

The expansion of town and country uses of land can remove many acres from farm use in a short period. Freeways and superhighways can require as much as 50 acres per mile. Shopping centers may be large

TABLE 5.—*Estimated soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The instructions for referring to other series that appear in the first column of this table. The symbol < means less than; the symbol

Soil series and map symbols	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface	Coarse fraction larger than 3 inches	Percentage passing sieve— No. 4 (4.7 mm)	Percentage passing sieve— No. 10 (2.0 mm)	Percentage passing sieve— No. 40 (0.42 mm)	Percentage passing sieve— No. 200 (0.074 mm)
	Ft	*Ft*	*In*	*Pct*				
Allis: AkA, AlA, AmA. Urban land part of AmA too variable to rate.	0–1	2–3	0–8		95–100	95–100	90–100	75–100
			8–36	0–5	95–100	90–100	85–100	80–100
			36					
Bogart: BsA, BtA, BtB	1½–2½	>6	0–8	0–5	85–100	80–100	75–95	50–80
			8–30	0–5	75–100	70–100	60–90	40–70
			30–42	0–5	75–100	70–100	60–90	45–75
			42–60	0–5	75–90	70–85	40–70	15–45
Carlisle: Cg	0	>6	0–16		95–100	90–100	85–100	70–90
			16–60					
Chagrin: Ch	>3	>6	0–11		95–100	90–100	85–100	75–100
			11–30		95–100	90–100	85–100	65–100
			30–60		95–100	90–100	85–100	69–95
Chili: ClA, ClB, ClB2, CnB. Urban land part of CnB too variable to rate.	>3	>6	0–19	0–5	90–100	70–90	50–75	40–70
			19–42	0–10	70–90	50–80	35–65	30–60
			42–60	0–10	45–75	25–65	20–55	5–25
Conotton: CoB, CoC	>3	>6	0–8	5–10	70–90	55–75	45–65	25–40
			8–56	10–20	50–75	35–60	20–40	10–25
			56–60	10–20	40–75	25–60	15–50	5–15
Cut and fill land: Cz. Material too variable to rate; onsite inspection needed.								
Dekalb: DkB	>3	2–3	0–9	1–10	75–90	70–90	60–80	30–50
			9–26	5–15	60–90	50–75	40–60	15–30
			26					
Del Rey: DsB	½–1½	>6	0–8		95–100	90–100	85–100	65–95
			8–30		95–100	90–100	85–100	75–95
			30–60		95–100	90–100	85–100	70–95
Ellsworth: ElB, ElB2, ElC2, ElD2, ElF2.	1½–3	>5	0–9		95–100	90–100	85–95	75–90
			9–29		95–100	90–100	80–100	75–95
			29–81		95–100	85–100	80–100	70–95
Elnora: EnA	1½–3	>6	0–11		85–100	80–100	75–95	20–35
			11–34		85–100	80–100	75–100	15–30
			34–60		85–100	80–100	75–100	15–30
Fitchville: FcA, FcB, FdA, FeA. Urban land part of FeA too variable to rate.	½–1½	>6	0–10		100	100	95–100	85–100
			10–33		100	100	95–100	80–100
			33–60		95–100	90–100	85–100	60–95
Fulton: FuA, FuB	½–1½	>6	0–8		100	100	95–100	80–100
			8–36		100	100	95–100	80–100
			36–72		100	95–100	90–100	85–100

significant to engineering

soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the
> means more than. Absence of data indicates that the soil is too variable to be rated or that no estimate was made]

USDA texture	Classification		Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential	
	Unified	AASHTO					Steel	Concrete
			In per hr	*In per in of soil*	*pH*			
Silty clay loam	CL or ML	A-6 or A-7	0.6-2.0	0.13-0.17	4.5-5.5	Moderate		Moderate.
Silty clay or silty clay loam	CH, CL, or MH	A-6 or A-7	0.06-0.2	0.11-0.15	4.5-5.5	Moderate	High	Moderate.
Shale bedrock.								
Loam	ML or CL	A-4 or A-6	2.0-6.0	0.13-0.17	5.6-7.3	Low		Low.
Loam and gravelly loam	ML or SM	A-4 or A-6	2.0-6.0	0.11-0.15	5.1-6.5	Low	Moderate	Moderate.
Clay loam or loam	ML or SC	A-4 or A-6	0.6-2.0	0.12-0.16	5.6-6.5	Low	Moderate	Moderate.
Gravelly loamy sand	SM or SC	A-2 or A-4	>6.0	0.08-0.12	5.1-7.3	Low	Moderate	Moderate.
Mucky silt loam	Pt or ML	A-4		0.20-0.25	4.5-6.0	Low		Moderate.
Muck	Pt	(1)	>6.0	0.20-0.25	4.5-7.3		High	Moderate.
Silt loam	ML or CL	A-4 or A-6	2.0-6.0	0.16-0.20	5.6-6.5	Low		Low.
Silt loam	ML or CL	A-4 or A-6	0.6-2.0	0.16-0.20	6.1-7.3	Low	Low	Low.
Silt loam and fine sandy loam.	ML or CL	A-4 or A-6	0.6-2.0	0.16-0.20	6.1-7.3	Low	Low	Low.
Loam	ML or SM	A-4	2.0-6.0	0.13-0.17	5.1-7.3	Low		Low.
Gravelly loam	GM or ML	A-4, A-2, or A-6	2.0-6.0	0.10-0.14	5.6-6.5	Low	Low	Moderate.
Stratified sand and gravel	SM or GM	A-1 or A-2	>6.0	0.02-0.04	5.6-6.5	Low	Low	Moderate.
Gravelly loam	SM, SC, or GM	A-2 or A-4	>6.0	0.08-0.12	5.6-7.3	Low		Low.
Gravelly sandy loam and very gravelly loam.	GM or GC	A-1 or A-2	>6.0	0.05-0.08	5.1-6.5	Low	Low	High.
Gravelly loamy sand	GW-GM	A-1 or A-2	>6.0	0.02-0.05	4.5-6.5	Low	Low	High.
Channery loam	SM, SC, or GM	A-2	>6.0	0.08-0.12	4.5-5.5	Low		Moderate.
Channery loam and sandy loam.	SM	A-2	>6.0	0.07-0.12	4.5-6.0	Low	Moderate	Moderate.
Sandstone.								
Silt loam	ML or CL	A-4 or A-6	0.6-2.0	0.16-0.20	5.1-6.0	Low		Low.
Silty clay loam	CH or CL	A-6 or A-7	0.06-0.2	0.13-0.17	5.6-7.3	Moderate	Moderate	Low.
Silt loam	ML or CL	A-4 or A-6	0.2-0.6	0.14-0.18	6.1-7.8	Low	Moderate	Low.
Silt loam	ML or CL	A-4 or A-6	0.6-2.0	0.16-0.20	4.5-6.0	Low		Moderate.
Silty clay loam	CL or CH	A-6 or A-7	<0.06	0.15-0.19	4.5-7.3	Moderate	High	Moderate.
Clay loam	CL or CH	A-6 or A-7	0.06-0.2	0.13-0.17	6.6-7.8	Moderate	Moderate	Low.
Loamy fine sand	SC or SM	A-2	>6.0	0.06-0.10	5.6-6.5	Low		Low.
Loamy fine sand	SC or SM	A-2	>6.0	0.05-0.09	5.1-6.5	Low	Low	Low.
Loamy fine sand	SM or SC	A-2	>6.0	0.04-0.08	5.1-7.3	Low	Low	Low.
Silt loam	ML or CL	A-4 or A-6	0.6-2.0	0.16-0.20	4.5-6.5	Low		Moderate.
Silt loam or silty clay loam	CL or ML	A-7 or A-6	0.2-0.6	0.13-0.17	4.5-6.5	Moderate	High	Moderate.
Silt loam	ML or CL	A-4 or A-6	0.2-0.6	0.15-0.19	6.1-7.3	Low	Moderate	Low.
Silt loam	ML or CL	A-6 or A-4	0.6-2.0	0.17-0.20	5.6-7.3	Low		Moderate.
Clay or silty clay loam	CL or CH	A-6 or A-7	0.06-0.2	0.15-0.18	5.1-7.3	High	High	Moderate.
Clay	CH or MH	A-7	0.06-0.2	0.12-0.16	6.6-7.8	High	High	Low.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	Coarse fraction larger than 3 inches	Percentage passing sieve—			
	Seasonal high water table	Bedrock			No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)
	Ft	*Ft*	*In*	*Pct*				
Fulton—continued								
FvA			40–60		85–100	80–100	55–75	25–45
To a depth of about 40 inches, estimates are the same as FuA and FuB.								
Haskins: HsA, HsB, HtA	½–1½	>6	0–13	0–5	85–100	80–95	75–95	50–80
Urban land part of HtA too variable to rate.			13–32	5–10	75–95	70–95	65–90	50–80
			32–60	0–5	85–100	80–100	75–100	70–95
Holly: Hy	0–½	>6	0–8		95–100	90–100	85–100	70–100
			8–33		95–100	90–100	85–100	80–100
			33–60		95–100	90–100	50–85	30–50
Hornell: HzA, HzB	1½–3	2–3	0–6		90–100	85–100	75–100	65–100
			6–23	0–10	80–100	75–100	70–95	60–90
			23					
Jimtown: JsA, JtA, JtB, JuA	½–1½	>6	0–10	0–5	90–100	80–90	70–85	50–80
Urban land part of JuA too variable to rate.			10–37	0–10	80–95	75–90	65–85	30–55
			37–60	5–20	50–75	45–60	30–50	10–40
Lobdell: Lb	1½–2½	>6	0–15		95–100	90–100	75–95	65–100
			15–31		95–100	90–100	65–90	50–70
			31–60		95–100	90–100	50–75	30–60
Lockport: LcB	½–1½	2–3	0–11		95–100	90–100	85–100	75–100
			11–38	0–5	90–100	85–100	80–100	75–100
			38					
Lorain:								
Ln	0	>6	0–8		100	100	90–100	85–100
			8–44		100	100	95–100	90–100
			44–60		100	100	95–100	90–100
Ls			44–60		85–100	80–100	50–75	25–45
To a depth of about 44 inches, estimates are the same as for Ln.								
Luray: Ly	0	>6	0–11		100	95–100	90–100	85–100
			11–31		100	95–100	90–100	85–100
			31–47		95–100	80–100	75–95	60–85
			47–64		95–100	90–100	90–100	80–100
*Mahoning: MgA, MgB, MgB2, MhA, MkA, MkB, MmA.	½–1½	>4	0–9		95–100	90–100	85–100	75–90
For Tiro part of MkA and MkB, see Tiro series.			9–30		95–100	90–100	85–95	75–95
Urban land part of MmA too variable to rate.			30–60		95–100	90–100	85–95	70–90
Mentor: MnB, MnC, MnE	>3	>6	0–7		95–100	90–100	80–95	70–90
			7–40		95–100	90–100	80–95	80–90
			40–60		90–100	85–100	75–95	60–90

significant to engineering—Continued

USDA texture	Classification: Unified	Classification: AASHTO	Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential: Steel	Corrosion potential: Concrete
			In per hr	*In per in of soil*	*pH*			
Loamy sand and sandy loam	SM or SC	A-2 or A-4	>6.0	0.04-0.12	6.6-7.8	Low	High	Low.
Loam	ML or CL	A-4 or A-6	0.6-2.0	0.15-0.19	5.1-7.3	Low		Moderate.
Clay loam and sandy clay loam.	CL or CH	A-6 or A-4	0.2-0.6	0.13-0.17	5.1-6.5	Low	Moderate	Moderate.
Silty clay loam	CL or CH	A-6 or A-7	<0.06	0.15-0.19	6.1-7.8	Moderate	Moderate	Low.
Silt loam	ML or CL	A-4 or A-6	0.6-2.0	0.16-0.20	6.1-7.3	Low		Low.
Silt loam and silty clay loam	CL or CH	A-6 or A-7	0.6-2.0	0.15-0.19	5.6-7.3	Moderate	High	Low.
Stratified silt loam and sandy loam.	SM or SC	A-2 or A-4	2.0-6.0	0.10-0.14	6.1-7.8	Low	High	Low.
Silt loam	ML or CL	A-4 or A-6	0.6-2.0	0.16-0.20	4.5-5.5	Low		High.
Silty clay loam	CL or MH	A-6 or A-7	<0.06	0.15-0.19	4.5-5.0	Moderate	High	High.
Shale bedrock.								
Loam	ML or CL	A-4 or A-6	0.6-2.0	0.13-0.17	5.1-6.6	Low		Moderate.
Loam and gravelly loam	ML or SM	A-4, A-6, or A-2	0.6-2.0	0.12-0.16	4.5-6.0	Low	Moderate	Moderate.
Sandy loam and gravelly loamy sand.	SM or GM	A-2 or A-4	>6.0	0.04-0.08	5.6-7.3	Low	Moderate	Low.
Silt loam	ML or CL	A-4 or A-6	0.6-2.0	0.16-0.20	5.1-6.5	Low		Moderate.
Loam and sandy loam	ML	A-4	0.6-2.0	0.13-0.17	5.6-7.3	Low	Moderate	Moderate.
Sandy loam	SM or ML	A-4 or A-2	2.0-6.0	0.10-0.14	5.6-7.3	Low	Low	Low.
Silty clay loam	CL or MH	A-6 or A-7	0.6-2.0	0.15-0.19	4.5-6.0	Moderate		Moderate.
Silty clay	MH, CH, or CL	A-6 or A-7	<0.06	0.12-0.16	4.5-6.0	Moderate	High	High.
Shale bedrock.								
Silty clay loam	CL or MH	A-6 or A-7	0.2-0.6	0.15-0.19	5.6-6.0	Moderate		Moderate.
Silty clay and silty clay loam	CH, MH, or CL	A-7 or A-6	0.06-0.2	0.14-0.18	5.6-6.5	High	High	Moderate.
Clay	CH or CL	A-7 or A-6	0.06-0.2	0.12-0.16	6.1-7.8	High	High	Low.
Loamy sand and sandy loam	SM or SC	A-2 or A-4	>6.0	0.08-0.12	6.1-7.8	Low	High	Low.
Silty clay loam	CL or MH	A-6 or A-7	0.2-0.6	0.16-0.20	6.1-7.3	Low		Low.
Silty clay loam or silt loam	CH or CL	A-7 or A-6	0.2-0.6	0.15-0.19	6.1-7.3	Moderate	High	Low.
Loam	ML or CL	A-4 or A-6	0.6-2.0	0.13-0.17	6.1-7.3	Moderate	High	Low.
Silty clay loam	CH or CL	A-7 or A-6	0.2-0.6	0.15-0.19	6.1-7.8	Moderate	High	Low.
Silt loam	ML or CL	A-4 or A-6	0.6-2.0	0.16-0.20	4.5-6.0	Low		Moderate.
Silty clay and silty clay loam	MH or CL	A-6 or A-7	<0.06	0.14-0.18	4.5-6.0	Moderate	High	Moderate.
Clay loam	CL or MH	A-6 or A-7	<0.06	0.12-0.16	6.1-6.8	Moderate	Moderate	Low.
Silt loam	ML or CL	A-4 or A-6	0.6-2.0	0.16-0.20	4.5-6.0	Low		Moderate.
Silty clay loam and silt loam	CL or CH	A-6 or A-7	0.6-2.0	0.14-0.18	5.1-6.0	Moderate	Moderate	Moderate.
Silt loam	ML or CL	A-4 or A-6	0.6-2.0	0.15-0.19	4.5-6.0	Low	Moderate	Moderate.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	Coarse fraction larger than 3 inches	Percentage passing sieve—			
	Seasonal high water table	Bedrock			No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)
	Ft	*Ft*	*In*	*Pct*				
Mermill: Mo	0	>6	0–14		95–100	90–100	80–100	55–80
			14–32		95–100	90–100	65–90	40–65
			32–60		95–100	90–100	85–100	80–95
Miner: Mr, Ms	0	>4	0–9		95–100	90–100	85–100	80–100
			9–32		95–100	90–100	80–100	75–100
			32–60		85–100	80–100	70–100	65–100
Mitiwanga: MtA, MtB, MvB, MxB. Urban land part of MxB too variable to rate.	½–1½	2–3	0–15	0–5	85–95	75–90	70–90	65–90
			15–35	2–10	80–95	75–90	70–90	60–85
			35					
Olmsted: Om, On	0	>4	0–9		90–100	80–100	75–90	45–60
			9–36	0–5	90–100	80–100	55–85	30–55
			36–60	0–5	90–100	80–100	45–70	15–30
Orrville: Or	½–1½	>6	0–8		100	95–100	80–100	65–90
			8–42	0–5	95–100	90–100	80–100	65–90
			42–60		100	95–100	85–100	70–100
Oshtemo: OtA, OtB, OtC	>3	>6	0–12	0–5	85–100	75–100	45–70	25–45
			12–30	0–10	75–100	70–100	55–85	25–45
			30–62	0–10	60–95	50–95	40–60	10–35
Quarries: Qu. Material too variable to rate; onsite investigation needed.								
Rawson: RdA, RdB, RdC2	1½–2½	>6	0–11		85–100	80–100	70–95	50–80
			11–25	0–5	85–100	80–100	55–80	30–55
			25–60	0–5	95–100	90–100	85–100	70–90
Sebring: Sb, Sd	0–½	>4	0–15		100	100	95–100	85–100
			15–50		100	95–100	95–100	85–100
			50–67		95–100	85–100	80–100	70–100
Senecaville: Se	½–1½	>4	0–10		95–100	90–100	80–100	65–100
			10–32		95–100	90–100	85–100	70–90
			32–60		95–100	90–100	85–100	70–90
Shinrock: SkA, SkB	1½–2½	>6	0–9		95–100	90–100	85–100	65–100
			9–36		95–100	90–100	85–100	70–100
			36–60		100	100	90–100	75–100
Stafford: Sw	0–1	>6	0–11		85–100	80–100	50–85	30–50
			11–32		85–100	80–100	40–70	10–30
			32–60		85–100	80–100	25–60	10–30
Tioga: Tg	>3	>6	0–5		85–100	80–100	75–95	40–55
			5–16		85–100	80–100	45–75	40–55
			16–60		85–100	80–100	35–50	25–45

significant to engineering—Continued

USDA texture	Classification: Unified	Classification: AASHTO	Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential: Steel	Corrosion potential: Concrete
			In per hr	*In per in of soil*	*pH*			
Loam	ML or CL	A-4 or A-6	0.6-2.0	0.13-0.17	5.1-6.5	Low		Moderate.
Sandy clay loam and sandy loam.	ML, CL, or SM	A-4 or A-6	0.6-2.0	0.15-0.19	5.6-7.3	Low	High	Low.
Silty clay loam and clay loam.	CL or CH	A-6 or A-7	0.06-2.0	0.15-0.19	6.6-7.8	Moderate	High	Low.
Silty clay loam	MH, CL, or CH	A-6 or A-7	0.2-0.6	0.15-0.19	6.1-6.5	Moderate		Low.
Silty clay	CH, CL, or MH-CH	A-7 or A-6	0.06-0.2	0.14-0.18	5.6-7.3	Moderate	High	Low.
Silty clay loam	CL, CH, or ML-CL	A-7 or A-6	0.06-0.2	0.15-0.19	6.6-7.8	Moderate	High	Low.
Silt loam	ML or CL	A-4 or A-6	0.6-2.0	0.16-0.20	4.5-6.0	Low		Moderate.
Loam and clay loam	ML or CL	A-4 or A-6	0.6-2.0	0.15-0.19	4.5-6.0	Low	High	Moderate.
Sandstone bedrock.								
Fine sandy loam	ML or SM	A-4	2.0-6.0	0.12-0.16	5.6-7.3	Low		Moderate.
Sandy loam and sandy clay loam.	SM, SC, or CL	A-6, A-4, or A-2	2.0-6.0	0.15-0.19	5.1-6.5	Low	High	Moderate.
Loamy fine sand	SM or SC	A-2 or A-1	2.0-6.0	0.06-0.10	5.6-7.3	Low	High	Low.
Silt loam	ML or CL	A-4 or A-6	2.0-6.0	0.16-0.20	5.1-6.0	Low		Moderate.
Silty clay loam, clay loam, and gravelly loam.	CL or CH	A-6 or A-7	0.6-2.0	0.15-0.19	4.5-6.5	Low	High	Moderate.
Silty clay	CL or CH	A-6 or A-7	0.6-2.0	0.14-0.18	5.6-6.5	Moderate	High	Low.
Sandy loam	SM or SC	A-2 or A-4	2.0-6.0	0.10-0.14	6.1-7.3	Low		Moderate.
Gravelly sandy loam	SM or SC	A-2 or A-4	2.0-6.0	0.10-0.14	4.5-6.0	Low	Low	Moderate.
Loamy sand, gravelly sand, and sandy loam.	SM or SW-SM	A-2 or A-1	>6.0	0.06-0.10	5.6-7.8	Low	Low	Low.
Loam	ML or CL	A-4 or A-6	0.6-2.0	0.13-0.17	5.1-6.5	Low		Moderate.
Sandy loam and sandy clay loam.	SC or ML	A-4 or A-2	0.6-2.0	0.11-0.15	5.1-6.5	Low	Moderate	Moderate.
Clay loam	CH or MH	A-7 or A-6	0.06-0.2	0.13-0.16	6.1-7.8	Moderate	Moderate	Low.
Silt loam	ML or CL	A-6 or A-4	0.6-2.0	0.16-0.20	6.1-7.3	Low		Moderate.
Silty clay loam	CL or CH	A-6 or A-7	0.2-0.6	0.14-0.18	5.1-7.3	Moderate	High	Moderate.
Silty clay loam	CL or CH	A-6 or A-7	0.2-0.6	0.14-0.18	6.1-7.3	Moderate	High	Moderate.
Silt loam	ML orCL	A-4 or A-6	0.6-2.0	0.16-0.20	5.1-6.0	Low		Moderate.
Silt loam and silty clay loam	MH or CL	A-7 or A-6	0.2-0.6	0.15-0.19	5.1-6.5	Moderate	Moderate	Moderate.
Silty clay loam	CL or MH	A-7 or A-6	0.2-0.6	0.14-0.18	5.1-6.5	Moderate	Moderate	Moderate.
Silt loam	ML or CL	A-4 or A-6	0.6-2.0	0.16-0.20	6.1-7.3	Low		Low.
Silty clay and silty clay loam	CL or CH	A-6 or A-7	0.2-0.6	0.14-0.18	5.1-7.3	Moderate	Moderate	Low.
Silt loam	ML or CL	A-4 or A-6	0.6-2.0	0.14-0.18	6.1-7.8	Moderate	Moderate	Low.
Fine sandy loam	SC or SM	A-4 or A-2	>6.0	0.08-0.12	5.1-6.0	Low		Moderate.
Loamy fine sand	SM or SW-SM	A-2 or A-1	>6.0	0.06-0.09	5.1-6.0	Low	Moderate	Moderate.
Loamy fine sand	SM or SW-SM	A-2 or A-1	>6.0	0.05-0.09	5.1-6.0	Low	Moderate	Moderate.
Fine sandy loam	SM or ML	A-4	2.0-6.0	0.12-0.16	5.6-6.5	Low		Low.
Fine sandy loam	SM, SC, or ML	A-4	0.6-6.0	0.12-0.16	5.6-6.5	Low	Low	Low.
Fine sandy loam and sand and gravel.	SM or SC	A-4 or A-2	>6.0	0.10-0.14	6.1-7.3	Low	Low	Low.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	Coarse fraction larger than 3 inches	Percentage passing sieve—			
	Seasonal high water table	Bedrock			No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)
	Ft	*Ft*	*In*	*Pct*				
Tiro. Mapped only with Mahoning soils.	½–1½	>6	0–12		100	95–100	80–95	70–85
			12–30		100	95–100	85–100	80–95
			30–41		90–100	85–100	80–95	70–85
			41–60		90–100	85–100	80–100	75–90
Trumbull: TrA	0–½	>6	0–14		100	95–100	90–100	85–95
			14–44		100	95–100	90–100	80–100
			44–60		100	90–100	85–100	85–95
Tyner: TyB, TyC	>3	>6	0–9		85–100	80–100	50–70	15–30
			9–41		85–100	80–100	35–60	5–20
			41–60		85–100	80–100	35–60	5–25
Upshur: UpC, UpF	>3	2–3	0–7		100	95–100	90–100	70–100
			7–39	0–5	95–100	90–100	85–100	80–100
			39					
Weikert: WeB	>3	1–2	0–10	5–10	50–85	35–80	30–70	20–60
			10–20	5–20	40–75	30–65	20–50	15–25
			20					

[1] Organic material.

enough to require 50 to 100 acres. These uses permanently remove land from farm use.

This section of the soil survey describes properties of the soils and explains their effect on farming and on selected nonfarm uses of land. It will help community planners and industrial users of land, who generally look for areas that are least costly to develop and maintain. Development and maintenance costs are related to soil maps and in other parts of this survey. Table 7 (see page 48) shows the estimated degree and kinds of limitation of soils for some selected land uses. From this information, alternative uses can be considered in long-range planning and zoning. Because intensive manipulation of the soil alters some of its natural properties, the ratings for some uses will no longer apply to areas that have undergone intensive cutting and filling.

The estimated degree of limitation of the soils for a specified land use are indicated as slight, moderate, and severe. A rating of *slight* indicates that the soil has no important limitation to the specified use. *Moderate* shows that the soil has some limitations to the specified use. These limitations need to be recognized, but they can be overcome or corrected. A rating of *severe* indicates that the soil has serious limitations that are costly and difficult to overcome.

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

Farming.—The soils have been rated according to their limitations for cultivated crops only. The degree of limitation is based on slope and the hazard of erosion or on the ease or difficulty of obtaining artificial drainage. Farming is rated in this table in a comparative manner to aid land use planners when they consider whether or not farming is a sound land use.

Disposal of sewage effluent from septic tanks.—Most of the soils in the county have some limitations for disposing of effluent from septic tanks. Such limitations include a seasonal high water table, restricted permeability, poor natural drainage, the hazard of flooding, excess slope, and a shallow depth to bedrock.

Flooding and a seasonal high water table prevent proper functioning of disposal fields for variable periods of time. In table 7 all soils that are subject to flooding have been rated severe. However, frequency of local flooding may be such that some of the soils could be rated moderate or slight if other soil properties are not limiting.

Many of the soils in the county have been rated severe because of permeability that is moderately slow or very slow. The estimated permeability of each soil in the county is shown in table 5. A severe limitation is also imposed by a restrictive layer, such as shale bedrock, that interferes with adequate filtration and the movement of effluent. Some soils that are rated severe are better for sewage disposal than others that have a similar rating.

Locating septic tank filter beds on slopes of more than 12 percent may result in erosion and seepage downslope or in an unstable saturated soil.

Some soils in the county have a gravelly and sandy substratum, through which effluent that is inadequately filtered can contaminate ground water or nearby springs, lakes, or streams. Even though the soils dispose of the effluent quickly, there is a distinct hazard of polluting underground water supplies.

Before a septic tank system is installed, an investigation should be made at the proposed site to determine suitable design or alternative solutions to the soil limita-

significant to engineering—Continued

USDA texture	Classification		Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential	
	Unified	AASHTO					Steel	Concrete
			In per hr	*In per in of soil*	*pH*			
Silt loam	ML or CL	A–4 or A–6	0.6–2.0	0.16–0.20	5.6–7.3	Low		Moderate.
Silty clay loam	CL or CH	A–6 or A–7	0.06–0.2	0.14–0.19	5.1–7.3	Moderate	High	Moderate.
Clay loam	CL or CH	A–6 or A–7	0.06–0.2	0.15–0.19	6.1–7.8	Moderate	Moderate	Low.
Silty clay loam	CL or MH	A–6 or A–7	0.06–0.2	0.14–0.19	6.6–7.8	Moderate	Moderate	Low.
Silty clay loam	CL or MH	A–6 or A–7	0.2–0.6	0.15–0.19	5.1–6.0	Low		Moderate.
Clay	CL or CH	A–6 or A–7	0.06–0.2	0.12–0.16	5.1–7.3	Moderate	High	Low.
Silty clay loam	CL or CH	A–6 or A–7	0.06–0.2	0.15–0.17	6.6–7.8	Moderate	High	Low.
Loamy sand	SM or SC	A–2	>6.0	0.08–0.12	4.5–6.5	Low		Moderate.
Loamy sand and coarse sand	SP or SM	A–2 or A–1	>6.0	0.02–0.06	4.5–6.5	Low	Low	Low.
Medium sand	SP or SM	A–1 or A–2	>6.0	0.02–0.06	5.1–6.5	Low	Low	Low.
Silt loam	ML or CL	A–4 or A–6	0.6–2.0	0.16–0.20	4.5–6.0	Low		Moderate.
Silty clay and silty clay loam	CH or MH	A–7	0.06–0.2	0.14–0.18	4.5–6.5	High	Moderate	Moderate.
Shale bedrock.								
Channery fine sandy loam	SM or ML	A–2 or A–4	2.0–6.0	0.08–0.12	4.5–6.0	Low		Moderate.
Channery sandy loam	GM or GC	A–2 or A–1	2.0–6.0	0.06–0.10	4.5–6.0	Low	High	High.
Sandstone bedrock.								

tions. Improperly functioning filter fields are a health hazard and a major source of pollution to water supplies.

Homesite location.—Major soil features that limit use of soils as homesites are limited depth to bedrock, hazard of flooding, poor natural drainage, and excess slope. Not considered is disposal 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 (fig. 7).

Soils subject to flooding have severe limitations for permanently used structures. Although flooding may be infrequent, it is costly and damaging when it does occur. Homes on naturally wet soils may have wet basements if adequate drainage is not provided. Lorain, Luray, Miner, and Sebring soils are among the soils in this county that have this wetness limitation. In some areas of the county, systems of open-ditch drains have been installed so that the soils can be used for crops. Excavations in these areas for such structures as homes can disrupt the established drainage system and change the soil back to its natural condition of wetness.

Some of the soils, such as Fitchville or Sebring soils, have a high content of silt. Such soils are not so favorable for supporting structural foundations as soils that are coarser textured, such as Chili and Bogart soils. Soils that have high shrink-swell properties are likely to heave and crack foundations unless precautions are taken. Also, high shrink-swell properties affect the alignment of sidewalks, patios, floors, and rock walls. To minimize this effect, a subgrade or layers of sandy or gravelly material directly below the structure is desirable.

Excavating basements and installing underground utility lines are difficult and expensive in soils that have limited depth to bedrock. Slopes that are more than 12 percent are subject to erosion and are limitations in excavating and leveling.

Lawns, landscaping, and golf fairways.—In most areas that are developed for homes and golf courses, the natural surface layer, 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 layer from areas graded for streets also can be saved and used for lawns and fairways. Among the soil properties that determine whether a good lawn or golf fairway can be established are natural drainage, degree of slope, depth to bedrock, texture of the surface layer, stoniness and rockiness, and hazard of flooding.

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

Athletic fields and other intensive play areas.—Among the properties that are considered when selecting sites for athletic fields and other intensive play areas are natural drainage, slope, depth to the water table, depth to and kind of bedrock, permeability, degree of stoniness, the hazard of flooding, and the texture of the surface layer. In table 7 the use of fill

TABLE 6.—*Interpretations of engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The instructions for referring to other series

Soil series and map symbols	Susceptibility to frost action	Suitability as a source of—			Soil features affecting—
		Topsoil	Sand and gravel	Road fill	Highway location
Allis: AkA, AlA, AmA. Urban land part of AmA too variable to rate.	Moderate to high.	Fair: clayey	Not suitable	Fair to poor: clayey.	Seasonal high water table; shale bedrock at a depth of 2 to 3 feet.
Bogart: BsA, BtA, BtB	Moderate	Good: gravelly in some areas.	Fair in upper 3 to 4 feet; good below.	Good	Seasonal high water table; easy to work; needs low cuts and fills in some places.
Carlisle: Cg	High	Poor: organic material; suitable if mixed with mineral soils.	Not suitable	Not suitable; organic material.	Organic material must be removed from roadbed; wet most of the year.
Chagrin: Ch	Moderate to high.	Good	Not suitable	Fair: silty; susceptible to frost action.	Hazard of flooding; high hazard of frost heaving.
Chili: ClA, ClB, ClD2, CnB. Urban land part of CnB too variable to rate.	Low	Fair: gravelly	Fair in upper 3 to 4 feet; good below.	Good	Needs low cuts and fills in some places; source of subbase.
Conotton: CoB, CoC	Low	Poor: gravelly; contains many cobbles.	Fair: contains many cobbles.	Good	Needs some cuts and fills; cobbly in most places.
Cut and fill land: Cz. Material too variable to rate; needs onsite inspection.					
Dekalb: DkB	Low	Poor: coarse fragments.	Poor: sandstone bedrock at a depth of 2 to 3 feet.	Fair: contains many cobbles; bedrock at a depth of 2 to 3 feet.	Needs some cuts and fills; contains many cobbles; bedrock at a depth of 2 to 3 feet.
Del Rey: DsB	Moderate to high.	Fair: clayey below a depth of 9 inches.	Not suitable	Fair to poor: clayey below a depth of 9 inches.	Seasonal high water table; moderate hazard of frost heaving.
Ellsworth: ElB, ElB2, ElC2, ElD2, ElF2.	Moderate	Fair: clayey below a depth of 9 inches.	Not suitable	Fair: clayey	Seasonal water table; needs cuts and fills in places.

properties of the soils

soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the that appear in the first column of this table]

Soil features affecting—Continued					
Pipeline construction and maintenance	Pond reservoir areas	Embankments	Drainage for crops and pasture	Irrigation	Waterways
Shale bedrock at a depth of 2 to 3 feet; seasonal high water table.	Seasonal high water table; shale bedrock at a depth of 2 to 3 feet; rapid seepage in places in fractured shale bedrock.	Shale bedrock at a depth of 2 to 3 feet; poor to fair stability; low permeability.	Seasonal high water table; slow permeability; shale bedrock at a depth of 2 to 3 feet.	Slow water intake rate; medium available water capacity; needs drainage.	Seasonal high water table; low fertility; shale bedrock at a depth of 2 to 3 feet.
Ditch wall unstable; seasonal high water table.	Sandy and gravelly material; high seepage.	Fair stability; fair to poor compaction characteristics; medium permeability.	Moderately well drained; seasonal high water table; rapid permeability; ditch wall unstable.	Rapid water intake rate; medium available water capacity.	Generally low slopes; small amount of runoff; droughty.
Ditch wall unstable; organic material; wet most of the year.	High water table; rapid seepage; suitable for dug ponds in places.	Unstable organic material; high permeability.	High water table; organic material; very unstable.	Rapid water intake rate; high available water capacity; needs drainage.	Wet; organic soil.
Hazard of flooding	Hazard of flooding; moderate seepage.	Fair stability and compaction characteristics; medium permeability; low piping resistance.	Not needed, well drained.	Medium water intake rate; high available water capacity; hazard of flooding.	Hazard of stream erosion.
Ditch wall unstable	Sandy and gravelly material; high seepage.	Fair stability; medium to high permeability; hazard of piping.	Not needed, well drained.	Rapid water intake rate; low available water capacity.	Small amount of runoff; droughty; difficult to vegetate.
Ditch wall unstable; cobbly in most places.	Sandy and gravelly material; high seepage; contains many cobbles.	Fair stability; poor compaction characteristics; high permeability.	Not needed, well drained.	Rapid water intake rate; low available water capacity; cobbly in most places.	Small amount of runoff; contains many cobbles.
Ditch wall unstable; sandstone bedrock at a depth of 2 to 3 feet.	Sandy and gravelly material; bedrock at a depth of 2 to 3 feet; hazard of rapid seepage in fractured bedrock.	Fair stability; poor compaction characteristics; high permeability.	Not needed, well drained.	Rapid water intake rate; low available water capacity; bedrock at a depth of 2 to 3 feet.	Low slopes; small amount of runoff; bedrock at a depth of 2 to 3 feet; contains many cobbles.
Seasonal high water table; slow permeability.	Seasonal high water table; slow seepage.	Fair stability and compaction characteristics; low permeability.	Seasonal high water table; slow permeability; needs surface drainage in places.	Needs drainage; medium water intake rate; medium available water capacity.	Seasonal high water table; low slopes; erodible.
Seasonal wetness	Slow seepage; good sites in most places.	Fair to good stability and compaction characteristics; very low permeability.	Moderately well drained; seasonal water table; very slow permeability.	Slow water intake rate; medium available water capacity.	Sloping; erodible; high runoff; clayey material; difficult to work.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Susceptibility to frost action	Suitability as a source of—			Soil features affecting—
		Topsoil	Sand and gravel	Road fill	Highway location
Elnora: EnA	Low	Poor: sandy	Fair for sand; poor for gravel.	Good	Highly erodible on embankments; needs low cuts and fills in places.
Fitchville: FcA, FcB, FeA. Urban land part of FeA too variable to rate.	High	Good	Not suitable	Poor: susceptible to frost action.	Seasonal high water table; high hazard of frost heaving; erodible and unstable on slopes.
FdA	High	Good	Not suitable	Poor: silty; susceptible to frost action.	Seasonal high water table; hazard of flooding; poor stability; high hazard of frost heaving.
Fulton: FuA, FuB	Moderate to high.	Fair: clayey below a depth of 8 inches.	Not suitable	Fair to poor: clayey.	Seasonal high water table; plastic, clayey material; difficult to work.
FvA	Moderate to high.	Fair: clayey below a depth of 8 inches.	Poor: clayey material to a depth of 3 to 4 feet.	Fair: clayey	Seasonal high water table; moderate to high hazard of frost heaving; clayey material in upper 3 to 4 feet; difficult to work.
Haskins: HsA, HsB, HtA. Urban land part of HtA too variable to rate.	Moderate	Good	Not suitable	Fair: clayey	Gravelly in upper 2 to 3 feet, clayey below; seasonal high water table.
Holly: Hy	Moderate	Poor: generally wet.	Not suitable	Poor: generally wet.	Hazard of flooding; high water table most of the year; moderate hazard of frost heaving.
Hornell: HzA, HzB	Moderate	Fair: clayey below a depth of 6 inches.	Not suitable	Fair to poor: clayey.	Seasonal high water table; moderate hazard of frost heaving; shale bedrock at a depth of 2 to 3 feet; needs some cuts and fills.

properties of the soils—Continued

Soil features affecting—Continued					
Pipeline construction and maintenance	Pond reservoir areas	Embankments	Drainage for crops and pasture	Irrigation	Waterways
Ditch wall unstable	Excessive seepage; sandy material.	High permeability; hazard of piping.	Generally not needed; rapid permeability; unstable ditch wall.	Rapid water intake rate; low available water capacity.	Droughty; erodible on slopes; difficult to vegetate.
Ditch wall unstable; seasonal wetness.	Seasonal high water table; moderate seepage; needs compaction in entire area.	Fair stability and compaction characteristics; low permeability; erodible on slopes.	Moderately slow permeability; seasonal high water table; ditchbank unstable; needs drainage in places.	Needs drainage; medium water intake rate; medium available water capacity.	Seasonal high water table; short low slopes; very erodible; fairly easy to work.
Ditch wall unstable; seasonal wetness.	Seasonal high water table; hazard of stream overflow; moderate seepage.	Fair stability and compaction characteristics; low permeability; erodible on slopes.	Seasonal high water table; hazard of flooding; moderately slow permeability; ditch wall unstable.	Needs drainage; medium water intake rate; medium available water capacity.	Seasonal high water table; short low slopes; very erodible; easy to work.
Ditch wall unstable; seasonal wetness.	Seasonal high water table; slow seepage.	Clayey material; low permeability; poor compaction characteristics.	Seasonal high water table; slow permeability; needs surface drainage in most places; ditch wall unstable.	Needs drainage; slow water intake rate; medium available water capacity.	Seasonal high water table; clayey soil difficult to work.
Ditch wall unstable; seasonal wetness.	Seasonal high water table; excessive seepage in sandy material at a depth of 3 to 4 feet; requires seal.	Good stability and compaction characteristics in upper 3 feet, poor below; low permeability in upper 3 feet, high below.	Seasonal high water table; slow permeability in upper part.	Needs drainage; slow water intake rate; medium available water capacity.	Seasonal high water table; clayey soil difficult to work.
Seasonal wetness	Seasonal high water table; slow seepage in underlying clayey material; upper 2 to 3 feet of sandy and gravelly material must be sealed at embankments.	Sandy and gravelly in upper 2 to 3 feet, clayey below if the two materials are mixed, fair to good compaction characteristics and low permeability.	Moderately rapid permeability in upper 2 to 3 feet, very slow below; seasonal high water table.	Needs drainage; medium water intake rate; meium available water capacity.	Generally short slopes; seasonal high water table; upper 2 to 3 feet easy to work.
Wet much of the year.	Hazard of stream overflow; high water table; moderate to moderately slow seepage; sandy layers in places.	Fair stability and compaction characteristics; low permeability; fair piping resistance; seams of sand in places.	Moderate permeability; high water table; outlets difficult to locate in places.	Hazard of flooding; needs drainage; medium water intake rate; medium available water capacity.	Hazard of flooding; high water table; subject to stream erosion.
Bedrock at a depth of 2 to 3 feet; seasonal wetness.	Shale bedrock at a depth of 2 to 3 feet; possible high seepage in shale.	Seasonal high water table; fair stability and compaction characteristics; low permeability.	Moderately well drained; needs random tile in places; outlets difficult to obtain because of shale bedrock at a depth of 2 to 3 feet.	Bedrock at a depth of 2 to 3 feet; slow water intake rate; low available water capacity.	Generally short slopes; seasonal high water table; clayey material difficult to work.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Susceptibility to frost action	Suitability as a source of—			Soil features affecting—
		Topsoil	Sand and gravel	Road fill	Highway location
Jimtown: JsA, JtA, JtB, JuA. Urban land part of JuA too variable to rate.	Low	Fair: gravelly	Fair to good below a depth of 2 to 3 feet.	Fair: wetness	Seasonal high water table; gravelly material easy to work.
Lobdell: Lb	Moderate to high.	Good	Not suitable	Fair: clayey	Hazard of periodic flooding; moderate hazard of frost heaving.
Lockport: LcB	Moderate to high.	Poor: clayey	Not suitable	Fair to poor; clayey; seasonal wetness.	Seasonal high water table; moderate hazard of frost heaving; shale at a depth of 2 to 3 feet.
Lorain:					
Ln	Moderate to high.	Poor: clayey; generally wet.	Not suitable	Poor: clayey; generally wet.	Seasonal high water table; plastic clayey material difficult to work; high hazard of frost heaving.
Ls	Moderate	Poor: clayey; generally wet.	Poor: generally wet; clayey to a depth of 3 to 4 feet.	Poor: clayey; generally wet.	Seasonal high water table; clayey material in upper 3 to 4 feet; needs fills in most places.
Luray: Ly	High	Poor: generally wet.	Not suitable	Poor: silty; generally wet.	Seasonal high water table; high hazard of frost heaving; needs fills.
*Mahoning: MgA, MgB, MgB2, MhA, MkA, MkB, MmA. For Tiro part of MkA and MkB, see Tiro series. Urban land part of MmA too variable to rate.	Moderate to high.	Poor: clayey below a depth of 9 inches.	Not suitable	Poor: clayey	Seasonal high water table; high hazard of frost heaving; clayey material difficult to work; needs cuts and fills in places.
Mentor: MnB, MnC, MnE	High	Good	Not suitable	Poor: silty; susceptible to frost action.	Needs some cuts and fills; highly erodible; unstable material; flows if wet in places.
Mermill: Mo	Moderate	Poor: generally wet.	Not suitable	Poor: generally wet.	Seasonal high water table; moderate hazard of frost heaving; fairly easy to work.

properties of the soils—Continued

Soil features affecting—Continued					
Pipeline construction and maintenance	Pond reservoir areas	Embankments	Drainage for crops and pasture	Irrigation	Waterways
Ditch wall unstable; seasonal wetness.	Sandy and gravelly material; high seepage.	Fair stability; fair to good compaction characteristics; medium to high permeability.	Ditch wall unstable; moderate permeability; seasonal high water table; drainage fairly good if outlets available.	Needs drainage; medium water intake rate; medium to low available water capacity.	Seasonal high water table; erodible; easy to work.
Hazard of flooding; seasonal wetness.	Hazard of overflow; moderate seepage; sandy seams.	Fair stability and compaction characteristics; medium permeability.	Moderately well drained; moderate permeability; hazard of flooding.	Hazard of flooding; medium water intake rate; medium available water capacity.	Hazard of stream erosion; seasonal high water table; easy to work.
Shale bedrock at a depth of 2 to 3 feet; seasonal wetness.	Seasonal high water table; shale bedrock at a depth of 2 to 3 feet; possible rapid seepage in shale.	Shale at a depth of 2 to 3 feet; good to fair stability and compaction characteristics.	Seasonal high water table; very slow permeability; shale bedrock at a depth of 2 to 3 feet.	Bedrock at a depth of 2 to 3 feet; slow water intake rate.	Seasonal high water table; shale bedrock at a depth of 2 to 3 feet; clayey material difficult to work.
Wet much of the year; clayey; slow permeability.	Seasonal high water table; very slow seepage; suitable for dug ponds.	Good stability; fair compaction characteristics; clayey material; high shrink-swell potential; low permeability.	Seasonal high water table; slow permeability; outlets difficult to locate.	Needs drainage; slow water intake rate; high available water capacity.	Seasonal high water table; clayey material difficult to work.
Ditch wall unstable below clayey material; wet much of the year.	Must be sealed over sandy material surface; excessive seepage in sandy material.	Good stability and compaction characteristics in upper 3 feet, poor below; low permeability in upper 3 feet, medium below.	Seasonal high water table; slow permeability in upper 3 feet, moderately rapid below.	Needs drainage; slow water intake rate; high available water capacity.	Seasonal high water table; clayey material difficult to work.
Ditch wall unstable; wet much of the year.	Seasonal high-water table; slow seepage; suitable for dug ponds.	Poor stability; fair compaction characteristics; low permeability.	Moderately slow permeability; seasonal high water table.	Needs drainage; medium water intake rate; high available water capacity.	Seasonal high water table; clayey material difficult to work.
Seasonal wetness; very slow permeability.	Seasonal high water table; slow seepage.	Fair stability and compaction characteristics; low permeability.	Very slow permeability; seasonal high water table.	Needs drainage; slow water intake rate; medium available water capacity.	Low slopes; erodible; clayey material difficult to work; seasonal high water table.
Ditch wall unstable; seasonal wetness.	Moderate seepage; compaction of area needed.	Poor stability; fair compaction characteristics; medium permeability; erodes easily on slopes.	Well drained; generally needs no drainage.	Medium water intake rate; medium available water capacity.	Steep slopes; highly erodible; easy to work.
Ditch wall unstable in upper 2 to 3 feet; wet much of the year.	Seasonal high water table; slow seepage in the underlying clayey material; upper 2 to 3 feet of sandy and gravelly material must be sealed off at embankments.	Sandy and gravelly in upper 2 to 3 feet; clayey material below; if the two layers are mixed, fair to good compaction characteristics and medium to low permeability.	Seasonal high water table; ditch wall unstable in upper 2 to 3 feet; moderate permeability in upper 2 to 3 feet, slow below.	Needs drainage; slow water intake rate; high available water capacity.	Seasonal high water table; erodible.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Susceptibility to frost action	Suitability as a source of—			Soil features affecting—
		Topsoil	Sand and gravel	Road fill	Highway location
Miner: Mr, Ms	Moderate to high.	Poor: generally wet.	Not suitable	Poor: generally wet.	Seasonal high water table; high hazard of frost heaving; needs fills in most places.
Mitiwanga: MtA, MtB, MvB, MxB. Urban land part of MxB too variable to rate.	Moderate	Fair: clayey; coarse fragments.	Not suitable	Fair: wetness; clayey.	Seasonal high water table; bedrock at a depth of 2 to 3 feet; material easy to work.
Olmsted: Om, On	Moderate to high.	Poor: generally wet.	Poor in upper 3 to 4 feet, fair for sand below.	Poor: generally wet.	Seasonal high water table; easy to work; high hazard of frost heaving; fills generally needed.
Orrville: Or	Moderate to high.	Good	Not suitable	Fair: silty; wet.	Hazard of flooding; seasonal high water table; high hazard of frost heaving.
Oshtemo: OtA, OtB, OtC	Low	Poor: sandy	Good for sand	Good	Embankments highly erodible; needs cuts and fills in places.
Quarries: Qu. Material too variable to rate; needs onsite inspection.					
Rawson: RdA, RdB, RdC2	Low	Good	Not suitable	Good in upper 2 to 3 feet, poor below.	Loamy material in upper 2 to 3 feet, clayey below; seasonal high water table; needs cuts and fills in places.
Sebring: Sb, Sd	High	Poor: generally wet.	Not suitable	Poor: silty; generally wet.	Seasonal high water table; erodible; unstable; flows in places if wet; high hazard of frost heaving.
Senecaville: Se	Moderate	Fair: clayey below a depth of 10 inches.	Not suitable	Fair: silty; wet.	Hazard of flooding; seasonal high water table; moderate hazard of frost heaving.

properties of the soils—Continued

Soil features affecting—Continued					
Pipeline construction and maintenance	Pond reservoir areas	Embankments	Drainage for crops and pasture	Irrigation	Waterways
Wet much of the year; slow permeability.	Seasonal high water table; slow seepage; suitable for dug ponds.	Fair stability and compaction characteristics; moderate shrink-swell potential; low permeability.	Seasonal high water table; slow permeability; needs surface drainage in places.	Needs drainage; slow water intake rate; high available water capacity.	Seasonal high water table; clayey material difficult to work; slow permeability.
Bedrock at a depth of 2 to 3 feet; seasonal wetness.	Seasonal high water table; fractured bedrock at a depth of 2 to 3 feet; possible high seepage in places in bedrock.	Fair stability and compaction characteristics; medium permeability; 20 to 60 percent coarse fragments; sandstone bedrock at a depth of 2 to 3 feet.	Seasonal high water table; sandstone bedrock at a depth of 2 to 3 feet.	Bedrock at a depth of 2 to 3 feet; medium water intake rate; medium available water capacity.	Seasonal high water table; erodible on slopes; bedrock at a depth of 2 to 3 feet.
Ditch wall unstable; wet much of the year.	Seasonal high water; sandy and gravelly; high seepage likely.	Fair stability and compaction characteristics; hazard of piping; medium permeability.	Seasonal high water table; moderately rapid permeability; ditch wall unstable.	Needs drainage; rapid water intake rate; medium available water capacity.	Seasonal high water table; high fertility.
Hazard of flooding; seasonal wetness.	Hazard of stream overflow; moderate seepage; few sandy seams in places.	Fair stability and compaction characteristics; low permeability; strata of sand in places.	Moderate permeability; seasonal high water table; hazard of flooding; outlets difficult to locate.	Hazard of flooding; needs drainage; medium water intake rate; medium available water capacity.	Seasonal high water table; hazard of flooding and stream erosion.
Ditch wall unstable	High seepage; sandy and gravelly material.	Fair stability; hazard of piping; high permeability.	Not needed, well drained.	Rapid water intake rate; low available water capacity.	Coarse sandy soil; droughty; erodible; difficult to vegetate.
Seasonal wetness; slow permeability.	Slow seepage in underlying clayey material; loamy material in upper part must be sealed at embankments.	Sandy and gravelly material in upper 2 to 3 feet, clayey below; if the two layers are mixed, fair stability and compaction characteristics and medium to low permeability.	Seasonal high water table; needs random tile drainage in places.	Medium water intake rate; medium available water capacity.	Generally low slopes; easy to work.
Ditch wall unstable; wet much of the year.	Seasonal high water table; moderate seepage; compaction of area needed.	Poor stability and compaction characteristics; low permeability; erodible; poor resistance to piping.	Moderately slow permeability; seasonal high water table; ditch wall unstable.	Needs drainage; medium water intake rate; high available water capacity.	Seasonal high water table; easy to work; erodible.
Hazard of flooding; seasonal wetness.	Hazard of stream overflow; moderate seepage; sandy in places.	Fair stability and compaction characteristics; low permeability.	Hazard of flooding; seasonal high water table; moderately slow permeability.	Hazard of flooding; needs drainage; slow water intake rate.	Seasonal high water table; hazard of flooding and stream erosion.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Susceptibility to frost action	Suitability as a source of—			Soil features affecting—
		Topsoil	Sand and gravel	Road fill	Highway location
Shinrock: SkA, SkB	Moderate	Fair: somewhat clayey below a depth of 9 inches.	Not suitable	Fair to poor: clayey.	Seasonal high water table; moderate hazard of frost heaving; needs cuts and fills in places.
Stafford: Sw	Low	Fair: sandy below a depth of 10 inches.	Good for sand; poor for gravel.	Good	Erodible on embankments; seasonal high water table.
Tioga: Tg	Moderate	Good	Poor: high in fines.	Fair: susceptible to frost action.	Hazard of flooding; highly erodible on embankments.
Tiro Mapped only with Mahoning soils.	High	Good	Not suitable	Poor: susceptible to frost action.	Seasonal high water table; high hazard of frost heaving; needs cuts and fills in places.
Trumbull: TrA	Moderate to high.	Poor: clayey; generally wet.	Not suitable	Poor: generally wet.	Seasonal high water table; high hazard of frost heaving.
Tyner: TyB, TyC	Low	Poor: sandy	Good for sand; not suitable for gravel.	Good	Highly erodible on embankments; needs cuts and fills in places.
Upshur: UpC, UpF	Moderate	Fair: clayey below a depth of 7 inches.	Not suitable	Poor: clayey	Needs cuts and fills in places; shale bedrock at a depth of 2 to 3 feet; clayey material difficult to work.
Weikert: WeB	Low	Poor: many sandstone fragments.	Not suitable	Good	Bedrock at a depth of 1 foot to 2 feet; needs cuts and fills in some places.

material from other areas was not considered in the ratings. Soils on flood plains that are not subject to costly damage by flood water and that are not used during normal periods of flooding can be used for baseball diamonds, picnic areas, and other intensive play areas. The ratings in table 7 for streets and parking lots are also important when considering the use of soils for tennis courts.

Parks and other extensive play areas.—These areas can be located on many kinds of soils that have severe limitations for most other uses. Flood plains, for example, can be safely developed as extensive play areas. Many areas along streams are scenic and, because of their linear shape, can be used by a relatively large number of people (fig. 8). Considered in rating the soils for parks and other extensive play areas were the hazard of flooding, degree of stoniness and rockiness, degree of slope, texture of the surface layer, and depth to the water table.

Campsites.—Sites that are suitable for tents and trailers should be located in areas that are suited to unsurfaced parking lots for cars and camping trailers. Among the properties that are considered when selecting campsites are the hazard of flooding, a seasonal

properties of the soils—Continued

Soil features affecting—Continued					
Pipeline construction and maintenance	Pond reservoir areas	Embankments	Drainage for crops and pasture	Irrigation	Waterways
Seasonal wetness	Seasonal high water table; slow seepage.	Fair stability and compaction characteristics; low permeability.	Moderately well drained; needs random tile drainage in places; moderately slow permeability.	Slow water intake rate; medium available water capacity.	Seasonal high water table; erodible on slopes; clayey material difficult to work.
Ditch wall unstable; seasonal wetness.	Excessive seepage; sandy material.	Poor stability and compaction characteristics; high permeability; hazard of piping.	Seasonal high water table; rapid permeability; ditch wall unstable.	Rapid water intake rate; medium to low available water capacity.	Moderate fertility; erodible on slopes.
Ditch wall unstable; hazard of flooding.	Excessive seepage; sandy material; hazard of stream overflow.	Poor stability and compaction characteristics; high permeability; hazard of piping.	Hazard of flooding; well drained.	Hazard of flooding; medium water intake rate; medium available water capacity.	Moderate fertility; hazard of stream overflow.
Seasonal wetness; slow permeability.	Seasonal high water table; slow seepage.	Fair stability and compaction characteristics; low permeability.	Seasonal high water table; moderate permeability.	Needs drainage; medium water intake rate; medium available water capacity.	Seasonal high water table; erodible; clayey material difficult to work.
Wet much of the time; slow permeability.	Seasonal high water table; slow seepage.	Fair stability and compaction characteristics; low permeability.	Seasonal high water table; slow permeability; needs surface drainage in places.	Needs drainage; slow water intake rate; medium available water capacity.	Seasonal high water table; clayey material difficult to work.
Ditch wall unstable	Excessive seepage; sandy material.	Poor stability and compaction characteristics; high permeability; subject to piping.	Not needed, well drained.	Rapid water intake rate; low available water capacity.	Low fertility; very erodible; difficult to vegetate.
Bedrock at a depth of 2 to 3 feet; slow permeability.	Shale bedrock at a depth of 2 to 3 feet; possible excessive seepage in shale in places.	Shale bedrock at a depth of 2 to 3 feet; fair to good stability and compaction characteristics.	Well drained; slow permeability; shale bedrock at a depth of 2 to 3 feet.	Bedrock at a depth of 2 to 3 feet; slow water intake rate; medium available water capacity.	Shale bedrock at a depth of 2 to 3 feet; clayey material difficult to work.
Bedrock at a depth of 1 foot to 2 feet.	Fractured bedrock at a depth of 1 foot to 2 feet; excessive seepage.	Bedrock at a depth of 1 foot to 2 feet; many stone fragments.	Not generally needed, bedrock at a depth of 1 foot to 2 feet.	Bedrock at a depth of 1 foot to 2 feet; rapid water intake rate.	Bedrock at a depth of 1 foot to 2 feet; many sandstone fragments.

high water table, permeability, slope, and texture. Wetness is the major factor that affects the degree of limitation for campsites. Soils that have slopes of less than 12 percent are the most desirable for use as tent campsites, but trailers require less sloping soils than tents. Medium-textured soils have fewer limitations for campsites than very clayey or very sandy soils.

Sanitary landfill.—Among the properties affecting soils for trench-type sanitary landfill are depth to rock, seasonal wetness, permeability, slope, texture, and hazard of flooding. Deep, nearly level, well-drained soils that have slow permeability generally have the least limitation for sanitary landfill. This combination of properties, however, exists in very few soils. Excessive wetness in the form of ponding or a high water table increases the difficulty of excavation and proper covering. Clayey soils are less desirable as cover than are coarser textured soils, because clayey soils are difficult to grade properly and are subject to cracking when dry. All of the soils that have bedrock above a depth of 60 inches are rated *severe.*

Cemeteries.—Soils have few limitations for use as cemeteries if they are deep, well drained, and permeable. The depth to rock and natural drainage are espe-

Figure 6.—**Drainage ditch in a Mahoning silt loam. Outlet pipes for tile and grassed slopes minimize erosion and maintenance of this ditch.**

cially important. Other features that affect use of cemeteries are the hazard of flooding, slope, permeability, depth to the water table, and texture.

Descriptions of the Soils

This section describes the soil series and mapping units in Lorain County. Each soil series is described in detail and then, briefly, each mapping unit in that series. Unless specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. The profile described in the series is representative of mapping units in that series. If the profile of a given mapping unit is different from the one described for the series, these differences are stated in describing the mapping unit, or they are differences that are apparent in the name of the mapping unit. Color terms are for moist soil unless otherwise stated.

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

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit are the capability unit and woodland suitability group to which the mapping unit has been assigned. The page for the description of each capability unit can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The approximate acreage and proportionate extent of each mapping unit are shown in table 8. Many of the terms used in describing soils can be found in the Glossary at the back of this survey, and more detailed information about the terminology and methods of

Figure 7.—**Areas of a Mahoning soil. Grasses for lawns are difficult to establish where this soil has been graded and the subsoil exposed.**

soil mapping can be obtained from the Soil Survey Manual (*8*).

Allis Series

The Allis series consists of somewhat poorly drained and poorly drained, nearly level soils on lake plains in the northern part of the county. These soils formed in glacial till that is 20 to 40 inches deep over shale.

In a representative profile in a cultivated area the surface layer is dark grayish-brown silty clay loam about 8 inches thick. The subsurface layer is gray silty clay loam about 2 inches thick. The subsoil extends to a depth of 36 inches and is mottled gray silty clay. Shale bedrock is at a depth of 36 inches.

Runoff is medium. Permeability is slow, and available water capacity is medium. The soils have a high water table during wet seasons. The root zone is moderately deep. It is generally strongly acid or very strongly acid.

Drained areas of Allis soils are used for small grain, corn, and hay. Some areas are used for grapes. Undrained areas either are wooded or are idle and are overgrown with brush.

Representative profile of Allis silty clay loam, 0 to 2 percent slopes, 85 yards south of Chester Road and three-eighths of a mile west of Jaycox Road, city of Avon:

Ap—0 to 8 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; common, coarse, distinct, brownish-yellow (10YR 6/8) and grayish-brown (2.5Y 5/2) mottles; weak, very coarse, granular structure; friable; common roots; many fine pores; thin, patchy, degraded coatings on root channels; very strongly acid; abrupt, wavy boundary.

A&B—8 to 10 inches, gray (5Y 5/1) silty clay loam, light olive brown (2.5Y 5/4) crushed; common, fine, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium and coarse, subangular blocky structure; firm; common fine roots; many fine pores; thin, continuous, degraded coatings of dark grayish brown (2.5Y 4/2); numerous quartz sand grains; very strongly acid; clear, wavy boundary.

B21g—10 to 19 inches, gray (5Y 5/1) silty clay, light olive brown (2.5Y 5/4) crushed; many, fine and medium, distinct, yellowish-brown (10YR 5/8) mottles and many, fine, medium, brownish-yellow (10YR 6/8) mottles; strong, medium and coarse, subangular and angular blocky structure; firm; common roots; few fine pores; thin, continuous, olive-gray (5Y 5/2) coatings on all ped surfaces; few fine quartz pebbles; very strongly acid; diffuse, wavy boundary.

B22g—19 to 26 inches, gray (10YR 5/1) silty clay; common, fine, prominent, strong-brown (7.5YR 5/8) mottles; moderate, medium, prismatic structure parting to moderate, medium, angular blocky; firm;

TABLE 7.—*Limitations of the soils*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soils. The instructions for referring to other series

Soil series and map symbols	Farming	Disposal of sewage effluent from septic tanks	Homesite location [1] (three stories or less with basement)	Lawns, landscaping, and golf fairways	Streets and parking lots
Allis: AkA, AlA, AmA. Urban land part of AmA too variable to rate.	Severe: wetness.	Severe: high water table most of the year; slow permeability; moderately deep to shale.	Severe: high water table most of the year; moderately deep to shale.	Moderate: high water table most of the year.	Moderate: high water table; high frost heaving.
Bogart:					
BsA, BtA	Slight	Moderate: seasonal high water table of short duration.	Moderate: seasonal high water table of short duration.	Slight	Slight
BtB	Slight	Moderate: seasonal high water table of short duration.	Moderate: seasonal high water table of short duration.	Slight	Slight
Carlisle: Cg	Moderate: wetness; subject to soil blowing.	Severe: high water table most of the year.	Severe: high water table most of the year; organic soil.	Severe: high water table most of the year; organic soil.	Severe: high water table most of the year; organic soil.
Chagrin: Ch	Slight	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Chili:					
ClA	Slight	Slight [2]	Slight	Moderate: low available water capacity.	Slight
ClB, CnB. Urban land part of CnB too variable to rate.	Slight	Slight [2]	Slight	Moderate: low available water capacity.	Slight
ClD2	Moderate: slope; hazard of erosion.	Moderate: slope [2]	Moderate: slope	Moderate: slope; low available water capacity.	Moderate: slope
Conotton:					
CoB	Moderate: contains stone fragments that hinder tillage.	Slight [2]	Slight	Severe: low available water capacity.	Slight
CoC	Moderate: contains stone fragments that hinder tillage.	Moderate: slope [2]	Moderate: slope	Severe: low available water capacity.	Moderate: slope
Cut and fill land: Cz. Material too variable to rate; needs onsite inspection.					
Dekalb: DkB	Slight	Severe: shallow to bedrock.	Severe: shallow to bedrock.	Severe: low available water capacity.	Moderate: shallow to bedrock.
Del Rey: DsB	Slight	Severe: slow permeability; seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Ellsworth:					
ElB, ElB2	Moderate: hazard of erosion.	Severe: very slow permeability.	Moderate: seasonal high water table.	Slight	Moderate: high in clay content.

for town and country uses

soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the that appear in the first column of this table]

Athletic fields and other intensive play areas	Parks and other extensive play areas	Campsites for—		Sanitary landfill	Cemeteries
		Tents	Trailers		
Moderate: high water table; slow permeability.	Moderate: high water table.	Severe: high water table.	Severe: high water table.	Severe: moderately deep to shale.	Severe: high water table; slow permeability; moderately deep to shale.
Moderate: seasonal high water table of short duration; gravelly.	Slight	Slight	Slight	Moderate: seasonal high water table of short duration.	Moderate: seasonal high water table of short duration.
Moderate: seasonal high water table of short duration; slope.	Slight	Slight	Moderate: slope	Moderate: seasonal high water table of short duration.	Moderate: seasonal high water table of short duration.
Severe: high water table most of the year; organic soil.	Severe: high water table most of the year; organic soil.	Severe: high water table most of the year; organic soil.	Severe: high water table most of the year; organic soil.	Severe: high water table most of the year; organic soil.	Severe: high water table most of the year; organic soil.
Moderate: subject to flooding of short duration.	Moderate: subject to flooding of short duration.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Slight	Slight	Slight	Slight	Severe: moderately rapid permeability.[2]	Slight.
Moderate: slope	Slight	Slight	Moderate: slope	Severe: moderately rapid permeability.[2]	Slight.
Severe: slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: moderately rapid permeability.[2]	Moderate: slope.
Severe: gravelly and cobbly.	Moderate: gravelly and cobbly.	Moderate: gravelly and cobbly.	Moderate: gravelly and cobbly; slope.	Severe: rapid permeability.	Slight.
Severe: gravelly and cobbly; slope.	Moderate: slope; gravelly and cobbly.	Moderate: gravelly and cobbly; slope.	Severe: slope	Severe: rapid permeability.	Moderate: slope.
Moderate: shallow to bedrock; slope.	Slight	Slight	Moderate: slope	Severe: shallow to bedrock; rapid permeability.	Severe: shallow to bedrock.
Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Moderate: seasonal high water table.	Severe: slow permeability.
Moderate: very slow permeability; slope.	Slight	Severe: very slow permeability.	Severe: very slow permeability.	Moderate: high in clay content; seasonal high water table.	Severe: very slow permeability.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Farming	Disposal of sewage effluent from septic tanks	Homesite location [1] (three stories or less with basement)	Lawns, landscaping, and golf fairways	Streets and parking lots
Ellsworth—continued					
ElC2	Severe: hazard of erosion.	Severe: very slow permeability.	Moderate: seasonal high water table; slope.	Moderate: slope	Moderate: slope; high in clay content.
ElD2	Severe: hazard of erosion.	Severe: very slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope
ElF2	Severe: hazard of erosion.	Severe: very slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope
Elnora: EnA	Moderate: droughty; subject to soil blowing.	Slight [2]	Slight	Severe: low available water capacity.	Slight
Fitchville:					
FcA, FeA Urban land part of FeA too variable to rate.	Slight	Severe: seasonal high water table; moderately slow permeability.	Severe: unstable; seasonal high water table.	Moderate: seasonal high water table.	Severe: high hazard of frost heaving.
FcB	Slight	Severe: seasonal high water table; moderately slow permeability.	Severe: unstable; seasonal high water table.	Moderate: seasonal high water table.	Severe: high hazard of frost heaving.
FdA	Slight	Severe: seasonal high water table; subject to occasional flooding.	Severe: seasonal high water table; subject to occasional flooding.	Moderate: seasonal high water table; subject to occasional flooding.	Severe: high hazard of frost heaving; subject to occasional flooding.
Fulton: FuA, FuB, FvA	Moderate: wetness.	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Haskins:					
HsA, HtA Urban land part of HtA too variable to rate.	Slight	Severe: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
HsB	Slight	Severe: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Holly: Hy	Moderate: wetness.	Severe: subject to flooding; seasonal high water table.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table.	Severe: subject to flooding; seasonal high water table.
Hornell: HzA, HzB	Moderate: wetness.	Severe: shallow to shale.	Moderate: seasonal high water table; shallow to shale.	Moderate: very slow permeability; shallow to shale.	Moderate: shallow to shale.
*Jimtown:					
JsA, JtA, JuA Urban land part of JuA too variable to rate.	Slight	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
JtB	Slight	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Lobdell: Lb	Slight	Severe: subject to flooding; seasonal high water table.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.

for town and country uses—Continued

Athletic fields and other intensive play areas	Parks and other extensive play areas	Campsites for— Tents	Campsites for— Trailers	Sanitary landfill	Cemeteries
Severe: slope	Moderate: slope	Severe: very slow permeability.	Severe: very slow permeability.	Moderate: high in clay content; seasonal high water table.	Severe: very slow permeability; slope.
Severe: slope	Severe: slope	Severe: very slow permeability; slope.	Severe: very slow permeability; slope.	Moderate: high in clay content; slope.	Severe: very slow permeability; slope.
Severe: slope	Severe: slope	Severe: very slow permeability; slope.	Severe: very slow permeability; slope.	Severe: slope	Severe: slope.
Slight	Slight	Slight	Slight	Severe: rapid permeability.	Moderate: sandy.
Moderate: 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.
Moderate: 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.
Moderate: seasonal high water table; subject to occasional flooding.	Moderate: seasonal high water table; subject to occasional flooding.	Severe: seasonal high water table; subject to occasional flooding.	Severe: seasonal high water table; subject to occasional flooding.	Severe: subject to occasional flooding.	Severe: seasonal high water table; subject to occasional flooding.
Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: slow permeability; seasonal high water table.	Moderate: slow permeability; seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table; slow permeability.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table.
Moderate: seasonal high water table; slope.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Moderate: seasonal high water table.	Severe: seasonal high water table.
Severe: subject to flooding; seasonal high water table.	Severe: subject to flooding; seasonal high water table.	Severe: subject to flooding; seasonal high water table.	Severe: subject to flooding; seasonal high water table.	Severe: subject to flooding; seasonal high water table.	Severe: subject to flooding; seasonal high water table.
Severe: very slow permeability.	Moderate: seasonal high water table; high in clay content.	Severe: very slow permeability.	Severe: very slow permeability.	Moderate: seasonal high water table; shallow to shale.	Severe: shallow to shale.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table.
Moderate: seasonal high water table; slope.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table.
Severe: subject to flooding.	Moderate: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Farming	Disposal of sewage effluent from septic tanks	Homesite location [1] (three stories or less with basement)	Lawns, landscaping, and golf fairways	Streets and parking lots
Lockport: LcB	Moderate: wetness.	Severe: seasonal high water table; very slow permeability.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Lorain: Ln, Ls	Moderate: wetness.	Severe: slow permeability; seasonal high water table.	Severe: seasonal high water table; high shrink-swell potential.	Severe: seasonal high water table.	Severe: seasonal high water table.
Luray: Ly	Slight	Severe: seasonal high water table.	Severe: seasonal high water table; unstable.	Severe: seasonal high water table.	Severe: seasonal high water table.
*Mahoning:					
MgA, MkA, MmA. For Tiro part of MkA, see Tiro series. Urban land part of MmA too variable to be rated.	Moderate: wetness.	Severe: very slow permeability; seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
MgB, MgB2, MkB. For Tiro part of MkB, see Tiro series.	Moderate: needs drainage; hazard of erosion.	Severe: very slow permeability; seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
MhA	Moderate: wetness.	Severe: seasonal high water table; very slow permeability.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Mentor:					
MnB	Slight	Moderate: moderate permeability.	Moderate: unstable material where wet.	Slight	Moderate: unstable material where wet.
MnC	Moderate: hazard of erosion.	Moderate: moderate permeability; slope.	Moderate: unstable material where wet; slope.	Moderate: slope	Moderate: slope; unstable material where wet.
MnE	Severe: hazard of erosion.	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Mermill: Mo	Slight	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Miner:					
Mr	Moderate: wetness.	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Ms	Moderate: wetness.	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Mitiwanga:					
MtA	Moderate: wetness.	Severe: seasonal high water table; shallow to bedrock.	Severe: seasonal high water table; shallow to bedrock.	Moderate: seasonal high water table; shallow to bedrock.	Moderate: shallow to bedrock; seasonal high water table.

for town and country uses—Continued

Athletic fields and other intensive play areas	Parks and other extensive play areas	Campsites for—		Sanitary landfill	Cemeteries
		Tents	Trailers		
Severe: very slow permeability; seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table; very slow permeability.	Severe: seasonal high water table; very slow permeability.	Moderate: seasonal high water table.	Severe: seasonal high water table; very 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.	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.	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.	Moderate: seasonal high water table.	Severe: seasonal high water table; very slow permeability.
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.	Moderate: seasonal high water table; high in clay content.	Severe: seasonal high water table; very slow permeability.
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: shallow to bedrock.	Severe: shallow to bedrock; seasonal high water table.
Moderate: slope	Slight	Slight	Moderate: slope	Slight	Moderate: moderate permeability; ditchwall unstable.
Severe: slope	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: moderate permeability; ditchwall unstable; slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Moderate: shallow to bedrock; seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Severe: shallow to bedrock.	Severe: seasonal high water table; shallow to bedrock.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Farming	Disposal of sewage effluent from septic tanks	Homesite location [1] (three stories or less with basement)	Lawns, landscaping, and golf fairways	Streets and parking lots
Mitiwanga—continued					
MtB, MxB. Urban land part of MxB too variable to rate.	Moderate: wetness.	Severe: seasonal high water table; shallow to bedrock.	Severe: seasonal high water table; shallow to bedrock.	Moderate: seasonal high water table; shallow to bedrock.	Moderate: shallow to bedrock; seasonal high water table.
MvB	Moderate: wetness.	Severe: seasonal high water table; shallow to bedrock.	Severe: seasonal high water table; shallow to bedrock.	Moderate: seasonal high water table; shallow to bedrock.	Moderate: shallow to bedrock; seasonal high water table.
Olmsted:					
Om	Slight	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
On	Slight	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Orrville: Or	Slight	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.	Moderate: seasonal high water table; subject to flooding.	Severe: subject to flooding.
Oshtemo:					
OtA	Moderate: droughty; subject to soil blowing.	Slight	Slight	Severe: low available water capacity.	Slight
OtB	Moderate: droughty; subject to soil blowing.	Slight [2]	Slight	Severe: low available water capacity.	Slight
OtC	Moderate: droughty; subject to soil blowing.	Moderate: slope [2]	Moderate: slope	Severe: low available water capacity.	Moderate: slope
Quarries: Qu. Material too variable to rate; needs onsite inspection.					
Rawson:					
RdA	Slight	Severe: slow permeability.	Moderate: seasonal wetness.	Slight	Slight
RdB	Slight	Severe: slow permeability.	Moderate: seasonal wetness.	Slight	Slight
RdC2	Moderate: hazard of erosion.	Severe: slow permeability.	Moderate: slope	Moderate: slope	Moderate: slope
Sebring:					
Sb	Moderate: wetness.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Sd	Moderate: wetness.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Senecaville: Se	Slight	Severe: seasonal high water table; subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.

for town and country uses—Continued

Athletic fields and other intensive play areas	Parks and other extensive play areas	Campsites for— Tents	Campsites for— Trailers	Sanitary landfill	Cemeteries
Moderate: seasonal high water table; shallow to bedrock.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Severe: shallow to bedrock.	Severe: seasonal high water table; shallow to bedrock.
Moderate: shallow to bedrock; seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table; stony.	Moderate: seasonal high water table; stony; slope.	Severe: shallow to bedrock.	Severe: seasonal high water table; shallow to bedrock.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; shallow to bedrock.	Severe: seasonal high water table; shallow to bedrock.
Severe: seasonal high water table.	Moderate: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: subject to flooding.	Severe: seasonal high water table; subject to flooding.
Slight	Slight	Slight	Slight	Severe: moderately rapid permeability.	Slight.
Moderate: slope	Slight	Slight	Moderate: slope	Severe: moderately rapid permeability.	Slight.
Severe: slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: moderately rapid permeability.	Moderate: slope.
Slight	Slight	Slight	Slight	Slight	Moderate: seasonal wetness.
Moderate: slope	Slight	Slight	Moderate: slope	Slight	Moderate: seasonal wetness.
Severe: seasonal high water table of short duration; slope.	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: 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; hazard of ponding.	Severe: seasonal high water table; hazard of ponding.
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; shallow to bedrock.
Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Farming	Disposal of sewage effluent from septic tanks	Homesite location [1] (three stories or less with basement)	Lawns, landscaping, and golf fairways	Streets and parking lots
Shinrock:					
SkA	Slight	Severe: moderately slow permeability.	Moderate: seasonal high water table.	Slight	Slight
SkB	Slight	Severe: moderately slow permeability.	Moderate: seasonal high water table.	Slight	Slight
Stafford: Sw	Slight	Severe: seasonal high water table.	Severe: seasonal high water table; unstable.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Tioga: Tg	Slight	Severe: subject to flooding.	Severe: subject to flooding.	Moderate: subject to flooding.	Severe: subject to flooding.
Trumbull: TrA	Severe: wetness	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Tyner:					
TyB	Severe: low productivity; low available water capacity; subject to soil blowing.	Slight [2]	Slight	Severe: low available water capacity.	Slight
TyC	Severe: low productivity; low available water capacity; subject to soil blowing.	Moderate: slope [2]	Moderate: slope	Severe: low available water capacity.	Moderate: slope
Upshur:					
UpC	Moderate: hazard of erosion.	Severe: slow permeability.	Severe: shallow to bedrock.	Moderate: medium available water capacity.	Moderate: shallow to bedrock.
UpF	Severe: hazard of erosion.	Severe: slow permeability; slope.	Severe: slope; subject to slippage.	Severe: slope	Severe: slope
Weikert: WeB	Severe: shallow to bedrock; stony; droughty.	Severe: shallow to bedrock; stony.	Severe: shallow to bedrock.	Severe: shallow to bedrock; stony; low available water capacity.	Severe: shallow to bedrock; stony.

[1] The ratings shown for Homesite location also apply to light industrial, institutional, and commercial buildings of three stories or less.

common fine and medium roots; few fine pores; thin and thick, gray (5Y 5/1), continuous clay coatings on ped surfaces; several sandstone and quartz pebbles; strongly acid; diffuse, wavy boundary.

B3g—26 to 36 inches, gray (5Y 5/1) silty clay; many, fine and medium, prominent, brownish-yellow (10YR 6/8) and yellowish-brown (10YR 5/8) mottles; weak, thick, platy structure; firm; few fine roots; thick, patchy, gray (5Y 5/1) coatings on ped surfaces; large root holes filled with dark-gray (10YR 4/1) silty clay loam; lower 3 inches shows thin, platy shale pattern; strongly acid; clear, irregular boundary.

R1—36 to 40 inches, dark-gray (10YR 4/1) clay shale bedrock; many, medium, prominent, strong-brown (7.5YR 5/8) mottles; massive; firm; light olive-brown (2.5Y 5/4) fillings in cracks; strongly acid; gradual, wavy boundary.

R2—40 inches +, very dark grayish-brown (10YR 3/2) shale bedrock; firm, brittle, becomes harder with depth; dark-brown (7.5YR 4/4) and dark reddish-brown (5YR 3/4), weathered surfaces.

The solum ranges from 20 to 40 inches in thickness. This thickness corresponds closely to the depth to shale bedrock. Reaction is very strongly acid to strongly acid throughout the solum. The content of coarse fragments increases as depth increases, and the thicker profiles commonly have a shaly lower horizon.

The A horizon is generally less than 10 inches thick. The Ap horizon is dark grayish-brown (2.5Y 4/2 or 10YR 4/2), grayish-brown (2.5Y 5/2), or gray (5Y 5/1) silty clay loam or loam. An A2 horizon is lacking in some places, but where present it is gray (5Y 5/1) or olive-gray (5Y 5/2) silty clay loam or silty clay and has weak granular or weak blocky structure. The A&B horizon is silty clay loam or silty clay.

for town and country uses—Continued

Athletic fields and other intensive play areas	Parks and other extensive play areas	Campsites for—		Sanitary landfill	Cemeteries
		Tents	Trailers		
Moderate: moderately slow permeability.	Slight	Slight	Slight	Slight	Moderate: seasonal high water table.
Moderate: moderately slow permeability.	Slight	Slight	Moderate: slope	Slight	Moderate: seasonal high water table.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table.
Moderate: subject to flooding.	Moderate: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
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.
Slight	Slight	Slight	Moderate: slope	Severe: rapid permeability.[3]	Slight.
Moderate: slope	Severe: slope	Moderate: slope	Severe: slope	Severe: rapid permeability.[3]	Moderate: slope.
Moderate: slow permeability; shallow to bedrock.	Slight	Moderate: slow permeability.	Moderate: slope; slow permeability.	Moderate: shallow to bedrock.	Severe: slow permeability; shallow to bedrock.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; slow permeability.
Severe: shallow to bedrock; stony.	Moderate: stony	Moderate: stony	Moderate: stony; slope.	Severe: shallow to bedrock.	Severe: shallow to bedrock.

[3] Possible hazard of pollution to streams, lakes, springs, or shallow wells where permeability is rapid in the substratum.

The B horizon is grayish brown (10YR 5/2), light brownish gray (2.5Y 6/2), dark gray (10YR 4/1), or gray (10YR 5/1 or N 5/0) and has common to many prominent mottles of yellowish brown (10YR 5/8), brownish yellow (10YR 6/8), olive yellow (2.5Y 6/6), and strong brown (7.5YR 5/6 or 5/8). This horizon is heavy silty clay loam or silty clay. It has coarse, prismatic to moderate, medium and coarse, blocky structure.

In most places there is no C horizon, but, where present, it is similar to the B horizon in color. Its texture is very shaly clay or silty clay, and its boundary with the underlying shale bedrock is gradual. The shaly material is hard, but it is cracked and thinly bedded and can be removed with a backhoe. In places some material from the B horizon is found in cracks and partings in the upper part of the shale bedrock.

Allis soils are the somewhat poorly drained and poorly drained member of a drainage sequence that includes the moderately well drained Hornell soils. They are in landscape positions similar to those of Mahoning, Trumbull, and Fulton soils. They are more acid, contain more shale fragments throughout the profile, and are shallower over shale bedrock than Mahoning, Trumbull, and Fulton soils. They are finer textured than Mitiwanga soils and are underlain by shale bedrock rather than by sandstone. They are yellower in hue and are more acid than similar Lockport soils. They do not have the glacial till directly on the shale bedrock, which is characteristic of the Miner, shale substratum, soils.

Allis loam, 0 to 2 percent slopes (AkA).—This soil has a profile similar to the one described as representative of the series, but the surface layer and the upper part of the subsoil are loam. For this reason, this soil is easier to till than the representative soil and is subject

***Figure 8.*—Recreation park on Chagrin silt loam along the Black River.**

to less crusting. Included in mapping were areas of soils that are 40 to 60 inches deep over shale bedrock.

Wetness is a severe limitation if the soil is farmed. Artificial drainage is difficult because bedrock is at a depth of 20 to 40 inches. Seasonal wetness, slow permeability, and shallowness over bedrock limit this soil for most nonfarm uses. Capability unit IVw–1; woodland suitability group 2w1.

Allis silty clay loam, 0 to 2 percent slopes (AlA).—This soil is mainly in the northern half of the county, generally in areas 100 to 200 acres in size. It has the profile described as representative of the series. Where the soil is near old beach ridges, the surface layer and the upper part of the subsoil commonly contain more sand and gravel than the representative profile.

Included with this soil in mapping were a few areas of soils that have a darker surface layer than this Allis soil. Also included were small areas of soils that have a thin layer of glacial till over the shale bedrock and are generally less acid than this Allis soil.

This strongly acid soil needs drainage. In places drainage systems are difficult to install because of the shale bedrock. Seasonal wetness, the slow permeability, and shallowness over bedrock limit many nonfarm uses. Capability unit IVw–1; woodland suitability group 2w1.

Allis-Urban land complex, nearly level (AmA).—This complex is 50 to 70 percent Allis loam or Allis silty clay loam and 25 to 40 percent Allis soil material that has been altered as a result of grading and filling. The original Allis soil has been altered to the extent that it is difficult to identify. Shale or shale fragments normally are at a depth of 20 to 40 inches. Most areas of this mapping unit are in the cities of Lorain and Avon.

Included with this complex in mapping were areas of Miner silty clay loam, shale substratum in low spots and drainageways. Also included were areas of Lockport soils. In places these Miner and Lockport soils have also been altered by grading and filling.

Surface drainage as well as internal drainage is needed. The water table is high during winter and spring. The surface layer in altered areas commonly is strongly acid, is low in organic-matter content, has poor tilth, and is sticky when wet and cloddy when dry. Shale at a depth of 20 to 40 inches, the moderate

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

Soil	Acres	Percent
Allis loam, 0 to 2 percent slopes	941	0.3
Allis silty clay loam, 0 to 2 percent slopes	4,935	1.6
Allis-Urban land complex, nearly level	3,264	1.0
Bogart sandy loam, 0 to 2 percent slopes	347	.1
Bogart loam, 0 to 2 percent slopes	1,125	.4
Bogart loam, 2 to 6 percent slopes	969	.3
Carlisle mucky silt loam	446	.1
Chagrin silt loam	3,082	1.0
Chili loam, 0 to 2 percent slopes	798	.3
Chili loam, 2 to 6 percent slopes	1,888	.6
Chili loam, 6 to 18 percent slopes, moderately eroded	433	.1
Chili-Urban land complex, gently sloping	402	.1
Conotton gravelly loam, 2 to 6 percent slopes	441	.1
Conotton gravelly loam, 6 to 12 percent slopes	62	[1]
Cut and fill land	1,902	.6
Dekalb very channery loam, 1 to 6 percent slopes	1,291	.4
Del Rey silt loam, 1 to 4 percent slopes	1,606	.5
Ellsworth silt loam, 2 to 6 percent slopes	5,383	1.7
Ellsworth silt loam, 2 to 6 percent slopes, moderately eroded	2,885	.9
Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded	4,174	1.3
Ellsworth silt loam, 12 to 18 percent slopes, moderately eroded	1,047	.3
Ellsworth silt loam, 18 to 50 percent slopes, moderately eroded	2,749	.9
Elnora loamy fine sand, 1 to 3 percent slopes	275	[1]
Fitchville silt loam, 0 to 2 percent slopes	7,003	2.2
Fitchville silt loam, 2 to 6 percent slopes	243	[1]
Fitchville silt loam, low terrace, 0 to 2 percent slopes	3,861	1.2
Fitchville-Urban land complex, nearly level	2,130	.7
Fulton silt loam, 0 to 2 percent slopes	1,006	.3
Fulton silt loam, 2 to 6 percent slopes	125	[1]
Fulton silt loam, sandy substratum, 0 to 2 percent slopes	574	.2
Haskins loam, 0 to 2 percent slopes	8,965	2.8
Haskins loam, 2 to 6 percent slopes	818	.3
Haskins-Urban land complex, nearly level	433	.1
Holly silt loam	1,236	.4
Hornell silt loam, 0 to 2 percent slopes	367	.1
Hornell silt loam, 2 to 6 percent slopes	299	[1]
Jimtown sandy loam, 0 to 2 percent slopes	1,284	.4
Jimtown loam, 0 to 2 percent slopes	3,732	1.2
Jimtown loam, 2 to 6 percent slopes	321	.1
Jimtown-Urban land complex, nearly level	814	.3
Lobdell silt loam	6,323	2.0
Lockport silty clay loam, 1 to 4 percent slopes	622	.2
Lorain silty clay loam	3,516	1.1
Lorain silty clay loam, sandy substratum	227	[1]
Luray silty clay loam	4,616	1.5
Mahoning silt loam, 0 to 2 percent slopes	88,140	27.8
Mahoning silt loam, 2 to 6 percent slopes	20,692	6.5
Mahoning silt loam, 2 to 6 percent slopes, moderately eroded	701	.2
Mahoning silt loam, sandstone substratum, 0 to 2 percent slopes	137	[1]
Mahoning-Tiro silt loams, 0 to 2 percent slopes	24,568	7.8
Mahoning-Tiro silt loams, 2 to 6 percent slopes	7,769	2.5
Mahoning-Urban land complex, nearly level	6,401	2.0
Mentor silt loam, 2 to 6 percent slopes	434	.1
Mentor silt loam, 6 to 12 percent slopes	127	[1]
Mentor silt loam, 12 to 25 percent slopes	104	[1]
Mermill loam	3,314	1.0
Miner silty clay loam	19,890	6.3
Miner silty clay loam, shale substratum	3,386	1.1
Mitiwanga silt loam, 0 to 2 percent slopes	5,193	1.6
Mitiwanga silt loam, 2 to 6 percent slopes	1,444	.5
Mitiwanga channery loam, 1 to 4 percent slopes	643	.2
Mitiwanga-Urban land complex, gently sloping	692	.2
Olmsted fine sandy loam	2,247	.7
Olmsted loam, sandstone substratum	704	.2
Orrville silt loam	8,862	2.8
Oshtemo sandy loam, 0 to 2 percent slopes	1,025	.3
Oshtemo sandy loam, 2 to 6 percent slopes	1,035	.3
Oshtemo sandy loam, 6 to 12 percent slopes	92	[1]
Quarries	893	.3
Rawson loam, 0 to 2 percent slopes	954	.3
Rawson loam, 2 to 6 percent slopes	1,042	.3
Rawson loam, 6 to 12 percent slopes, moderately eroded	117	[1]
Sebring silt loam	3,115	1.0
Sebring silt loam, sandstone substratum	189	[1]
Senecaville silt loam	801	.3
Shinrock silt loam, 0 to 2 percent slopes	137	[1]
Shinrock silt loam, 2 to 6 percent slopes	280	[1]
Stafford fine sandy loam	255	[1]
Tioga fine sandy loam	684	.2
Trumbull silty clay loam, 0 to 2 percent slopes	18,454	5.8
Tyner loamy sand, 1 to 6 percent slopes	510	.2
Tyner loamy sand, 6 to 12 percent slopes	133	[1]
Upshur silt loam, 2 to 8 percent slopes	93	[1]
Upshur silt loam, 25 to 70 percent slopes	335	.1
Weikert channery fine sandy loam, 1 to 6 percent slopes	344	.1
Water areas	1,904	.6
Total	316,800	100.0

[1] Less than 0.1 percent.

shrink-swell potential, seasonal wetness, and the slow permeability limit this complex for some uses. Capability unit and woodland suitability group not assigned.

Bogart Series

The Bogart series consists of moderately well drained, nearly level to gently sloping soils on beach ridges, stream terraces, and outwash plains. These soils formed in loamy outwash or beach deposits that are underlain by poorly sorted gravel and sand.

In a representative profile in a cultivated area the surface layer is dark grayish-brown loam about 10 inches thick. The upper 20 inches of the subsoil is mottled, dark yellowish-brown and yellowish-brown loam and yellowish-brown gravelly loam; and the lower 12 inches is mottled, dark yellowish-brown clay loam. The substratum is grayish-brown fine gravelly loamy sand that extends to a depth of 60 inches.

Permeability is moderate, runoff is medium, and available water capacity is medium. The organic-matter content is moderate to low. The soils have a deep root zone that is mainly slightly acid or medium acid. During dry periods they are droughty in places.

Bogart soils are used for truck crops, general crops, and nursery crops and for nonfarm uses.

Representative profile of Bogart loam, 0 to 2 percent slopes, 50 yards south of Albrecht Road, 100 yards east of West Ridge Road, in Carlisle Township:

Ap1—0 to 8 inches, dark grayish-brown (10YR 4/2) loam;

weak, fine, granular structure; friable; many roots; neutral; abrupt, smooth boundary.

Ap2—8 to 10 inches, dark grayish-brown (10YR 4/2) loam; moderate, medium, granular structure; friable; many roots; 3 percent pebbles; slightly acid; abrupt, wavy boundary.

B21t—10 to 17 inches, dark yellowish-brown (10YR 4/4) loam; many, medium, distinct, dark grayish-brown (10YR 4/2) mottles; weak, coarse, subangular blocky structure; firm; common roots; dark-brown (10YR 4/3), very patchy, thin clay films on ped surfaces and bridging sand grains; 5 percent pebbles; medium acid; clear, wavy boundary.

B22t—17 to 26 inches, yellowish-brown (10YR 5/4) loam; many, fine and medium, prominent, gray (10YR 6/1) and yellowish-brown (10YR 5/6) mottles; weak, medium and coarse, subangular blocky structure; firm; few roots; dark-brown (10YR 4/3), thin, patchy clay films on ped surfaces; 10 percent pebbles; medium acid; clear, wavy boundary.

B23t—26 to 30 inches, yellowish-brown (10YR 5/4) gravelly loam; weak, coarse, subangular blocky structure; friable; few roots; very patchy, thin clay films as bridging and coating on sand and gravel; few, fine, dark grayish-brown (10YR 4/2) root channels; medium acid; clear, wavy boundary.

IIB3—30 to 42 inches, dark yellowish-brown (10YR 4/4) clay loam; common, fine and medium, distinct, pale-brown (10YR 6/3) mottles that have strong-brown (7.5YR 5/8) rinds; massive; medium acid; clear, wavy boundary.

IIIC—42 to 60 inches, grayish-brown (2.5Y 5/2) fine gravelly loamy sand; single grained; medium acid.

The Ap horizon is dark grayish-brown (10YR 4/2) or brown (10YR 4/3) loam or sandy loam. The A1 horizon, where present, ranges from 1 inch to 4 inches in thickness and generally is very dark brown (10YR 2/2) or very dark grayish brown (10YR 3/2). The A2 horizon is typically brown (10YR 5/3) or yellowish brown (10YR 5/4) and is thin and intermittent in plowed areas. The B horizon ranges from 15 to 40 inches in thickness. Its matrix has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 5. Its reaction is medium acid or strongly acid. It is 18 to 30 percent clay. The B horizon is mainly loam, gravelly loam, sandy clay loam, or clay loam, but thin layers of sandy loam also occur and most of the sand is coarser than very fine sand. In this horizon thin clay films bridge sand grains and pebbles and commonly cover 25 to 75 percent of the ped surfaces. The B horizon has weak to moderate and fine to coarse subangular blocky structure. The C horizon is generally massive or single grained. Its matrix has hue of 10YR and 2.5Y, value of 3 to 5, and chroma of 2 to 4. Its reaction ranges from mildly alkaline to strongly acid.

Bogart soils are the moderately well drained member of a drainage sequence that includes the well-drained Chili soils, the somewhat poorly drained Jimtown soils, and the very poorly drained Olmsted soils. They are in landscape positions similar to those of Rawson and Ellsworth soils. They do not have the clayey material below a depth of 40 inches that characterizes Rawson soils. They are coarser textured throughout the profile than Mentor, Shinrock, and Ellsworth soils. They have less sand and more clay in the profile than Elnora soils.

Bogart sandy loam, 0 to 2 percent slopes (BsA).—This nearly level soil has a profile similar to the one described as representative of the series, but the surface layer and the upper part of the subsoil are sandy loam. This soil is on the lake plain and along the major streams of the county. Areas range in size from large to small. Included in mapping were areas of soils that have a surface layer of fine sand. Also included were spots of Mentor, Fitchville, and Haskins soils.

During extended dry periods, this soil is droughty. The included soils that have the sandier surface layer are the most droughty. Seasonal wetness and droughtiness are limitations for some nonfarm uses. Capability unit IIs–1; woodland suitability group 2o1.

Bogart loam, 0 to 2 percent slopes (BtA).—This nearly level soil has the profile described as representative of the series. It is on the lake plain and along the major streams of the county. Areas range in size from large to small.

Included with this soil in mapping were small areas of soils that have a surface layer of silt loam and other small areas that are gravelly. Also included in flats were spots of wetter Fitchville, Jimtown, and Haskins soils. These spots of wetter soils commonly need to be drained.

This soil is somewhat droughty. Slight seasonal wetness and droughtiness are limitations for some nonfarm uses. Capability unit IIs–1; woodland suitability group 2o1.

Bogart loam, 2 to 6 percent slopes (BtB).—This soil is adjacent to drainageways and on beach ridges. Included in mapping were small areas of soils that have a surface layer of loam. Also included were spots of the wet Jimtown and Haskins soils on the less sloping areas and areas of Rawson soils in more sloping areas.

This soil is subject to moderate erosion and is droughty if farmed. Slight seasonal wetness and droughtiness are limitations for some nonfarm uses. Capability unit IIe–1; woodland suitability group 2o1.

Carlisle Series

The Carlisle series consists of very poorly drained, dark-colored, nearly level, organic soils in depressions and kettle holes throughout the county. These soils formed in highly decomposed woody, grassy, or sedgy material more than 42 inches thick.

In a representative profile the surface layer is very dark grayish-brown mucky silt loam about 16 inches thick. Below this, and extending to a depth of 62 inches, is dark-brown and very dark grayish-brown muck.

Permeability is moderately rapid, and the available water capacity is high. Stability is poor. The soils have a high water table during much of the year. They have a deep root zone.

Most drained areas of Carlisle soils are used for vegetables and other special crops. Most undrained areas are wooded or are overgrown with swamp vegetation.

Representative profile of Carlisle mucky silt loam, in an uncultivated area, 2,310 feet west of junction of Baird Road and Garfield Road, approximately 500 feet north of Garfield Road, along drainageway, in Henrietta Township:

A—0 to 16 inches, very dark grayish-brown (10YR 3/2) mucky silt loam, dark brown (10YR 3/3) rubbed; moderate, medium, granular structure; friable; pH 4.8 in potassium chloride; abrupt, smooth boundary.

IIOa2—16 to 42 inches, dark-brown (7.5YR 3/2) muck, very dark gray (10YR 3/1) rubbed; 20 percent fiber, less than 5 percent rubbed; weak, medium, platy structure; soft; few woody fragments; pH 5.2 in potassium chloride; clear, smooth boundary.

IIOa2—42 to 48 inches, dark-brown (10YR 4/3) muck, very dark grayish brown (10YR 3/2) rubbed; less than 5 percent fiber, 0 rubbed; weak, medium, platy structure; soft; pH 6.2 in potassium chloride; gradual, smooth boundary.

IIOa3—48 to 62 inches, very dark grayish-brown (2.5Y 3/2) muck, very dark grayish brown (10YR 3/2) rubbed; less than 5 percent fibers, 0 rubbed; massive; soft; pH 6.0 in potassium chloride.

The A horizon is mucky silt loam. It ranges from 6 to 16 inches in thickness and from very dark grayish brown (10YR 3/2) to black (10YR 2/1) in color. The subsurface tiers range from very strongly acid in the upper part and strongly acid in the lower part to neutral throughout some profiles. They are massive or have weakly developed structure. The subsurface tiers of muck are dark brown (7.5YR 3/2 or 10YR 4/3) and very dark grayish brown (2.5YR 3/2). They range from 5 to 20 percent in fiber content and may be rubbed to less than 5 percent.

Carlisle soils in Lorain County are more acid than is defined as within the range for the series and their surface layer contains more mineral material, but these differences do not alter the usefulness and behavior of the soils.

Carlisle soils are closely associated on the landscape with Lorain, Luray, Miner, and Mermill soils. They have organic (muck) layers below the surface layer, which do not occur in those soils.

Carlisle mucky silt loam (Cg).—This soil is mainly in depressions, most of which are old kettle holes. It is mainly in the southern and western parts of the county, but spots of this soil too small to map separately occur throughout the county. They are identified by a symbol for marsh on the detailed soil map. Included in mapping were small areas of soils around the outer edge of many of the mapped areas in which the organic material is less than 42 inches thick.

Wetness is the main hazard in farming. Wetness and instability are severe limitations for nearly all nonfarm uses. Capability unit IIIw–5; woodland suitability group 5w1.

Chagrin Series

The Chagrin series consists of well-drained, nearly level soils on flood plains of the larger streams of the county. These soils formed in slightly acid, medium-textured recent alluvium that washed from soils of the uplands.

In a representative profile in a cultivated area the surface layer is dark grayish-brown silt loam about 11 inches thick. The subsoil extends to a depth of about 30 inches and is dark-brown and dark yellowish-brown silt loam. Between depths of 30 and 55 inches, the substratum is dark yellowish-brown silt loam. Below a depth of 55 inches and extending to a depth of 60 inches, the substratum is dark-brown fine sandy loam.

Permeability is moderate, runoff is slow, and available water capacity is high. These soils have a deep root zone. Flooding is the main hazard.

In areas where flooding is controlled, Chagrin soils are suited to the general crops commonly grown in the county. In areas where flooding is frequent, these soils are used for recreation, forest, or permanent pasture.

Representative profile of Chagrin silt loam, approximately 3 miles southeast of Lagrange, 400 feet north of the Short Road, 100 feet west of the East Branch of the Black River, 800 feet east of Foster Road, in Penfield Township:

Ap—0 to 11 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium and coarse, granular structure; friable; medium acid; abrupt, smooth boundary.

B21—11 to 22 inches, dark-brown (10YR 4/3) silt loam; moderate, medium, subangular blocky structure; friable; dark grayish-brown (10YR 4/2) organic coatings on ped surfaces; slightly acid; clear, smooth boundary.

B22—22 to 30 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, medium and coarse, subangular blocky structure; friable; slightly acid; gradual, smooth boundary.

C1—30 to 42 inches, dark yellowish-brown (10YR 4/4) silt loam; massive; friable; common, distinct, very dark grayish-brown (10YR 3/2) and dark grayish-brown (10YR 4/2) worm casts; slightly acid; clear, smooth boundary.

C2—42 to 55 inches; dark yellowish-brown (10YR 4/4) light silt loam; massive; friable; slightly acid; clear, smooth boundary.

IIC—55 to 60 inches, dark-brown (10YR 4/3) fine sandy loam; massive; friable; slightly acid.

The solum ranges from 24 to 48 inches in thickness. Reaction ranges from medium acid to neutral. The Ap horizon ranges from dark brown (10YR 4/3) to dark grayish brown (10YR 4/2) and has weak, fine, granular structure to moderate, coarse, granular. In undisturbed areas the A1 horizon is 1 inch to 4 inches thick and is very dark brown (10YR 2/2) to very dark gray (10YR 3/1). The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. This horizon is generally silt loam or loam, but it contains individual horizons of sandy loam, clay loam, or silty clay loam. Stratification in places is evident. This horizon has weak, medium or coarse, subangular blocky structure. The C horizon is stratified brown, dark-brown, grayish-brown, dark grayish-brown, or yellowish-brown loam, silt loam, sandy loam, and fine sand. It has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. The profile typically becomes coarser textured as depth increases.

Chagrin soils are the well-drained member of a drainage sequence that includes the moderately well drained Lobdell soils, the somewhat poorly drained Orrville soils, and the poorly drained Holly soils. They are more silty throughout than the similar Tioga soils. They are at a lower level on the landscape than the Fitchville, low terrace, soils, and in places the transition between these two soils is very gradual.

Chagrin silt loam (Ch).—This soil is in large areas on the flood plains of Black, Vermilion, and West Branch Rocky Rivers and Beaver Creek.

Included with this soil in mapping were small depressions and meander scars consisting of the more poorly drained Lobdell, Orrville, and Holly soils. Also included were areas of Fitchville, low terrace, soils that are at a slightly higher elevation, areas of soils that have slopes of as much as 4 percent, and, along the Vermilion River, small areas of soils that have a high content of shale chips below a depth of 40 inches.

Flooding is the main limitation in farming. Flooding is a severe limitation to many nonfarm uses. Capability unit IIw–1; woodland suitability group 1o1.

Chili Series

The Chili series consists of well-drained, nearly level to moderately steep soils on beach ridges, outwash plains, and stream terraces. These soils formed in loamy outwash or beach deposits that are underlain by stratified sand and gravel.

In a representative profile the surface layer is dark grayish-brown loam about 9 inches thick. The subsurface layer is dark yellowish-brown loam about 3 inches thick. The subsoil extends to a depth of about 42 inches. It is dark yellowish-brown loam in the upper 7 inches and yellowish-brown gravelly loam in the lower 23 inches. The underlying material is yellowish-brown stratified sand and gravel that extend to a depth of 60 inches.

Runoff is slow, and permeability is moderately rapid. Available water capacity is low. The soils have a deep root zone that generally ranges from medium acid to neutral.

Most areas of Chili soils are used for specialized crops and general crops. Many areas are used for nonfarm purposes.

Representative profile of Chili loam, 0 to 2 percent slopes, south of State Route 10, 200 yards west of Island Road, in North Ridgeville:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) rubbed; moderate, fine and medium, granular structure; friable; many fine roots; neutral; abrupt, smooth boundary.

A2—9 to 12 inches, dark yellowish-brown (10YR 4/4) loam; moderate, medium and coarse, subangular blocky structure; friable; common fine roots; many fine and medium pores; medium acid; clear, smooth boundary.

B21t—12 to 19 inches, dark yellowish-brown (10YR 4/4) loam; weak, coarse, subangular blocky structure; friable; few fine roots; thin, patchy, dark-brown (10YR 4/3) clay films on ped surfaces; many fine, medium, and coarse pores; about 5 percent gravel; slightly acid; clear, smooth boundary.

IIB22t—19 to 36 inches, yellowish-brown (10YR 5/6) gravelly loam; massive; firm; few roots; pale-brown (10YR 6/3) clay films on sand grains; about 20 percent gravel; medium acid; clear, wavy boundary.

IIB3—36 to 42 inches, yellowish-brown (10YR 5/4) gravelly loam; many, medium, distinct, pale-brown (10YR 6/3) mottles; massive; loose; about 30 percent gravel; medium acid; clear, smooth boundary.

IIIC—42 to 60 inches, yellowish-brown (10YR 5/4), stratified, poorly sorted sand and gravel; single grained; loose; medium acid.

The solum ranges from 40 to 60 inches in thickness. Gravel is mainly sandstone, but it also includes fragments of shale, limestone, and igneous rock. Where the A1 horizon is undisturbed, it is very dark grayish brown (10YR 3/2) or very dark brown (10YR 2/2). The B horizon mainly has a hue of 10YR, but in places it has a hue of 7.5YR or 5YR. The Bt horizon ranges from 20 to 30 inches in thickness and generally extends to a depth of less than 40 inches. This horizon is mainly loam, gravelly loam, heavy sandy loam, or sandy clay loam. Content of gravel in the lower part of the B horizon ranges from 10 to 40 percent. The C horizon is stratified sand and gravel.

Chili soils are the well-drained member of a drainage sequence that includes the moderately well drained Bogart soils, the somewhat poorly drained Jimtown soils, and the poorly drained Olmsted soils. They are near the similar Oshtemo and Tyner soils. They contain more gravel and clay throughout than Oshtemo and Tyner soils and contain fewer coarse fragments than Conotton soils. They do not have the underlying till or lacustrine material that is typical of Rawson soils.

Chili loam, 0 to 2 percent slopes (ClA).—This soil is in elongated areas along beach ridges and major ridges and major streams of the county. It has the profile described as representative of the series.

Included with this soil in mapping were spots of soils that have a surface layer of silt loam, sandy loam, or fine sandy loam. Also included were small spots of gravelly loam and small spots of moderately well drained Bogart soils.

Droughtiness is the main limitation in farming. This soil is well suited to the production of nursery stock and truck crops. Much of the acreage is used for nonfarm purposes. The soil has few limitations for most nonfarm uses. Capability unit IIs–1; woodland suitability group 2o1.

Chili loam, 2 to 6 percent slopes (ClB).—This soil is in elongated areas that generally range from 5 to 25 acres in size.

Included with this soil in mapping were a few areas of soils that have slopes of more than 6 percent and small areas in which erosion has removed more than half of the original surface layer and brown subsoil material has been mixed into the surface layer. Also included were some spots of soils that have a surface layer of silt loam, sandy loam, fine sandy loam, or gravelly loam.

Erosion is the major limitation in farming. The soil has few limitations for most nonfarm uses. Capability unit IIe–1; woodland suitability group 2o1.

Chili loam, 6 to 18 percent slopes, moderately eroded (ClD2).—This soil is in elongated areas on beach ridges and stream terraces throughout the county. The present surface layer is a mixture of the original surface layer and the upper part of the subsoil. Erosion on this soil has caused it to have somewhat lower available water capacity and to be more difficult to till than other Chili soils. Included in mapping were spots of Conotton, Bogart, and Oshtemo soils.

Erosion is a severe limitation in farming. Slope is a limitation for many nonfarm uses. Capability unit IIIe–1; woodland suitability group 2o1.

Chili-Urban land complex, gently sloping (CnB).—This complex is about 50 to 70 percent Chili loam and about 25 to 40 percent Chili soil material that has been altered as a result of grading and filling. The profile of this Chili soil is similar to the representative profile, except that on the surface there has commonly been some topsoil removed or some fill material deposited.

Included with this complex in mapping were small areas of Jimtown and Bogart soils that in places have also been altered by grading and filling.

In areas of Urban land, the surface layer generally has low organic-matter content, low fertility, and poor tilth. The available water capacity is inadequate for good growth of lawns and shrubs. Erosion is a hazard in areas that are sloping and bare of vegetation. Capability unit and woodland suitability group not assigned.

Conotton Series

The Conotton series consists of well-drained, gently sloping to sloping soils in areas near sandstone highs in the northern part of the county. These soils formed in loamy material that has a high content of sand and gravel.

In a representative profile in a cultivated area the surface layer is dark grayish-brown gravelly loam about 8 inches thick. The subsoil extends to a depth of about 56 inches. The upper 4 inches of the subsoil is brown very gravelly sandy loam, and the lower 44 inches is dark-brown gravelly sandy loam and very gravelly loam. The substratum is dark-brown loamy sand that extends to a depth of 60 inches.

Permeability is rapid, and the available water capacity is low. The organic-matter content is low. The soils have a deep root zone that is mainly strongly acid or medium acid.

Conotton soils are used mainly for general farm crops, orchards, and nonfarm purposes.

Representative profile of Conotton gravelly loam, 2 to 6 percent slopes, approximately 330 feet west of the intersection of Claus and Middle Ridge Roads, approximately 50 feet south of Middle Ridge Road, in Brownhelm Township:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) gravelly loam; weak, medium and fine, granular structure; friable; 30 percent gravel; slightly acid; clear, wavy boundary.

B1—8 to 12 inches, brown (7.5YR 5/4) very gravelly sandy loam; very weak, medium, subangular blocky structure; very friable; 45 percent gravel; fingers of the Ap horizon extend into this horizon; medium acid; clear, smooth boundary.

B21t—12 to 23 inches, dark-brown (7.5YR 4/4) gravelly sandy loam; weak, medium, subangular blocky structure; friable; 40 percent gravel; dark-brown (7.5YR 4/2), thin, patchy clay films bridging sand grains and coating tops of gravel; strongly acid; clear, smooth boundary.

B22t—23 to 39 inches, dark-brown (7.5YR 4/4) very gravelly loam; massive; friable; 50 percent gravel; dark-brown (7.5YR 4/2), medium, patchy clay films bridging sand grains and coating tops of gravel; strongly acid; clear, smooth boundary.

B3—39 to 56 inches, dark-brown (7.5YR 4/4) gravelly sandy loam; massive; friable; 35 percent gravel; very patchy thin clay films coating tops of large pieces of gravel; very strongly acid.

IIC—56 to 60 inches, dark-brown (7.5YR 4/2) coarse and medium loamy sand; single grained; loose; very strongly acid.

The solum ranges from 40 to 80 inches in thickness. Structure is weak or is lacking. Much of the soil is massive in place, but when removed it crumbles readily under slight pressure to loose, single grained. Coarse fragments range from 10 to 40 percent in the surface layer to 30 to 90 percent in the lower part of the B horizon and in the C horizon, but in a few places the C horizon has no gravel. Reaction ranges from slightly acid to very strongly acid throughout the profile but is mainly strongly acid. The Ap horizon ranges from dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2) to dark brown (10YR 4/3). The B horizon typically is 7.5YR in hue but ranges from 10YR to 5YR in hue and from 3 to 5 in value and chroma. Clay films are on the surfaces of pebbles and also form bridges between sand grains.

Conotton soils contain more coarse gravel throughout than Chili and Bogart soils. They are deep over bedrock, whereas Mitiwanga, Weikert, and Dekalb soils have bedrock within a depth of 40 inches.

Conotton gravelly loam, 2 to 6 percent slopes (CoB).—This soil has the profile described as representative of the series. Included in mapping were small areas of Chili soils and areas of soils that have a surface layer of gravelly or channery sandy loam or loam. Also included were spots of severely eroded soils and a few spots of Dekalb soils.

Droughtiness and the hindrance of cultivation by coarse fragments are the main limitations in farming. The soil has few limitations for many nonfarm uses. Capability unit IIIs–1; woodland suitability group 3f1.

Conotton gravelly loam, 6 to 12 percent slopes (CoC).—The slope of this soil increases the runoff and causes this soil to be more subject to erosion than the soil described as representative of the series.

Included with this soil in mapping were small areas of Chili soils and areas of soils that have a surface layer of gravelly or channery sandy loam or loam. Also included were spots of severely eroded soils and a few spots of Dekalb soils.

The hazard of erosion is severe if this soil is farmed. Slope and the high content of coarse fragments are limitations for many nonfarm uses. Capability unit IIIe–1; woodland suitability group 3f1.

Cut and Fill Land

Cut and fill land (Cz) consists of soil material that has been leveled, moved, or removed and on which earth, trash, and slag have been dumped. Some areas are blacktopped and used as factory parking lots. Material has been removed from some areas for fill in road construction. Areas from which soil was removed sometimes become filled with water. Included with this land type in mapping were the rights-of-way of divided highways.

Cut and fill land has low organic-matter content. The soil material varies considerably over a short distance, and in some places tilth is poor. Graded areas that are bare are easily eroded, but grass can be established by mulching, fertilizing, and seeding. Trees that tolerate the calcareous soil and its poor tilth can be grown. Generally, the areas have little value for farming. Capability unit and woodland suitability group not assigned.

Dekalb Series

The Dekalb series consists of well-drained, nearly level to gently sloping soils that are commonly around sandstone highs and sandstone ridges in the northern half of the county. These soils formed in material weathered from sandstone bedrock. Sandstone bedrock is at a depth of 20 to 40 inches.

In a representative profile the surface layer is very dark grayish-brown very channery loam about 5 inches thick. The subsurface layer, about 4 inches thick, is dark-brown very channery loam. The subsoil is yellowish-brown very channery loam that extends to a depth of 26 inches. Sandstone bedrock is at a depth of 26 inches.

Permeability is rapid, and the available water capacity is low. The soils have low organic-matter content. They have a moderately deep root zone that is commonly very strongly acid or strongly acid.

Most areas of Dekalb soils are used for nonfarm purposes or are idle.

Representative profile of Dekalb very channery loam, 1 to 6 percent slopes, west of Stony Ridge Road, one-fourth mile south of the intersection of Long and Stony Ridge Roads, in the city of Avon:

A1—0 to 5 inches, very dark grayish-brown (10YR 3/2) very channery loam; moderate, fine, granular structure; very friable; many fine and medium roots; strongly acid; clear, wavy boundary.

A2—5 to 9 inches, dark-brown (10YR 4/3) very channery loam; weak, fine, subangular blocky structure; friable; common fine and medium roots; very strongly acid; clear, smooth boundary.

B2—9 to 26 inches, yellowish-brown (10YR 5/4) very channery loam; weak, fine, subangular blocky structure; friable; few roots; 70 percent coarse channers; common dark-brown (10YR 4/3) worm casts; strongly acid; abrupt, smooth boundary.

R—26 inches +, sandstone bedrock.

Depth to bedrock ranges from 20 to 40 inches. The solum typically is stony or channery throughout. It is 30 to 70 percent, by volume, stony or channery fragments. Content of coarse fragments increases as depth increases and in places is as much as 90 percent, by volume, in the lower horizons. A few clay films bridge sand grains and the surfaces of channers. The A horizon ranges from very dark gray (10YR 3/1) to dark brown (10YR 4/3). The B horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 6. Reaction is very strongly acid or strongly acid throughout the profile.

Dekalb soils are underlain by bedrock at a depth of 20 to 40 inches, whereas the similar Weikert soils have bedrock within a depth of 20 inches. Dekalb soils contain more coarse fragments throughout than Mitiwanga soils. They have bedrock at a depth of 20 to 40 inches, whereas Chili, Conotton, Bogart, and Oshtemo soils have no bedrock within a depth of 40 inches.

Dekalb very channery loam, 1 to 6 percent slopes (DkB).—This soil is on flat, rounded tops of sandstone highs in the northern part of the county. Included in mapping were spots of Mitiwanga soils and spots of soils that have a channery surface layer. Also included were areas of soils that have slopes of slightly more than 6 percent.

The channery surface and moderate depth to bedrock make tillage and excavation very difficult. The top layers of the bedrock are weathered sufficiently to make excavation feasible. The underlying, unweathered bedrock is impervious to water, and it causes a water table to be perched at a depth of 1 foot or less for a short period during wet weather in winter and spring.

The hazard of erosion is moderate if this soil is farmed. The moderate depth to bedrock and coarse fragments in the soil are limitations for some nonfarm uses. Capability unit IIe-3; woodland suitability group 3o1.

Del Rey Series

The Del Rey series consists of somewhat poorly drained, nearly level to gently sloping soils on the lower parts of the undulating topography and on broad flats in the northwestern part of the county. These soils formed in lacustrine deposits.

In a representative profile in a cultivated area the surface layer is very dark gray silt loam about 8 inches thick. The subsoil extends to a depth of about 30 inches and is yellowish-brown and olive-brown, mottled silty clay loam. The substratum is grayish-brown silt loam that extends to a depth of 60 inches.

Permeability is slow, and the available water capacity is medium. These soils have moderate organic-matter content and a deep root zone. They have a perched water table in winter and spring, and they require drainage.

Del Rey soils are used mostly for general crops, such as corn, wheat, and meadow.

Representative profile of Del Rey silt loam, 1 to 4 percent slopes, 100 yards south of Lake Erie, one-fourth mile east of Erie County line, in Vermilion:

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) rubbed; moderate, medium, granular structure; friable; many roots; medium acid; abrupt, smooth boundary.

B21t—8 to 10 inches, yellowish-brown (10YR 5/6) silty clay loam; many, fine and medium, distinct, dark-gray (10YR 4/1) and dark grayish-brown (10YR 4/2) mottles; weak, medium, subangular blocky structure; friable; thin discontinuous clay films in root channels; slightly acid; abrupt, smooth boundary.

B22t—10 to 30 inches, olive-brown (2.5Y 4/4) silty clay loam; many, fine and medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium and coarse, subangular blocky structure; firm to very firm; dark grayish-brown (2.5Y 4/2) ped coatings; thin discontinuous clay films; neutral; clear, wavy boundary.

C—30 to 60 inches, grayish-brown (2.5Y 5/2) silt loam; many, fine and medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; mildly alkaline.

The solum ranges from 2 to 4 feet in thickness. It is strongly acid in the upper part and medium acid to mildly alkaline in the extreme lower part. The Ap horizon is dark grayish brown (10YR 4/2) or very dark grayish brown (2.5Y 3/2 or 10YR 3/2). The matrix of the B horizon is yellowish brown (10YR 5/6), dark yellowish brown (10YR 4/4), dark brown (10YR 4/3), or olive brown (2.5Y 4/4) and has mottles of yellowish brown (10YR 5/4, 5/6, or 5/8). The ped coatings are very dark grayish brown (10YR 3/2), dark gray (10YR 4/1), or dark grayish brown (10YR 4/2). The B horizon is silty clay loam that has thin layers of silt loam, loam, or very fine sand. The soil is leached of carbonates to the lower boundary of the B2 horizon. The B3 horizon, if present, ranges from slightly acid to mildly alkaline.

Del Rey soils are the somewhat poorly drained member of a drainage sequence that includes the well-drained Shinrock soils. They differ from the similar Mahoning soils in having more sand in the profile and in being less acid. They are less acid, have stronger structure, and contain more clay than Fitchville soils.

Del Rey silt loam, 1 to 4 percent slopes (DsB).—This soil is on the lower parts of the undulating topography and on broad flats of the lake plain in the northwestern part of the county.

Included with this soil in mapping were spots of Mahoning and Fitchville soils. Also included were areas of soils in which the depth to carbonates is as little as 20 inches and, in some places, the underlying mildly alkaline material appears to be reworked glacial till. Also included were small spots of soils that have as much as 10 percent gravel on the surface.

Wetness is a moderate limitation in farming. Wetness is a limitation for many nonfarm uses. Capability unit IIw-2; woodland suitability group 2w1.

Ellsworth Series

The Ellsworth series consists of moderately well drained, gently sloping to very steep soils on convex slopes of the till plain and moraines. These soils formed in moderately fine textured glacial till.

In a representative profile in a cultivated area the surface layer is dark grayish-brown silt loam about 7 inches thick. The subsoil extends to a depth of about 29 inches and is yellowish-brown and dark-brown silt loam and silty clay loam. The substratum is dark-brown clay loam that extends to a depth of 80 inches.

Permeability is very slow, and the available water capacity is medium. The soils have moderate organic-matter content and a deep root zone.

Ellsworth soils are suited to the commonly grown field crops, such as corn, wheat, oats, and grass-legume crops.

Representative profile of Ellsworth silt loam, 2 to 6 percent slopes, 100 feet south of State Route 162, approximately 660 feet west of Quarry Road, in Rochester Township:

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

B1—7 to 9 inches, yellowish-brown (10YR 5/6) silt loam; common, distinct, pale-brown (10YR 6/3) mottles; weak, fine and medium, subangular blocky structure; firm; very strongly acid; clear, smooth boundary.

B21—9 to 12 inches, yellowish-brown (10YR 5/4) silty clay loam; common, medium, distinct, light brownish-gray (10YR 6/2) mottles; weak, coarse, subangular blocky structure; firm; very strongly acid; clear, smooth boundary.

B22t—12 to 19 inches, dark-brown (10YR 4/3) silty clay loam; moderate, medium, prismatic structure parting to medium and coarse, subangular blocky; prism faces coated with grayish-brown (10YR 5/2) clay films; strongly acid; clear, smooth boundary.

B23t—19 to 23 inches, dark-brown (10YR 4/3) silty clay loam; moderate, medium and coarse, prismatic structure parting to coarse, subangular blocky; very firm; continuous grayish-brown (10YR 5/2) clay films on vertical ped surfaces; strongly acid; clear, smooth boundary.

B24t—23 to 29 inches, dark-brown (10YR 4/3) silty clay loam; few, medium, distinct, grayish-brown (10YR 5/2) and dark-gray (10YR 4/1) mottles; weak, coarse, prismatic structure; very firm; neutral; clear, wavy boundary.

C1—29 to 34 inches, dark-brown (10YR 4/3) heavy clay loam; weak, coarse, subangular blocky structure; firm; few, thin, dark-brown (7.5YR 4/2) clay films in fractures; mildly alkaline; gradual, smooth boundary.

C2—34 to 41 inches, dark-brown (10YR 4/3) clay loam; common, distinct, grayish-brown (10YR 5/2) mottles; weak, medium, angular blocky structure; firm; mildly alkaline; gradual, smooth boundary.

C3—41 to 80 inches, dark-brown (10YR 4/3) clay loam; massive; firm; mildly alkaline.

The solum ranges from 28 to 36 inches in thickness. The A horizon is brown (10YR 4/3), dark grayish brown (10YR 4/2), or very dark grayish brown (10YR 3/2). It is typically less than 5 percent pebbles. The matrix of the B2 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 to 5. Mottles have hue of 10YR and 2.5Y, value of 4 or 5, and chroma of 2 or less. The B2 horizon ranges from silty clay loam or silty clay to heavy clay loam. In some parts of the B2 horizon, the continuous coatings on faces of prisms have value of 4 to 6 and chroma of 2 or 3. The matrix of the C horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Mottles have chroma of 2 or less. This horizon ranges from silty clay loam to clay loam and is mildly alkaline.

Ellsworth soils are the moderately well drained member of a drainage sequence that includes the somewhat poorly drained Mahoning soils, the poorly drained Trumbull soils, and the very poorly drained, dark-colored Miner soils. They have less sand and gravel throughout their profile than Oshtemo and Bogart soils. They have less sand and gravel in the upper part of the subsoil than Rawson soils. They do not have the shale bedrock within a depth of 20 to 40 inches that is characteristic of Upshur and Hornell soils. They are not stratified and they formed in glacial till, whereas Shinrock soils formed in lacustrine material.

Ellsworth silt loam, 2 to 6 percent slopes (EIB).—This gently sloping soil is on knolls and in small areas that parallel drainageways. It has the profile described as representative of the series.

Included with this soil in mapping were spots of Mahoning soils, small spots of poorly drained Trumbull soils in drainageways, and spots of soils in which the silty surface layer extends to a depth of 18 inches. Also included are areas of soils near Henrietta and South Amherst, where the red Bedford Shale has given the underlying material a reddish color and a less acid reaction.

Erosion is a severe hazard in farming. Localized wet spots require drainage. Wetness and a clayey subsoil are limitations for many nonfarm uses. Capability unit IIIe–2; woodland suitability group 3o1.

Ellsworth silt loam, 2 to 6 percent slopes, moderately eroded (EIB2).—This gently sloping soil is on knolls and in areas that parallel drainageways. It has a profile similar to the one described as representative of the series, but it is moderately eroded and the surface contains more clay. The present surface is a mixture of the original surface and the upper part of the subsoil. The surface layer is sticky when wet. It is a less favorable seedbed, is lower in organic-matter content, and is more difficult to till than that of the uneroded soils.

Included with this soil in mapping in the lower areas are spots of the wetter Mahoning and Trumbull soils.

Erosion is a severe hazard in farming. Wetness and a clayey subsoil are limitations for many nonfarm uses. Capability unit IIIe–2; woodland suitability group 3o1.

Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded (EIC2).—This soil is mainly along drainageways. It has a profile similar to the one described as representative of the series, but as much as half of the original surface layer has been lost through erosion and the present surface layer is a mixture of subsoil material and the original surface layer. The present surface layer is more difficult to till than the surface layer of the uneroded soils. Also, it is a less favorable seedbed, has lower available water capacity, and is lower in organic-matter content.

Included with this soil in mapping were spots of wetter Trumbull and Orrville soils in drainageways. Also included were areas of slightly eroded soils and areas of soils in which the surface layer is as much as 10 percent pebbles.

Erosion is a very severe hazard in cultivated areas. Slope and a clayey subsoil are limitations for many nonfarm uses. Capability unit IVe–1; woodland suitability group 3o1.

Ellsworth silt loam, 12 to 18 percent slopes, moderately eroded (EID2).—This moderately steep soil is in areas along the major drainageways. It has a profile similar to the one described as representative of the series, but as much as half of the original surface layer has been eroded away and the depth to carbonates is slightly less.

Included with this soil in mapping were spots of Mentor soils on the crest of the slopes. Also included were spots of soils in which the surface layer is loam and spots in which the surface layer is as much as 10 percent fragments of shale and siltstone.

The hazard of erosion is very severe. Slope is a limitation for most nonfarm uses. Capability unit VIe–1; woodland suitability group 3r1.

Ellsworth silt loam, 18 to 50 percent slopes, moderately eroded (EIF2).—This steep to very steep soil is in areas along major drainageways in the county. It has a profile similar to the one described as representative of the series, but as much as half of the original surface layer has been lost through erosion and the depth to carbonates is slightly less. Included in mapping were spots of severely eroded soils and spots of soils in which the surface layer is as much as 10 percent coarse fragments.

Erosion is a very severe hazard in cultivated areas. The soil should remain in permanent cover of vegetation to prevent further erosion. Slope is a severe limitation for most nonfarm uses. Capability unit VIIe-1; woodland suitability group 3r1.

Elnora Series

The Elnora series consists of moderately well drained, nearly level to gently sloping soils on beach ridges in the northern part of the county. These soils formed in loamy sand.

In a representative profile in a meadow the surface layer is dark grayish-brown loamy fine sand about 11 inches thick. The subsoil extends to a depth of about 34 inches and is brownish-yellow, pale-brown, and strong-brown loamy fine sand. The substratum is strong-brown loamy fine sand that extends to a depth of 60 inches.

Permeability is rapid, and the available water capacity is low. The soils have a perched water table near the surface for a short period in winter and spring, and they commonly need some drainage. These soils have low organic-matter content and a deep root zone.

Elnora soils are used for the commonly grown crops, such as corn, wheat, and grass-legume meadow.

Representative profile of Elnora loamy fine sand, 1 to 3 percent slopes, 660 feet east of State Route 83 and 825 feet north of the intersection of Mills Road and State Route 83, 200 feet east and 50 feet south of barn in meadow, in the city of Avon:

A1—0 to 11 inches, dark grayish-brown (10YR 4/2) loamy fine sand; weak, coarse, granular structure; very friable; many roots; slightly acid; abrupt, smooth boundary.

B1—11 to 14 inches, brownish-yellow (10YR 6/6) loamy fine sand; weak, medium, subangular blocky structure; very friable; some material from the A1 horizon is in this horizon; slightly acid; clear, smooth boundary.

B2—14 to 25 inches, pale-brown (10YR 6/3) loamy fine sand; many, coarse, prominent, strong-brown (7.5YR 5/6) mottles; single grained; loose; worm casts of dark grayish brown (10YR 4/2); slightly acid; gradual, smooth boundary.

B3—25 to 34 inches, strong-brown (7.5YR 5/6) loamy fine sand; many, coarse, prominent, light brownish-gray (2.5Y 6/2) mottles and common, coarse, prominent, yellowish-red (5YR 5/6) mottles; single grained; loose; slight cementation of sand grains at bottom of horizon; slightly acid; gradual, smooth boundary.

C—34 to 60 inches, strong-brown (7.5YR 5/6) loamy fine sand; single grained; loose; slightly acid.

The A horizon is typically dark grayish brown (10YR 4/2) but ranges from brown (10YR 4/3) to very dark grayish brown (10YR 3/2). The matrix of the B horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. Common gray mottles in the B horizon, generally below a depth of 24 inches, have hue of 10YR and 2.5Y, value of 4 to 6, and chroma of 2 or less. The B horizon is commonly loamy fine sand and is single grained or has weak granular or blocky structure. In some places there is slight bridging of clay between sand grains. The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. Common mottles in the C horizon have hue of 10YR, 7.5YR, or 2.5Y; value of 4 to 6; and chroma of 2 to 6. Reaction ranges from neutral to strongly acid.

Elnora soils are the moderately well drained member of a drainage sequence that includes the somewhat poorly drained Stafford soils. They do not have the clayey B horizon and coarse fragments that are typical of Bogart soils. They formed in sandy material, whereas the similar Mentor soils formed in silty material.

Elnora loamy fine sand, 1 to 3 percent slopes (EnA).—This soil is in small areas on the top of low knolls near the beach ridges in the northern part of the county. Included in mapping were small areas of soils that have a surface layer of sandy loam or loam, knolls where slopes are as much as 6 percent, and spots of Stafford soils in slight depressions.

The hazard of droughtiness is severe if this soil is farmed. Seasonal wetness and soil blowing also are limitations in farming. The sandy texture and seasonal wetness are limitations for some nonfarm uses. Capability unit IIIs-1; woodland suitability group 3s1.

Fitchville Series

The Fitchville series consists of somewhat poorly drained, nearly level to gently sloping soils on the lake plain and on stream terraces throughout the county. These soils formed in silty lacustrine material.

In a representative profile in a cultivated area the surface layer is dark grayish-brown silt loam about 8 inches thick. The subsurface layer is mottled, light brownish-gray and grayish-brown silt loam about 6 inches thick. The subsoil extends to a depth of 33 inches and is mottled, dark-brown silty clay loam. The substratum is mottled, dark-brown silt loam that extends to a depth of 60 inches.

Permeability is moderately slow, runoff is slow to medium, and the available water capacity is medium. The soils have a deep root zone that is mainly slightly acid to strongly acid.

Most areas of Fitchville soils have been cleared and are used for corn, wheat, soybeans, hay, and pasture.

Representative profile of Fitchville silt loam, 0 to 2 percent slopes, 1 mile east of State Route 301, south side of Jones Road, in Penfield Township:

Ap—0 to 8 inches, dark grayish-brown (2.5Y 4/2) silt loam; weak, fine, granular structure; friable; many roots; neutral; abrupt, smooth boundary.

A2—8 to 10 inches, light brownish-gray (2.5Y 6/2) silt loam; common, fine, distinct, yellowish-brown (10YR 5/8) mottles; weak, fine and medium, granular structure; friable; strongly acid; clear, smooth boundary.

B&A—10 to 14 inches, grayish-brown (2.5Y 5/2) silt loam; many, fine and medium, yellowish-brown (10YR 5/6) mottles; weak, coarse and medium, subangular blocky structure; friable; thin, patchy, grayish-brown (2.5Y 5/2) clay films on ped surfaces; strongly acid; clear, smooth boundary.

B21t—14 to 23 inches, dark-brown (7.5YR 4/4) silty clay loam; many gray (5Y 5/1) and dark-gray (5Y 4/1) mottles; weak, medium, prismatic structure parting to moderate, medium and coarse, subangular blocky; firm; continuous, gray (10YR 6/1), silty coatings on ped surfaces; thin grayish-brown (2.5Y 5/2) clay films on ped surfaces; medium acid; clear, smooth boundary.

B22t—23 to 33 inches, dark-brown (7.5YR 4/4) silty clay loam; many gray (5Y 5/1) mottles; weak, medium, subangular blocky structure; firm; patchy, dark-gray (5Y 4/1), thin clay films; silt coatings of gray (5Y 5/1) on ped surfaces; slightly acid; diffuse, wavy boundary.

C—33 to 60 inches, dark-brown (7.5YR 4/4) silt loam; many, medium, prominent, gray (5Y 5/1) mottles; neutral at a depth of 50 inches.

The solum ranges from 30 to 50 inches in thickness. The Ap horizon is typically dark grayish brown (2.5Y 4/2 or 10YR 4/2) or grayish brown (10YR 5/2). The matrix of the B2 horizon has hue of 10YR, 2.5Y, or 7.5YR; value of 4 to 6; and chroma of 2 to 6. Ped surfaces have dominant chroma of 2 or less. The silt or clay films have chroma of 2 or less, but the matrix typically has chroma of 3 to 6 and is mottled. The B2 horizon is silt loam or silty clay loam. Thin strata of loam or clay loam occur in some places. Reaction ranges from strongly acid to medium acid in the upper part and from medium acid to neutral in the lower part. Consistence is firm or friable but is typically firm.

Fitchville soils are the somewhat poorly drained member of a drainage sequence that includes the well-drained Mentor soils, the poorly drained Sebring soils, and the very poorly drained Luray soils. They contain more silt and fewer coarse fragments than Jimtown or Haskins soils. They are less clayey than Mahoning soils and do not overlie till. They do not have the stone fragments and the sandstone bedrock at a depth of 20 to 40 inches that are typical of Mitiwanga soils. They are more acid in the upper part of the profile than Del Rey and Fulton soils. They are more silty than Stafford soils, and they have thicker silty material than the similar Tiro soils.

Fitchville silt loam, 0 to 2 percent slopes (FcA).—In the northern part of the county, this soil is on flat to undulating areas and in slack water basins. In the southern part of the county, it commonly is along or in drainageways. Areas in the southern part are smaller than those in the northern part. This soil has the profile described as representative of the series.

Included with this soil in mapping were spots of the more poorly drained Luray and Sebring soils and spots of the more clayey Fulton soils. Where this Fitchville soil joins more gravelly soils, areas of Jimtown soils were included. In the area east and south of Amherst and north of State Route 113, small areas where the surface layer is channery were included. Also included were some low-lying areas where this Fitchville soil has received inwash material from adjacent higher areas, resulting in a thicker surface horizon than is typical.

Wetness is a major limitation in farming and is a limitation for many nonfarm uses. Capability unit IIw-2; woodland suitability group 2w2.

Fitchville silt loam, 2 to 6 percent slopes (FcB).—This soil is in slack water basins and in small upland areas, mostly in the northern part of the county. Included with this soil in mapping were areas of soils from which erosion has removed about half of the original surface layer. These soils contain less organic matter than uneroded Fitchville soils. Also included were spots of Jimtown soils.

Wetness is a moderate limitation in farming and is a limitation for many nonfarm uses. Capability unit IIw-2; woodland suitability group 2w2.

Fitchville silt loam, low terrace, 0 to 2 percent slopes (FdA).—This soil is at a slightly higher elevation than the first bottom along the major streams of the county. Included in mapping at a slightly higher elevation were areas of soils that are less gray and have slightly better drainage. Also included were small areas of Orrville and Lobdell soils. Some included soils in areas where the streams have meandered have slopes of 2 to 4 percent and are moderately eroded.

Flooding is the main limitation, and the soil needs drainage. Wetness and flooding are limitations for most nonfarm uses. Capability unit IIw-2; woodland suitability group 2w2.

Fitchville-Urban land complex, nearly level (FeA).—This complex is mainly in and near the city of Elyria between the two branches of the Black River. It is about 50 to 70 percent nearly level Fitchville soil and 25 to 40 percent Fitchville soil material that has been altered as a result of grading and filling. The original Fitchville soil has been altered to the extent that it is difficult to identify.

Included with this unit in mapping were small areas of Sebring soils that in places have also been altered by grading and filling.

The surface layer in altered areas commonly is low in organic-matter content and has poor tilth. The soil material also has poor stability and high potential for frost heaving, and it is highly erodible where bare of vegetation. The water table is perched late in winter and in spring. Capability unit and woodland suitability group not assigned.

Fulton Series

The Fulton series consists of somewhat poorly drained, nearly level to gently sloping soils on the lake plain in the northwestern part of the county. These soils formed in lacustrine sediment of silty clay, clay, and clay loam. Seams of fine sand are in some profiles.

In a representative profile in a cultivated area the surface layer is dark grayish-brown silt loam about 8 inches thick. The subsoil extends to a depth of about 36 inches. The upper 5 inches of the subsoil is brown silty clay loam, and the lower 23 inches is mottled grayish-brown and gray clay. The substratum is light olive-brown clay that extends to a depth of 72 inches.

Permeability is slow, and the available water capacity is medium. The organic-matter content is moderate. The soils have a deep root zone that is mainly slightly acid or neutral. They have a seasonal high water table, and they need to be drained.

Most areas of Fulton soils are used for nonfarm purposes.

Representative profile of Fulton silt loam, 0 to 2 percent slopes, southwest corner of Oakpoint Road and State Routes 2 and 6, in Lorain:

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

B1—8 to 13 inches, brown (10YR 5/3) silty clay loam; moderate, medium, subangular blocky structure; firm; many roots; light brownish-gray (2.5Y 6/2), thin, patchy silt coatings on ped surfaces; medium acid; clear, wavy boundary.

B21t—13 to 21 inches, grayish-brown (10YR 5/2) clay; common, medium, yellowish-brown (10YR 5/6, 5/8) and dark-brown (7.5YR 4/4) mottles; moderate, medium, angular blocky and subangular blocky structure; firm; few roots; thin, discontinuous, grayish-brown (2.5Y 5/2) clay films; slightly acid; clear, wavy boundary.

B22t—21 to 36 inches, gray (10YR 5/1) clay; common, distinct, yellowish-brown (10YR 5/4) mottles; weak, coarse, subangular blocky and fine angular blocky structure; firm; thin, patchy, grayish-brown (2.5Y 5/2) clay films; neutral; clear, wavy boundary.

C—36 to 72 inches, light olive-brown (2.5Y 5/4) clay; massive; very firm; stratified; mildly alkaline, calcareous.

The solum ranges from 28 to 45 inches in thickness. Depth to carbonates ranges from 24 to 42 inches. Reaction ranges from neutral to medium acid in the surface layer, from slightly acid to strongly acid in the upper part of the B horizon, and from slightly acid to mildly alkaline in the lower part of the B horizon. In places the A horizon is as much as 5 percent gravel. There is no gravel in the B and C horizons. The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. The matrix of the B horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 to 4. Chroma of 2 or less are not dominant in any part. Ped coatings are gray, grayish brown, dark gray, or dark grayish brown. Bright mottles range from common to many, and mottles grayer than the matrix range from common to none. The B horizon is mainly silty clay or clay. In places it is thinly stratified. The C horizon is calcareous, mainly fine-textured lacustrine material. Thin strata of silty clay loam, silt loam, or loam are in the C horizon in places, and in other places strata of loamy sand or sandy loam are below a depth of 40 inches.

Fulton soils are less acid than the similar Allis and Fitchville soils. They contain less silt than Fitchville soils. They are finer textured than the similar Jimtown and Haskins soils.

Fulton silt loam, 0 to 2 percent slopes (FuA).—This soil is in the northwestern part of the county in areas that parallel the shore of Lake Erie. Areas are commonly 10 to 100 acres in size and are generally between drainageways. This soil has the profile described as representative of the series.

Included with this soil in mapping were areas of gently sloping, moderately eroded soils. Also included were spots of Del Rey, Mahoning, Haskins, and Hornell soils.

Wetness is a severe limitation in farming. Wetness and the high content of clay are limitations for many nonfarm uses. Capability unit IIIw–3; woodland suitability group 3w1.

Fulton silt loam, 2 to 6 percent slopes (FuB).—This soil has a profile similar to the one described as representative of the series, but in the northern third of the county it is slightly less acid in reaction and is slightly finer textured. Some areas of this soil have concentrated runoff flowing across them, which causes small gullies to form.

Included with this soil in mapping on the crest areas were small areas of soils that have slightly better drainage.

Wetness and erosion are severe limitations in farming. Wetness and the clayey texture are limitations for many nonfarm uses. Capability unit IIIw–3; woodland suitability group 3w1.

Fulton silt loam, sandy substratum, 0 to 2 percent slopes (FvA).—This soil has a profile similar to the one described as representative of the series, but it is underlain by sandy loam or loamy sand at a depth of 40 to 60 inches. If this sandy material becomes saturated with water, it is likely to be unstable.

Included with this soil in mapping were some small areas of soils that are wet and have a darker surface layer. Some of these areas are identified on the detailed soil map by a special wet-spot symbol.

Wetness is the major limitation in farming. Wetness and the clayey texture are limitations for many nonfarm uses. Capability unit IIIw–3; woodland suitability group 3w1.

Haskins Series

The Haskins series consists of somewhat poorly drained, nearly level to gently sloping soils on the lake plain and uplands. These soils formed in loamy material that is finer textured in the lower part.

In a representative profile in a cultivated area the surface layer is dark grayish-brown loam about 7 inches thick. The upper 25 inches of the subsoil is mottled, grayish-brown, dark-brown, and yellowish-brown loam, clay loam, and sandy clay loam. The lower 11 inches is mottled, dark-brown silty clay loam. The substratum is dark-brown silty clay loam that extends to a depth of 60 inches.

Permeability is moderate in the loamy upper part of the profile and very slow in the finer textured lower part of the profile. Available water capacity is medium. The organic-matter content is moderate. The soils have a deep root zone. They have a temporary high water table and need to be drained for optimum growth of crops.

Haskins soils are used for the commonly grown crops, such as corn, soybeans, wheat, and hay.

Representative profile of Haskins loam, 0 to 2 percent slopes, approximately 3 miles southeast of Lagrange, 800 feet east of Vermont Street, 2,600 feet north of Short Road, in Penfield Township:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) loam; moderate, coarse, granular structure; friable; many roots; about 1 percent pebbles; slightly acid; abrupt, smooth boundary.

B1—7 to 13 inches, grayish-brown (2.5Y 5/2) loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; friable; common roots; ped coatings of grayish brown (2.5Y 5/2); thin very patchy clay films in voids; about 5 percent pebbles; medium acid; clear, wavy boundary.

B21t—13 to 20 inches, grayish-brown (2.5Y 5/2) clay loam; many, medium, distinct, strong-brown (7.5YR 5/6) mottles; moderate, coarse, subangular blocky structure; firm; few roots; ped coatings of gray (5Y 6/1, 5/1); thin patchy clay films in voids and on ped surfaces; about 10 percent fine gravel; medium acid; clear, wavy boundary.

B22t—20 to 27 inches, dark-brown (10YR 4/3) sandy clay loam; common, medium, distinct, grayish-brown (2.5Y 5/2) mottles and few, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; friable; few roots; medium, patchy, grayish-brown (2.5Y 5/2) and dark-brown (10YR 4/3) clay films bridging gravel and sand grains; 15 percent fine gravel; common, fine, black (10YR 2/1) stains; slightly acid; clear, wavy boundary.

B23t—27 to 32 inches, yellowish-brown (10YR 5/4) clay loam; common, medium, distinct, gray (5Y 5/1) mottles; weak, coarse, subangular blocky structure; firm; thin, very patchy, gray (5Y 5/1) clay films on ped surfaces; few black (10YR 2/1) stains; about 10 percent fine gravel; neutral; clear, wavy boundary.

IIB3—32 to 43 inches, dark-brown (10YR 4/3) silty clay loam; few, fine, distinct, gray (5Y 6/1) mottles; weak, coarse, subangular blocky structure parting to weak, thick, platy; firm; common light brownish-gray (2.5Y 6/2) coatings on horizontal and vertical surfaces; thin, very patchy, gray (5Y 5/1) clay films on ped surfaces; about 5 percent pebbles; mildly alkaline; gradual, smooth boundary.

IIC—43 to 60 inches, dark-brown (10YR 4/3) silty clay loam; weak, thick, platy structure; firm; some gray (5Y 5/1) vertical fractures in the till; about 5 percent pebbles; mildly alkaline, calcareous.

The solum ranges from 24 to 50 inches in thickness. Depth to the fine-textured underlying material ranges from 24 to 40 inches. Reaction ranges from neutral to strongly acid in the surface layer, from slightly acid to strongly acid in the upper part of the B horizon, and from slightly acid to mildly alkaline in the lower part of the B horizon. The content of gravel in the upper part of the solum ranges from about 2 to 20 percent.

The Ap horizon is dark grayish brown (10YR 4/2 or 2.5Y 4/2) or dark gray (10YR 4/1 or 2.5Y 4/1). This horizon has weak and moderate, fine to coarse, granular structure. The A2 horizon, where present, has hue of 10YR to 2.5Y, value of 5 or 6, and chroma of 2 or 3. It has weak, fine, subangular blocky structure.

The matrix of the upper part of the B horizon has hue of 10YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. The lower part of the B horizon contains common to many bright mottles and common to no gray mottles. It is dominantly clay loam or sandy clay loam. Individual horizons in places are more than 35 percent clay, and there are thin or medium continuous clay films to thin patchy clay films on both vertical and horizontal ped faces. The lower part of the B horizon formed in fine-textured material and is typically gray to brown and has common to many mottles. It is clay, silty clay, silty clay loam, or clay loam.

The C horizon is mildly alkaline glacial till or lacustrine sediment. This horizon is clay loam, clay, silty clay loam, or heavy clay loam. In areas where the underlying material is lacustrine sediment there are some lenses of light silty clay loam or silt loam.

Haskins soils are the somewhat poorly drained member of a drainage sequence that includes the well-drained Rawson soils and the very poorly drained Mermill soils. Haskins soils are finer textured at a depth of 20 to 40 inches than Jimtown soils. They are coarser textured than Mahoning, Tiro, Fulton, and Fitchville soils.

Haskins loam, 0 to 2 percent slopes (HsA).—This soil is on the lake plain and on uplands in the county. Areas on the lake plain are 5 to 100 acres in size and on the uplands are generally 5 to 25 acres in size. This soil has the profile described as representative of the series. It is commonly adjacent to Jimtown, Fitchville, or Mahoning soils.

Included with this soil in mapping were small areas of soils that have a surface layer of sandy loam, gravelly loam, or silt loam. Near Amherst were included some areas of soils that have a redder color. Also included were spots of Fitchville, Mahoning, Mermill, and Jimtown soils.

Wetness is a moderate limitation in farming, and it also limits many nonfarm uses. Capability unit IIw–2; woodland suitability group 2w2.

Haskins loam, 2 to 6 percent slopes (HsB).—This gently sloping soil is on remnants of beach ridges and along drainageways. Areas are commonly 3 to 10 acres in size.

Included with this soil in mapping were areas of soils that have a surface layer of silt loam, sandy loam, or gravelly loam. Also included were areas of moderately eroded soils from which erosion has removed as much as half of the original surface layer and spots of Rawson, Jimtown, and Mahoning soils.

Wetness and erosion are moderate limitations in farming. Wetness is a limitation for many nonfarm uses. Capability unit IIw–2; woodland suitability group 2w2.

Haskins-Urban land complex, nearly level (HtA).—This complex is about 50 to 70 percent a nearly level Haskins soil and 25 to 40 percent Haskins soil material that has been altered as a result of grading and filling. The original Haskins soil has been altered to the extent that it is difficult to identify. Included in mapping in small depressions were areas of Mermill soils that in places have also been altered by grading and filling.

The surface layer in altered areas of this complex commonly is low in organic-matter content, has poor tilth, and needs drainage. Where the original surface layer has been removed, the present surface layer commonly is high in content of clay and is mildly alkaline. Capability unit and woodland suitability group not assigned.

Holly Series

The Holly series consists of poorly drained, dark-colored, nearly level soils in low positions on flood plains of larger streams that flow through areas of low-lime till and along deeply dissected small tributaries where the gradient is low. These soils formed in recent alluvium.

In a representative profile in a cultivated area the surface layer is very dark grayish-brown silt loam about 8 inches thick. The subsoil extends to a depth of about 33 inches and is mottled, dark grayish-brown silty clay loam and silt loam. The substratum is dark grayish-brown stratified loamy sand, sandy loam, and silt loam that extends to a depth of 60 inches.

Permeability is moderate, and the available water capacity is medium. The organic-matter content is high. The soils have a deep root zone. They are subject to flooding and have a high water table for much of the year.

Most areas of Holly soils are swampy and are overgrown with brush and trees.

Representative profile of Holly silt loam, one-fourth mile west of intersection of Jaycox Road and Schwartz Road, in city of Avon:

Ap—0 to 8 inches, very dark grayish-brown (2.5Y 3/2) silt loam, dark grayish brown (2.5Y 4/2) rubbed; moderate, medium, angular blocky structure; firm; many roots; neutral; clear, smooth boundary.

B2g—8 to 16 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; many, medium, distinct, dark-brown (10YR 3/3) mottles; moderate, coarse, subangular blocky structure; firm; common roots; neutral; gradual, wavy boundary.

B3g—16 to 33 inches, dark grayish-brown (2.5Y 4/2) silt loam; many, medium, distinct, dark-brown (7.5YR 4/4) mottles; massive; friable; common roots; neutral; gradual, wavy boundary.

C—33 to 60 inches, dark grayish-brown (2.5Y 4/2) stratified loamy sand, sandy loam, and silt loam; many, medium, distinct, dark-brown (7.5YR 4/4) mottles; massive; friable; common roots; neutral.

The Ap horizon generally has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or less. It has weak or moderate, medium, granular or blocky structure. The B horizon has hue of 2.5Y, 5Y, or 10YR; value of 4 or 5; and chroma of 2 or less. It has mottles that have hue of 5YR, 7.5YR, or 10YR; value of 3 to 5; and chroma of 3 to 5. It is medium acid to neutral. This horizon is mainly silt loam or loam, but in places it is sandy loam and silty clay loam and in places are thin layers, less than 4 inches thick, of coarser or finer texture than the common texture. Below a depth of 40 inches the soil is stratified and consists of a variety of textures, including gravel.

Holly soils are the poorly drained member of a drainage sequence that includes the well drained Chagrin soils, the moderately well drained Lobdell soils, and the somewhat poorly drained Orrville soils. Holly soils formed in stratified material, including some sandy material, whereas Sebring soils formed entirely in silty material. They are coarser textured than Trumbull soils, are stratified, and do not contain the glacial till that is characteristic of Trumbull soils.

Holly silt loam (Hy).—This soil is in depressions on the flood plains along major streams, in old scars of major streams, and on flood plains along small streams of low gradient. Included in mapping were areas of soils that have a surface layer of sandy loam, loam, or silty clay. Also included were some spots of Orrville soils.

Flooding and seasonal wetness limit this soil for farming and for most nonfarm uses. Because of the elevation of this soil in relationship to the streams, outlets for drainage are difficult to obtain. Capability unit IIIw-1; woodland suitability group 2w1.

Hornell Series

The Hornell series consists of moderately well drained, nearly level to gently sloping soils on low knolls on the lake plain. These soils formed in 20 to 40 inches of glacial till over shale bedrock.

In a representative profile in a wooded area the surface layer is very dark grayish-brown silt loam about 2 inches thick. The subsurface layer, about 4 inches thick, is yellowish-brown silt loam. The subsoil extends to a depth of 20 inches and is yellowish-brown silty clay loam that is mottled in the lower part. The substratum is 3 inches of yellowish-brown and grayish-brown silty clay loam. Gray shale bedrock is at a depth of 23 inches.

Permeability is very slow, and the available water capacity is low. The organic-matter content is low. The soils have a moderately deep root zone that is mainly very strongly acid.

Most areas of Hornell soils are used for nonfarm purposes or are wooded.

Representative profile of Hornell silt loam, 0 to 2 percent slopes, in a wooded area, approximately 20 yards east of High Bridge Road, 1,700 feet south from Routes 6 and 2 on High Ridge Road, in Vermilion:

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

A2—2 to 6 inches, yellowish-brown (10YR 5/4) silt loam; moderate, thick, platy structure; friable; common roots; very strongly acid; clear, smooth boundary.

B1—6 to 11 inches, silty clay loam, yellowish-brown (10YR 5/6) ped interiors and yellowish-brown (10YR 5/4) ped surfaces; weak, fine and medium, subangular blocky structure; firm; common roots; very strongly acid; clear, smooth boundary.

B2—11 to 16 inches, silty clay loam, yellowish-brown (10YR 5/6) ped interiors and light yellowish-brown (10YR 6/4) ped surfaces; weak to moderate, fine and medium, subangular blocky structure; firm; common roots; very strongly acid; clear, smooth boundary.

B3—16 to 20 inches, yellowish-brown (10YR 5/6) heavy silty clay loam; many gray (10YR 5/1) mottles; weak to moderate, fine and medium, subangular blocky structure; firm; few roots; very strongly acid; clear, smooth boundary.

C—20 to 23 inches, yellowish-brown (10YR 5/6) and grayish-brown (10YR 5/2) light silty clay loam; weak, medium, subangular blocky structure; firm; very few roots; very strongly acid; abrupt, smooth boundary.

R—23 inches +, gray weathered shale bedrock; fragmented in the upper part.

The depth to shale bedrock ranges from 20 to 40 inches. Reaction is strongly acid to very strongly acid throughout the profile. The A horizon is very dark grayish brown (10YR 3/2), brown (10YR 4/3), or yellowish brown (10YR 5/4). The B horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 3 to 6. Mottles that have lower chroma are in the lower part of the B horizon. The B horizon is silty clay loam or silty clay. In places it contains a few lenses of sand.

Hornell soils in Lorain County have some grayer colors in the B horizon and are somewhat coarser textured throughout their profile than is defined as within the range for the series. These differences do not alter the usefulness or behavior of the soils.

Hornell soils are the moderately well drained member of a drainage sequence that includes the somewhat poorly drained Allis soils. Hornell soils are better drained and more acid than the nearby Miner, shale substratum, soils. They do not have the reddish color that characterizes Upshur soils. They differ from the similar Ellsworth, Shinrock, and Mentor soils in having shale bedrock at a depth of 20 to 40 inches. Also, they are more acid than Ellsworth and Shinrock soils and less silty than Mentor soils.

Hornell silt loam, 0 to 2 percent slopes (HzA).—This soil commonly is on elongated knolls in the northwestern part of the county. It has the profile described as representative of the series.

Included in mapping of this soil were small areas of Allis soils and the Miner, shale substratum, soils. Also included were areas of soils that have slopes of as much as 3 percent.

This soil is very acid and requires large applications of lime and fertilizer if general farm crops are grown. Past use of much of this soil was for grapes. Wetness is a severe limitation in farming. Wetness and bedrock at a depth of 20 to 40 inches are limitations for many nonfarm uses. Capability unit IIIw-2; woodland suitability group 2w2.

Hornell silt loam, 2 to 6 percent slopes (HzB).—This soil is commonly on knolls, adjacent to drainageways, and along Lake Erie. Areas are generally less than 20 acres in size.

Included with this soil in mapping were spots of soils that have slopes of slightly more than 6 percent and spots of moderately eroded or severely eroded soils. Also included were small areas of soils that have shale bedrock at a depth of 12 inches and small areas of Miner, shale substratum, soils and Allis soils, generally near the base of slopes.

Erosion and wetness are severe limitations in farming. This soil needs large applications of lime and fertilizer if general crops are grown. Wetness and bedrock at a depth of 20 to 40 inches are limitations for many nonfarm uses. Capability unit IIIw-2; woodland suitability group 2w2.

Jimtown Series

The Jimtown series consists of somewhat poorly drained, nearly level to gently sloping soils on beach ridges, outwash plains, and stream terraces. These soils formed in loamy material that is underlain by poorly sorted gravel and sand.

In a representative profile in a cultivated area the surface layer is brown loam about 10 inches thick. The subsoil extends to a depth of about 37 inches. The upper 16 inches of the subsoil is brown and grayish-brown loam. The lower 11 inches is light brownish-gray and grayish-brown gravelly loam and very gravelly loam. The substratum is brown sandy loam and brown and grayish-brown gravelly loamy sand that extends to a depth of 60 inches.

Permeability is moderate, runoff is slow, and the available water capacity is medium to low. Organic-matter content is moderate. The soils have a deep root zone that is mainly strongly acid or very strongly acid.

A large part of the acreage of Jimtown soils is used for nonfarm purposes. These soils are suited to the commonly grown truck and field crops (fig. 9).

Representative profile of Jimtown loam, 0 to 2 percent slopes, 500 feet east of West Ridge Road and 500 feet south of Albrecht Road, in Carlisle Township:

Ap—0 to 10 inches, brown (10YR 4/3) loam; moderate, medium and fine, granular structure; friable; many roots; strongly acid; abrupt, smooth boundary.

B1t—10 to 20 inches, brown (10YR 5/3) loam; common, medium, distinct, grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/6, 5/8) mottles; weak, medium and fine, prismatic structure parting to moderate, medium, platy; friable; few roots; very patchy thin clay films; few worm casts; very strongly acid; clear, wavy boundary.

B21tg—20 to 26 inches, grayish-brown (10YR 5/2) loam; many, medium, prominent, strong-brown (7.5YR 5/6, 5/8) and yellowish-red (5YR 4/6) mottles; weak, medium and fine, subangular blocky structure; firm; patchy, thin, light brownish-gray (10YR 6/2) clay films bridging sand grains; 5 percent gravel; few oxide concretions; very strongly acid; abrupt, smooth boundary.

B22tg—26 to 31 inches, light brownish-gray (10YR 6/2) gravelly loam; few, fine, prominent, reddish-brown (5YR 4/3) and yellowish-brown (10YR 5/6) mottles; weak, medium and fine, subangular blocky structure; firm; patchy thin clay films bridging sand grains; 20 percent gravel; strongly acid; abrupt, smooth boundary.

IIB3tg—31 to 37 inches, grayish-brown (10YR 5/2) very gravelly loam; few, fine, prominent, reddish-brown (5YR 4/3) mottles and common, fine, distinct, yellowish-brown (10YR 5/6) mottles; massive; firm; 50 percent gravel; patchy very thin clay films bridging sand grains; strongly acid; abrupt, smooth boundary.

IIIC1—37 to 42 inches, brown (10YR 5/3) sandy loam; common, medium, distinct, light brownish-gray (10YR 6/2) mottles and few, fine, distinct, yellowish-brown (10YR 5/6) mottles; massive; loose; medium acid; abrupt, smooth boundary.

IVC2—42 to 49 inches, grayish-brown (10YR 5/2) fine gravelly loamy sand; single grained; loose; neutral; abrupt, smooth boundary.

IVC3—49 to 60 inches, brown (10YR 5/3) gravelly loamy sand; single grained; loose; neutral.

The solum ranges from 26 to 48 inches in thickness, but it is typically about 34 inches thick. The A1 horizon, where present, ranges from 1 inch to 4 inches in thickness and is very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), or very dark brown (10YR 2/2). The A2 horizon, where present, ranges from 2 to 8 inches in thickness and typically is grayish brown (10YR 5/2 or 2.5Y 5/2). The Ap horizon is generally dark grayish brown (10YR 4/2) or brown (10YR 4/3). The B horizon ranges from 10 to 36 inches in thickness. The matrix has value of 4 to 6 and chroma of 2 to 4; chroma of 2 dominate either on ped surfaces or in the matrix. Reaction ranges from medium acid to very strongly acid and commonly is less acid as the depth increases. The B horizon is loam, gravelly loam, sandy clay loam, or light clay loam.

Jimtown soils are the somewhat poorly drained member of a drainage sequence that includes the well drained Chili

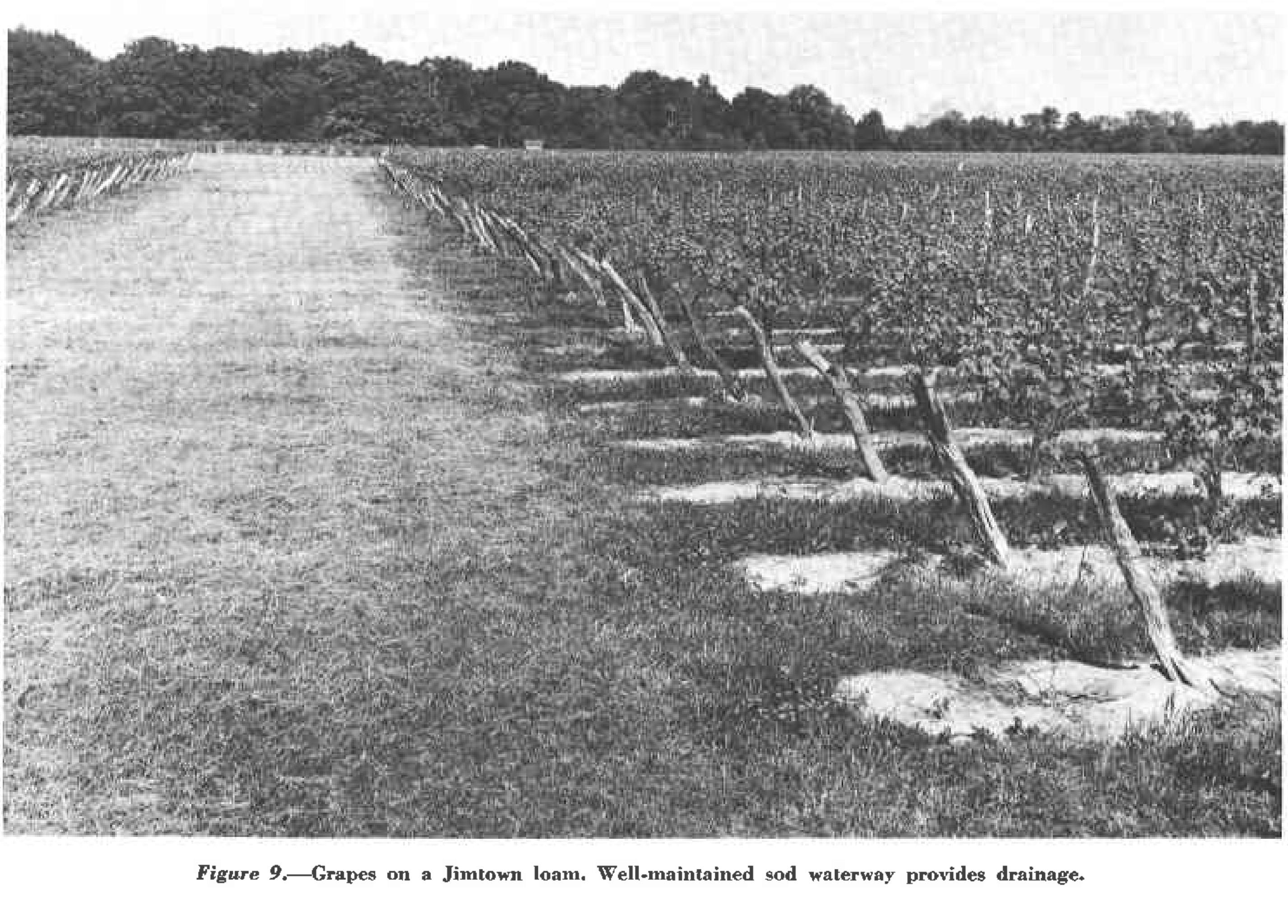

***Figure 9.*—Grapes on a Jimtown loam. Well-maintained sod waterway provides drainage.**

soils, the moderately well drained Bogart soils, and the poorly drained Olmsted soils. Jimtown soils are commonly adjacent to Haskins and Fitchville soils. They contain more sand and gravel and less silt than Fitchville soils. They do not have the fine-textured subsoil and substratum that are characteristic of Haskins soils. They are coarser textured than Fulton and Mahoning soils. They are more gravelly throughout than Stafford soils.

Jimtown sandy loam, 0 to 2 percent slopes (JsA).—This soil has a profile similar to the one described as representative of the series, but the upper part of the soil contains more sand and less organic matter. Soil blowing is more of a hazard on this soil than on the representative soil, because of the greater amount of sand and the somewhat lower available water capacity.

Included with this soil in mapping were small areas of soils that have slopes of slightly more than 2 percent. Also included were areas of soils that have a surface layer of fine sandy loam.

Wetness is a moderate limitation in farming, and it also limits many nonfarm uses. Capability unit IIw–3; woodland suitability group 2w2.

Jimtown loam, 0 to 2 percent slopes (JtA).—This nearly level to depressional soil is on the lake plain and along the major streams of the county. Areas are variable in size. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of soils that have a surface layer of loamy sand, sandy loam, gravelly loam, or silt loam. Also included were small areas of Fitchville and Haskins soils.

Wetness is the main limitation in farming. This soil is suited to truck crops, nursery stock, and the general farm crops commonly grown in the county. Wetness is a limitation for many nonfarm uses. Capability unit IIw–3; woodland suitability group 2w2.

Jimtown loam, 2 to 6 percent slopes (JtB).—This gently sloping soil is commonly near drainageways. Included in mapping were areas of soils that have a surface layer of gravelly loam or silt loam. Also included were small areas near sandstone highs in which the surface layer has numerous channers and small areas at the base of some slopes of poorly drained Olmsted soils.

Wetness is a moderate limitation in farming, and it also limits this soil for many nonfarm uses. Capability unit IIw–3; woodland suitability group 2w2.

Jimtown-Urban land complex, nearly level (JuA).—This complex is about 50 to 70 percent a nearly level Jimtown soil and 25 to 40 percent Jimtown soil material that has been altered as a result of grading and filling. The original Jimtown soil has been altered to the extent that it is difficult to identify.

Included with this complex in mapping were areas of Chili, Oshtemo, and Bogart soils, which are in higher areas and on crests of beach ridges. Also included in depressions were areas of the darker colored Olmsted soils. All of these included soils in places have also been altered by grading and filling.

The surface layer in altered areas of this unit commonly has low organic-matter content, low fertility, and poor tilth. The available water capacity is too low to support lawns and shrubs. Erosion is a hazard in sloping areas that are bare of vegetation. Capability unit and woodland suitability group not assigned.

Lobdell Series

The Lobdell series consists of nearly level, moderately well drained soils on the flood plains of the major streams. These soils formed in recently deposited alluvium.

In a representative profile in a cultivated area the surface layer extends to a depth of about 15 inches. The upper 5 inches is dark-brown silt loam, and the lower 10 inches is dark grayish-brown silt loam. The upper part of the subsoil extends to a depth of about 21 inches and is dark yellowish-brown loam. The lower part of the subsoil extends to a depth of about 31 inches and is dark-brown fine sandy loam. The substratum to a depth of 60 inches is yellowish-brown heavy sandy loam.

Permeability is moderate, and the available water capacity is medium. The organic-matter content is moderate. The soils have a deep root zone that is mainly slightly acid and neutral. Flooding is the main limitation, and some wet areas need drainage.

Lobdell soils are used for permanent pasture and for commonly grown general farm crops.

Representative profile of Lobdell silt loam, 300 feet west of intersection of Nickel-Plate and West Roads, 250 feet south of Nickel-Plate Road, in Pittsfield Township:

Ap1—0 to 5 inches, dark-brown (10YR 4/3) silt loam; weak, medium, granular structure; friable; common fine roots; slightly acid; clear, smooth boundary.

Ap2—5 to 15 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, coarse, granular structure; friable; some worm casts; slightly acid; abrupt, smooth boundary.

B2—15 to 21 inches, dark yellowish-brown (10YR 4/4) loam; weak, medium, subangular blocky structure; friable; numerous worm casts; dark grayish-brown (10YR 4/2) organic coatings on ped surfaces; neutral; clear, wavy boundary.

IIB3—21 to 31 inches, dark-brown (10YR 4/3) fine sandy loam; common, medium and coarse, prominent, gray (5Y 6/1) and dark-brown (7.5YR 4/4) mottles; weak, coarse, subangular blocky structure; friable; dark grayish-brown (10YR 4/2) organic coatings on ped surfaces; few worm casts; neutral; clear, smooth boundary.

IIC—31 to 60 inches, yellowish-brown (10YR 5/4) heavy sandy loam; common, medium, prominent, gray (5Y 5/1) mottles and common, fine, prominent, reddish-brown (5YR 4/4) mottles; massive; friable; neutral.

The solum ranges from 24 to 36 inches in thickness. Reaction ranges from strongly acid to neutral in the upper part of the profile and from medium acid to neutral below a depth of 24 inches. The Ap horizon is dark brown (10YR 4/3) or dark grayish brown (10YR 4/2). It has weak or moderate, fine to coarse, granular structure. The B horizon has hue of 10YR, 7.5YR, or 2.5Y; value of 4 or 5; and chroma of 3 or 4. This horizon is loam, silt loam, heavy sandy loam, and fine sandy loam. It has weak, medium or coarse, subangular blocky structure. The lower part of the B horizon has mottles at a depth of 15 to 24 inches that have chroma of 2 or less. The C horizon consists of layers of sandy loam, loam, silt loam, and fine sand that vary from relatively uniform to highly stratified. The C horizon commonly becomes coarser textured as depth increases. The matrix of the C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It contains mottles that have hue of 5YR to 5Y, value of 4 and 5, and high and low chroma.

Lobdell soils are the moderately well drained member of a drainage sequence that includes the poorly drained Holly soils, the somewhat poorly drained Orrville soils, and the well-drained Chagrin soils. Lobdell soils differ from the

Fitchville, low terrace, soils in having slightly better drainage, having a subsoil that formed in loamy material, and being flooded more frequently. They are coarser in texture and less reddish in color than Senecaville soils.

Lobdell silt loam (Lb).—This nearly level soil is along major streams and major tributaries throughout the county. Areas are variable in size. Where this soil is at the base of bedrock escarpments, it commonly contains numerous siltstone channers and shale fragments.

Included with this soil in mapping were a few areas of gently sloping soils where old stream channels dissect areas of this soil. Also included were narrow bands of Chagrin soils, commonly close to and parallel to the streams, spots of soils that have a surface layer of loam or fine sandy loam, and spots of Orrville soils. In some areas along Beaver Creek and the Vermilion River in the vicinity of South Amherst and Amherst were included areas of Lobdell soils that have a somewhat redder color than is typical. In some areas where deposition is occurring are other Lobdell soils that have an Ap horizon that is lighter colored than is typical.

Wetness is a moderate limitation in farming. Flooding and wetness are limitations for many nonfarm uses. Capability unit IIw–1; woodland suitability group 1o1.

Lockport Series

The Lockport series consists of somewhat poorly drained, nearly level to gently sloping soils that are mostly associated with sandstone highs in the northwestern part of the county. These soils formed in glacial till and in the underlying material weathered from red shale bedrock.

In a representative profile the surface layer is dark grayish-brown silty clay loam about 3 inches thick. The next layer is strong-brown silty clay loam about 8 inches thick. The subsoil extends to a depth of about 38 inches and is mottled, brown and reddish-brown silty clay. Weak-red, weathered, soft shale is at a depth of 38 inches.

Permeability is very slow, and the available water capacity is medium. The organic-matter content is moderate. The soils have a moderately deep root zone that is mainly very strongly acid.

Most areas of Lockport soils are used for nonfarm purposes.

Representative profile of Lockport silty clay loam, 1 to 4 percent slopes, approximately 100 feet north of trailer court, 120 feet east of Dewey Road, 1,980 feet north of the intersection of Dewey and North Ridge Road, in Amherst:

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) light silty clay loam; moderate, medium and fine, granular structure; friable; many roots; a few sandstone fragments as much as 6 inches in diameter; medium acid; clear, wavy boundary.

B&A—3 to 11 inches, strong-brown (7.5YR 5/6) silty clay loam; many, medium, distinct, pinkish-gray (7.5YR 6/2) mottles and few, fine, distinct, yellowish-red (5YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; common roots; continuous pinkish-gray (7.5YR 6/2) coatings on ped surfaces; few sandstone fragments as much as 6 inches in diameter; very strongly acid; clear, wavy boundary.

IIB21t—11 to 15 inches, brown (7.5YR 5/4) silty clay; many, medium, distinct, light-brown (7.5YR 6/4) mottles and few, fine, distinct, yellowish-red (5YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; continuous pinkish-gray (5YR 6/2) coatings on ped surfaces; few sandstone fragments as much as 6 inches in diameter; very strongly acid; clear, wavy boundary.

IIB22t—15 to 19 inches, reddish-brown (5YR 4/4) silty clay; few, medium, distinct, yellowish-red (5YR 5/6) and pinkish-gray (5YR 6/2) mottles; moderate, medium, subangular blocky structure; firm; continuous light reddish-brown (5YR 6/3) coatings on ped surfaces; very patchy thin clay films on ped surfaces; few sandstone fragments as much as 6 inches in diameter; few roots; very strongly acid; clear, wavy boundary.

IIB23t—19 to 25 inches, reddish-brown (5YR 5/4) silty clay; many, medium, distinct, yellowish-red (5YR 5/6) mottles, few, medium, distinct, yellowish-red (5YR 5/8) mottles, and few, fine, gray (10YR 6/1) mottles; moderate, coarse, subangular blocky structure; firm; pale-red (2.5YR 6/2) coatings on ped surfaces; thin very patchy clay films; very strongly acid; clear, wavy boundary.

IIB3t—25 to 38 inches, reddish-brown (5YR 4/3) silty clay; weak, coarse, prismatic structure; firm; long, narrow, gray (10YR 6/1) and light brownish-gray (10YR 6/2) streaks in old root channels; reddish-brown (5YR 5/3) coatings on ped surfaces; very patchy thin clay films; medium acid; gradual, wavy boundary.

IIC—38 to 60 inches, weak-red (2.5YR 4/2) weathered soft shale; weak, thick, platy structure; firm; few lens of gypsum crystals; neutral.

Depth to weathered shale bedrock ranges from 28 to 40 inches. Coarse fragments are few and are dominantly sandstone. The Ap horizon ranges from dark grayish brown (10YR 4/2) to very dark grayish brown (10YR 3/2). The upper part of the B horizon ranges from brown (7.5YR 5/4) to yellowish brown (10YR 5/6) and has common to many mottles of higher or lower chroma. The lower part of the B horizon is reddish brown (5YR 5/4, 4/3, or 4/4) and has mottles of yellowish red (5YR 5/6), pinkish gray (5YR 6/2), and red (2.5YR 5/6). It is silty clay to silty clay loam and has subangular blocky to prismatic structure. Reaction is medium acid to very strongly acid in the solum and slightly acid to neutral in the weathered shale. The C horizon is soft weathered shale. It is weak red (2.5YR 4/2) to dark reddish brown (5YR 3/4).

Lockport soils in Lorain County are mainly very strongly acid in the B horizon, which is outside the range defined for the series. However, this difference does not alter the usefulness or behavior of the soils.

Lockport soils are near the well-drained Upshur soils. They differ from Mahoning soils in being redder, more acid, and underlain by shale bedrock. They are less acid and redder than Allis soils. They are finer textured and redder than Mitiwanga soils.

Lockport silty clay loam, 1 to 4 percent slopes (LcB).—This soil is near sandstone highs in the northwestern part of the county. Areas are small or medium in size. Included in mapping were small areas of soils that have a surface layer of loam or silt loam. Also included were spots of soils in which depth to the shale bedrock is slightly less or slightly more than is typical of Lockport soils.

Wetness and erosion are severe limitations in farming. Wetness and shale bedrock at a depth of 20 to 40 inches are limitations for many nonfarm uses. Capability unit IIIw–2; woodland suitability group 3w1.

Lorain Series

The Lorain series consists of very poorly drained, dark-colored, nearly level soils in large and small depressions on the lake plain and in small upland depressions on the till plain. These soils formed in clayey lacustrine sediment.

In a representative profile in a cultivated area the surface layer is black silty clay loam about 8 inches thick. The upper 7 inches of the subsoil is dark grayish-brown silty clay loam, and the lower 41 inches is dark-gray silty clay and clay. The substratum is dark-gray clay that extends to a depth of 60 inches.

Permeability is slow, and the available water capacity is high. The organic-matter content is high. The soils have a deep root zone that is mainly slightly acid or neutral.

Lorain soils are used for the commonly grown general crops. Large areas are idle and are in brush.

Representative profile of Lorain silty clay loam, 50 feet south of Brownhelm Station Road, three-fourths of a mile east of High Bridge Road, in Brownhelm Township:

Ap—0 to 8 inches, black (10YR 2/1) silty clay loam; moderate, medium, granular structure; friable; common roots; slightly acid; abrupt, smooth boundary.

B1tg—8 to 15 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; weak, medium, prismatic structure parting to strong, medium, angular blocky; firm; common roots; thin continuous clay films on vertical surfaces of peds, thin patchy clay films on horizontal faces of peds; common black (10YR 2/1) stains on ped surfaces; medium acid; clear, wavy boundary.

B2tg—15 to 36 inches, dark-gray (N 4/0) silty clay; many, medium, distinct, strong-brown (7.5YR 5/6) mottles; weak, coarse, prismatic structure parting to moderate, coarse, angular blocky; firm; few roots; medium continuous clay films on vertical surfaces of peds; thin very patchy clay films on horizontal surfaces of peds; patchy very dark gray (N 3/0) organic stains on vertical surfaces of peds; slightly acid; clear, wavy boundary.

B31g—36 to 44 inches, dark-gray (N 4/0) silty clay; many, medium, distinct, strong-brown (7.5YR 5/6) and light olive-brown (2.5Y 5/4) mottles; weak, coarse, angular blocky structure; firm; neutral; gradual, wavy boundary.

B32g—44 to 56 inches, dark-gray (N 4/0) clay; common, medium, distinct, light olive-brown (2.5Y 5/4) and yellowish-brown (10YR 5/8) mottles; massive; firm; strata of loam and clay loam; neutral; gradual, wavy boundary.

C—56 to 60 inches, dark-gray (N 4/0) clay and some coarser textured strata; massive; firm; mildly alkaline, calcareous.

Depth to a calcareous layer ranges from 30 to 60 inches. The Ap and A1 horizons are black (10YR 2/1) and very dark grayish brown (10YR 3/2). The B horizon ranges from 18 to 50 inches in thickness. Its matrix has hue of 10YR, 2.5Y, 5Y, or N; value of 4 or 5; and chroma of mainly 0 to 2, except that the lower part, below a depth of 30 inches, has chroma of 3, 4, or 6 in some places. This horizon is typically silty clay and includes silty clay loam and clay. The upper part of the B horizon ranges from slightly acid to strongly acid. Reaction is less acid as depth increases, and in places the lower part of the B horizon is mildly alkaline.

Lorain soils are commonly near Miner, Luray, and Carlisle soils. They formed in lacustrine sediment, whereas Miner soils formed in glacial till. They are mostly finer textured than the similar Luray soils. They are finer textured than Olmsted soils and the upper part of Mermill soils. They formed in mineral material, whereas Carlisle soils formed in organic material.

Lorain silty clay loam (Ln).—This soil is mainly in large areas on the lake plain in the northern part of the county and in small depressions and along drainageways on the till plain in the southern part of the county. It has the profile described as representative of the series.

Included with this soil in mapping were spots of soils in which the surface layer is mainly organic material and other spots in which the dark-colored surface layer is somewhat thicker than the surface layer of the representative soil. In the vicinity of Avon were included areas of soils that have some stones and boulders on the surface, which may interfere with cultivation or excavation of the soils.

Wetness is a severe limitation in farming. The soil needs drainage before it can be properly tilled. It is clayey, and it becomes very cloddy if it is tilled when wet. Also, preparation of an adequate seedbed is difficult. Locally, this soil is referred to as "Blue Clay." Wetness is a severe limitation for most nonfarm uses. Capability unit IIIw–4; woodland suitability group 2w1.

Lorain silty clay loam, sandy substratum (Ls).—This soil is near the city of Avon in level to depressional areas on the lake plain. It has a profile similar to the one described as representative of the series, but sandy loam or loamy sand is at a depth of 40 to 60 inches. Included in mapping were small areas of soils that are underlain by sandy material at a depth of slightly less than 40 inches.

Wetness is a severe limitation in farming. The underlying sandy material is unstable when saturated and is likely to flow during excavation. Wetness is a severe limitation for most nonfarm uses. Capability unit IIIw–4; woodland suitability group 2w1.

Luray Series

The Luray series consists of very poorly drained, dark-colored, nearly level soils in nearly level to concave areas on the lake plain. These soils formed in silty lacustrine material.

In a representative profile in a cultivated area the surface layer is very dark grayish-brown silty clay loam about 8 inches thick. The subsoil extends to a depth of about 31 inches. The upper 19 inches of the subsoil is mottled, dark-gray and gray silty clay loam, and the lower 4 inches is mottled, grayish-brown silt loam. The substratum, to a depth of 64 inches, is mottled, grayish-brown stratified loam over mottled, grayish-brown and yellowish-brown silty clay loam.

Permeability is moderately slow, and the available water capacity is high. The organic-matter content is high. The soils have a deep root zone that is commonly neutral. They have a perched water table that is near the surface for much of the year, and water is likely to pond during periods of heavy rainfall.

Luray soils are used mainly for the general crops commonly grown in the county.

Representative profile of Luray silty clay loam, 125 yards east of Durkee Road, 150 yards north of State Route 10, 50 yards from base of the beach ridge, in Eaton Township:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, fine and medium, subangular blocky structure; friable; neutral; abrupt, smooth boundary.

B1—8 to 11 inches, dark-gray (10YR 4/1) and gray (10YR 5/1) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; dark-gray (10YR 4/1) and very dark grayish-brown (10YR 3/2) root channels; neutral; clear, wavy boundary.

B21gt—11 to 17 inches, dark-gray (10YR 4/1) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6 and 5/8) mottles; strong, medium and coarse, subangular blocky structure; firm; occasional dark-gray (10YR 4/1) fillings in root channels; continuous, gray (10YR 5/1), thin clay films; neutral; gradual, wavy boundary.

B22gt—17 to 21 inches, dark-gray (10YR 4/1) silty clay loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, prismatic structure parting to strong, medium and coarse, subangular blocky; gray (10YR 5/1) thin clay films on ped surfaces; very firm; neutral; diffuse, wavy boundary.

B23gt—21 to 27 inches, dark-gray (10YR 4/1) silty clay loam; common, fine, prominent, yellowish-brown (10YR 5/6) mottles; moderate, coarse, prismatic structure parting to weak, medium and coarse, subangular blocky; gray (10YR 5/1) thin clay films on ped surfaces; very firm; neutral; gradual, wavy boundary.

B3—27 to 31 inches, grayish-brown (2.5Y 5/2) silt loam; many, medium, distinct, olive-yellow (2.5Y 6/6) and yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; firm; gray (10YR 5/1) thin clay films on ped surfaces; neutral; gradual, wavy boundary.

C1—31 to 47 inches, grayish-brown (2.5Y 5/2) stratified loam and silt loam; many, medium, distinct, yellowish-brown (10YR 5/6 and 5/4) mottles; massive; neutral; abrupt, wavy boundary.

C2—47 to 64 inches, mottled grayish-brown (2.5Y 5/2) and yellowish-brown (10YR 5/6) silty clay loam; massive; very firm; mildly alkaline.

The solum ranges from 30 to 50 inches in thickness. The Ap horizon ranges from very dark gray (10YR 3/1) to very dark grayish brown (10YR 3/2). The B horizon ranges from 16 to 36 inches in thickness. Its matrix has hue of 10YR and 2.5Y, value of 4 or 5, and chroma of 1 or 2. It is typically dark gray (10YR 4/1) or grayish brown (10YR or 2.5Y 5/2). In the B horizon are mottles that have the same hue and value as the matrix, but 10 to 40 percent of these mottles have chroma of 3 to 8 and are typically yellowish brown (10YR 5/4 to 5/8). Ped surfaces have uniform dark-gray (10YR 4/1) or gray (10YR 5/1) clay films. The B horizon is silt loam or silty clay loam and is slightly acid or neutral.

Luray soils in Lorain County have a slightly thinner A horizon than is defined as within the range for the series. However, this difference does not alter the usefulness or behavior of the soils.

Luray soils are the very poorly drained member of a drainage sequence that includes the poorly drained Sebring soils, the somewhat poorly drained Fitchville soils, and the well-drained Mentor soils. They contain more silt than Lorain and Miner soils. They are finer textured than Olmsted soils and the upper part of Mermill soils. They formed in mineral material, whereas Carlisle soils formed in organic matter.

Luray silty clay loam (Ly).—This soil is in large areas, mostly on the northern lake plain, between the beach ridges in slack water areas, and along drainageways. Where this soil is at the base of beach ridges, in places it receives additional water from seepage from the area above. It generally is adjacent to Sebring, Fitchville, Lorain, and Mahoning soils.

Included with this soil in mapping were areas of soils that are somewhat more acid than is typical for Luray soils. Also included were spots of Lorain and Sebring soils.

Wetness is a moderate limitation in farming, and it also limits this soil for many nonfarm uses. Capability unit IIw-4; woodland suitability group 2w1.

Mahoning Series

The Mahoning series consists of somewhat poorly drained, nearly level to gently sloping soils on uplands throughout the county. These soils formed in moderately fine textured glacial till.

In a representative profile in a cultivated area the surface layer is dark grayish-brown silt loam about 7 inches thick. The subsurface layer is mottled, light brownish-gray silt loam about 2 inches thick. The next layer is mottled, grayish-brown silty clay loam about 3 inches thick. The subsoil extends to a depth of about 36 inches and is mottled, dark yellowish-brown silty clay and clay loam. The substratum is mottled, brown clay loam that extends to a depth of 60 inches.

Permeability is very slow, and the available water capacity is medium. The organic-matter content is moderate. The soils have a moderately deep root zone that is mainly very strongly acid or strongly acid. They have a perched water table during wet periods, and they warm up slowly in spring.

Mahoning soils are used for general farm crops, such as corn, small grain, and soybeans.

Representative profile of Mahoning silt loam, 0 to 2 percent slopes, 3 miles southeast of Wellington, 250 feet east of West Road, 130 feet south of railroad tracks, in Huntington Township:

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

A2—7 to 9 inches, light brownish-gray (10YR 6/2) silt loam; common, fine and medium, distinct, yellowish-brown (10YR 5/8) mottles; weak, fine, subangular blocky structure parting to weak, thin, platy; friable; common fine roots; very strongly acid; abrupt, wavy boundary.

B&A—9 to 12 inches, grayish-brown (10YR 5/2) silty clay loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, prismatic structure parting to weak, medium, angular blocky; firm; common fine roots; about 15 percent light brownish-gray (10YR 6/2) silt loam, mostly along prism faces; grayish-brown (10YR 5/2), thin, continuous clay films on vertical surfaces of peds within prisms and thin patchy clay films on horizontal surfaces of peds; few small pebbles; very strongly acid; gradual, smooth boundary.

B21t—12 to 20 inches, dark yellowish-brown (10YR 4/4) light silty clay; many, medium, distinct, grayish-brown (10YR 5/2) mottles and common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium and coarse, prismatic structure parting to moderate, medium, angular blocky; firm; common fine roots on prism faces; grayish-brown (10YR 5/2) ped surfaces; thin continuous clay films on vertical surfaces of peds and thin patchy clay films on horizontal surfaces; 2 percent pebbles; very strongly acid; gradual, smooth boundary.

B22t—20 to 30 inches, dark yellowish-brown (10YR 4/4) light silty clay; common, medium, distinct, grayish-brown (10YR 5/2) mottles; moderate, coarse, prismatic structure parting to weak, coarse, angular blocky; firm; few fine roots; medium, patchy, grayish-brown (10YR 5/2) clay films are mainly on the vertical surfaces of peds; 2 percent pebbles; slightly acid; clear, wavy boundary.

B3—30 to 36 inches, dark yellowish-brown (10YR 4/4) clay loam; common, medium, distinct, grayish-brown (10YR 5/2) mottles; weak, coarse, prismatic structure parting to weak, thick, platy; very firm, dense; very patchy, thin, grayish-brown (10YR 5/2) clay films on some vertical surfaces of peds; about 5 percent pebbles; mildly alkaline; clear, wavy boundary.

C—36 to 60 inches, brown (10YR 4/3) clay loam; common, medium, distinct, gray (10YR 5/1) mottles; weak, thick, platy structure; very firm, dense; common light-gray (10YR 7/1) and light brownish-gray (10YR 6/2) splotches of lime; about 5 percent pebbles; common black shale fragments; calcareous; moderately alkaline.

The solum ranges from 29 to 44 inches in thickness. It is 2 to 10 percent coarse fragments. In some places the profile contains moderately coarse textured strata. The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. The A2 horizon is intermittent in cultivated areas and is as much as 4 inches thick in some places. The matrix of the B2 horizon has hue of 10YR and 2.5Y, value of 4 to 6, and chroma of 2 to 4. Clay films in hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 or less are on ped surfaces in the B horizon. This horizon ranges from silty clay loam and clay loam to silty clay. The C horizon is silty clay loam or clay loam. The calcium carbonate equivalent ranges from 5 to 10 percent in the till.

Mahoning soils are the somewhat poorly drained member of a drainage sequence that includes the very poorly drained Miner soils, the poorly drained Trumbull soils, and the moderately well drained Ellsworth soils. They are finer textured in the upper part of the profile than Haskins soils. They do not have the high content of silt that is typical of Del Rey and Fitchville soils, and they also are more acid than Del Rey soils. They do not have the silty mantle that is typical of Tiro soils. They are not so fine textured as Fulton soils, and they do not have the laminated lacustrine material that is characteristic of those soils.

Mahoning silt loam, 0 to 2 percent slopes (MgA).—This soil has the profile described as representative of the series. It is in both physiographic areas in the county.

In the northern third of the county, this soil is on the wave-cut lake plain, where it is associated with areas of the darker colored Miner soils. Slopes are commonly less than 1 percent. Runoff is slow to ponded, and adequate drainage outlets are difficult to establish. Included in mapping of this soil on the wave-cut lake plain were areas of Miner and Lorain soils in depressions; some areas of soils, in many places at the bottom of the beach ridges, that have a darker colored surface layer than this Mahoning soil; pockets of water-worked glacial till; and some areas of soils that are stratified with lenses of medium-textured material.

On the till plain in the southern two-thirds of the county, this soil is associated with areas of Ellsworth soils on the higher knolls or steeper slopes. It is more sloping and is in smaller areas than in the northern part of the county. Runoff concentrates in some areas and causes some erosion. There are many wet spots and depressions, and drainage is therefore difficult.

Included in mapping in the southern part of the county were spots of the darker colored, wetter Trumbull and Miner soils in small oval or round depressions and in long narrow strips along drainageways.

Wetness is a severe hazard and limits this soil for farming and for most nonfarm uses. Capability unit IIIw–3; woodland suitability group 2w2.

Mahoning silt loam, 2 to 6 percent slopes (MgB).—This gently sloping soil is on breaks along drainageways and in undulating areas that receive runoff from higher lying areas.

Included with this soil in mapping were small areas of Ellsworth soils, small areas of moderately eroded soils, and some areas of soils that have slopes of slightly more than 6 percent. Also included in the generally narrow drainageways that intersect areas of this soil are the more poorly drained Trumbull and Minor soils.

Seasonal wetness is the major limitation in farming. Erosion is a hazard in cultivated areas unless management is optimum. The surface layer of this soil is easy to till, but it is subject to crusting. Seasonal wetness and very slow permeability are limitations for many nonfarm uses. Capability unit IIIw–3; woodland suitability group 2w2.

Mahoning silt loam, 2 to 6 percent slopes, moderately eroded (MgB2).—This soil has a profile similar to the one described as representative of the series, but the surface layer is thinner and contains more clay as a result of plowing into the more clayey subsoil. The surface layer is sticky when wet, is more difficult to till than that of the uneroded soil, and is low in organic-matter content. This soil is more droughty than the uneroded soil.

Included with this soil in mapping were small areas of Ellsworth soils. Also included near drainageways were areas of Trumbull, Miner, and other Mahoning soils.

Seasonal wetness and the effects of past erosion are limitations in farming unless management is optimum. Seasonal wetness and very slow permeability are limitations for many nonfarm uses. Capability unit IIIw–3; woodland suitability group 2w2.

Mahoning silt loam, sandstone substratum, 0 to 2 percent slopes (MhA).—This soil is near the base of sandstone hills in the northwestern part of the county. It has a profile similar to the one described as representative of the series, but broken or solid sandstone bedrock is at a depth of 40 to 60 inches. Just above the sandstone is loam or clay loam till.

Included with this soil in mapping were small areas of Mitiwanga and Allis soils, which have shale or sandstone bedrock within a depth of 40 inches.

This Mahoning soil is low in fertility. Bedrock makes subsurface drains difficult to install. Wetness is a severe limitation if the soil is farmed. Wetness and the very slow permeability are limitations for many nonfarm uses. Capability unit IIIw–3; woodland suitability group 2w2.

Mahoning-Tiro silt loams, 0 to 2 percent slopes (MkA).—These soils are in irregularly shaped areas that commonly range from 5 to 40 acres in size. In some areas the Mahoning soil makes up 30 to 70 percent of the mapping unit, but in others the Tiro soil makes up 30 to 70 percent.

Included with these soils in mapping were spots of Haskins soils on the higher parts of the landscape and spots of the more poorly drained Trumbull and Sebring soils on the lower parts. Also included were spots of Fitchville soils.

Runoff is low to medium. During winter and spring and in periods of prolonged rainfall, these soils have a water table that is perched near the surface. Wetness is a severe limitation if these soils are farmed. Wetness and the slow or very slow permeability are limitations for many nonfarm uses. Capability unit IIIw–3; woodland suitability group 2w2.

Mahoning-Tiro silt loams, 2 to 6 percent slopes (MkB).—These soils are in irregularly shaped areas that commonly range from 5 to 30 acres in size. In some areas the Mahoning soil makes up 30 to 70 percent of the mapping unit, but in others the Tiro soil makes up 30 to 70 percent.

Included with these soils in mapping were spots of Haskins and Ellsworth soils on the higher parts of the landscape and spots of Trumbull and Sebring soils on the lower parts. Also included were small areas of soils that are slightly better drained, small areas where slopes are slightly more than 6 percent, and a few areas of moderately eroded soils.

Runoff is medium. During winter and spring and in periods of prolonged rainfall, these soils have a water table that is perched near the surface. Wetness and erosion are severe limitations if these soils are farmed. Wetness and the slow or very slow permeability are limitations for many nonfarm uses. Capability unit IIIw–3; woodland suitability group 2w2.

Mahoning-Urban land complex, nearly level (MmA).—This complex is 50 to 70 percent a nearly level Mahoning silt loam and 25 to 40 percent Mahoning soil material that has been altered as a result of grading and filling. In places where the original Mahoning soil has been altered, it is difficult to identify.

Included with this complex in mapping were areas of sloping Ellsworth soils. Also included in depressions and drainageways were spots of Trumbull soils. In places these Ellsworth and Trumbull soils have also been altered by grading and filling.

The water table is perched during winter and spring. Internal drainage, as well as surface drainage, is needed. The surface layer in altered areas has poor structure, becomes sticky when wet, and is cloddy when dry. Establishing lawns and shrubs is difficult. Erosion is a hazard in sloping areas that are bare of vegetation. Capability unit and woodland suitability group not assigned.

Mentor Series

The Mentor series consists of gently sloping to steep, well-drained soils along the major streams in the county. These soils formed in silty lacustrine material.

In a representative profile the surface layer is dark grayish-brown silt loam about 3 inches thick. The subsurface layer is brown silt loam about 4 inches thick. The subsoil extends to a depth of about 40 inches and is yellowish-brown silt loam and silty clay loam and is mottled in the lower part. The substratum is yellowish-brown and dark yellowish-brown silt loam that extends to a depth of 60 inches.

Permeability is moderate, and the available water capacity is medium. The organic-matter content is moderate to low. The root zone is deep and is commonly strongly acid.

Mentor soils are commonly wooded or are used for nonfarm purposes.

Representative profile of Mentor silt loam, 12 to 25 percent slopes, on east side of Bank Street, one-half mile south of North Ridge Road, in Henrietta Township:

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

A2—3 to 7 inches, brown (10YR 5/3) silt loam; weak, fine, subangular blocky structure; friable; many roots; dark grayish-brown (10YR 4/2) coatings in root channels; strongly acid; clear, smooth boundary.

B1—7 to 10 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, subangular blocky structure; friable; common fine roots; brown (10YR 5/3) continuous coatings on ped surfaces; strongly acid; clear, smooth boundary.

B21t—10 to 15 inches, yellowish-brown (10YR 5/4) light silty clay loam; moderate, fine, subangular blocky structure; firm; common fine roots; brown (10YR 5/3) continuous coatings on ped surfaces; very patchy thin clay films; strongly acid; clear, smooth boundary.

B22t—15 to 22 inches, yellowish-brown (10YR 5/4) light silty clay loam; moderate, medium, subangular blocky structure; firm; few fine roots; dark-brown (10YR 4/3) continuous coatings on ped surfaces; very patchy thin clay films; strongly acid; clear, wavy boundary.

B23t—22 to 30 inches, yellowish-brown (10YR 5/4) light silty clay loam; many, fine, yellowish-brown (10YR 5/6) mottles and few, fine, grayish-brown (10YR 5/2) mottles; moderate, medium and coarse, subangular blocky structure; firm; few fine roots; patchy thin clay films; stongly acid; clear, smooth boundary.

B3t—30 to 40 inches, yellowish-brown (10YR 5/4) light silty clay loam; few, fine, gray (10YR 5/1) mottles and common, fine, yellowish-brown (10YR 5/6) mottles; weak to moderate, coarse, subangular blocky structure; few roots; very patchy thin clay films; few black shale fragments; strongly acid; clear, smooth boundary.

C1—40 to 52 inches, yellowish-brown (10YR 5/4) silt loam; common, fine, gray (10YR 5/1) mottles and common, fine, yellowish-brown (10YR 5/6) mottles; massive; friable; few roots; strongly acid; clear, smooth boundary.

C2—52 to 60 inches, dark yellowish-brown (10YR 4/4) silt loam; massive; friable; strongly acid.

The solum ranges from 30 to 60 inches in thickness and generally has no coarse fragments. The Ap horizon, where present, is commonly dark brown (10YR 4/3) but ranges from very dark grayish brown (10YR 3/2) to brown (10YR 5/3). The matrix of the B2 horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 5. Brown (7.5YR 4/4) or yellowish-brown (10YR 5/4) colors are most typical. Mottles that have chroma of 2 or less occur below a depth of 30 inches in places. Ped surfaces below a depth of 30 inches in places have coatings that have chroma of 2 or 3. The B2 horizon ranges from heavy silt loam to silty clay loam.

Mentor soils are the well-drained member of a drainage sequence that includes the very poorly drained Luray soils, the poorly drained Sebring soils, and the somewhat poorly drained Fitchville soils. They contain more silt than Ellsworth and Shinrock soils. They contain less sand or gravel throughout the profile than Bogart, Oshtemo, Elnora, and Tyner soils.

Mentor silt loam, 2 to 6 percent slopes (MnB).—This soil is in small areas on knolls and along drainageways. Included in mapping were spots of nearly level soils and small areas where the surface layer is loam or fine sandy loam. Also included were small areas of moderately well drained soils, spots of the somewhat poorly drained Fitchville soils, and small areas of moderately eroded soils.

Erosion is a moderate limitation in farming. Under good management, the soil is well suited to farming. Limitations are few for many nonfarm uses. Capability unit IIe–2; woodland suitability group 1o1.

Mentor silt loam, 6 to 12 percent slopes (MnC).—This soil is commonly along drainageways. Included in mapping were small areas of the somewhat poorly drained Fitchville soils at the base of some slopes. Also included were some small areas of moderately eroded soils.

Erosion is a severe limitation in farming, and erosion control practices should be used. On steeper slopes soil slippage is a hazard. Slope is a limitation for some nonfarm uses. Capability unit IIIe–2; woodland suitability group 1o1.

Mentor silt loam, 12 to 25 percent slopes (MnE).—This moderately steep to steep soil is along drainageways and larger streams. It has the profile described as representative of the series. Included in mapping were small areas of soils that have slopes of slightly more than 25 percent and small areas of moderately eroded or severely eroded soils.

Erosion is a very severe limitation in farming. Soil slippage is likely in some areas. Slope is a severe limitation for many nonfarm uses. Capability unit IVe–1; woodland suitability group 1r1.

Mermill Series

The Mermill series consists of very poorly drained, dark-colored, nearly level soils that are mainly in depressions on the lake plain. These soils formed in stratified loamy material and in the underlying finer textured material.

In a representative profile in a cultivated area the surface layer is very dark gray loam about 9 inches thick. The upper 23 inches of the subsoil is mottled, dark-gray and gray loam, sandy clay loam, and fine sandy loam. The lower 19 inches is mottled, grayish-brown silty clay loam. The substratum is grayish-brown clay loam that extends to a depth of 60 inches.

Permeability is moderate in the surface layer and upper part of the subsoil and is slow in the lower part of the subsoil. The available water capacity and organic-matter content are high. The root zone is deep and is mainly slightly acid or neutral. Wetness is the main limitation. The water table is perched, and water is likely to pond during periods of heavy rainfall.

Mermill soils are used mainly for farming. The commonly grown crops are corn, small grain, and soybeans.

Representative profile of Mermill loam, approximately 100 yards east of Jaycox Road, one-fourth mile south of Riegelsberger Road, in the city of Avon:

Ap—0 to 9 inches, very dark gray (10YR 3/1) loam; weak, fine and medium, subangular blocky structure and very coarse, granular; friable; many roots; medium acid; abrupt, wavy boundary.

B21g—9 to 14 inches, dark-gray (10YR 4/1) loam; common, fine, distinct, yellowish-brown (10YR 5/6 and 5/8) and strong-brown (7.5YR 5/8) mottles; weak, medium, subangular blocky structure; friable; common roots; numerous worm casts; slightly acid; clear, wavy boundary.

B22tg—14 to 22 inches, gray (N 5/0) light sandy clay loam; common, coarse, distinct, strong-brown (7.5YR 5/6) and yellowish-brown (10YR 5/8) mottles; weak, coarse, prismatic structure parting to moderate, medium, subangular and angular blocky; friable; thin, continuous, gray (N 5/0) clay films on ped surfaces; common roots; neutral; clear, wavy boundary.

B23tg—22 to 32 inches, gray (10YR 5/1) fine sandy loam; common, coarse, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; few, patchy, gray (10YR 5/1) clay films on ped surfaces; firm; few roots; neutral; abrupt, smooth boundary.

IIB3—32 to 51 inches, grayish-brown (10YR 5/2) silty clay loam; many, medium and coarse, prominent, dark-brown (7.5YR 4/4) and olive-brown (2.5Y 4/4) mottles; laminated; massive; very firm; thin gray (10YR 5/1) clay films; a few sandstone pebbles; mildly alkaline; calcareous; abrupt, smooth boundary.

IIIC—51 to 60 inches, grayish-brown (10YR 5/2) clay loam glacial till; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; massive; very firm; mildly alkaline; calcareous.

The Ap horizon is very dark gray (10YR 3/1), black (10YR 2/1), very dark grayish brown (10YR 3/2), or very dark brown (10YR 2/2). The B horizon is dark gray and gray (N 4/0 and 5/0, 10YR to 5Y 4/1 and 5/1), grayish brown (10YR and 2.5Y 5/2), or olive gray (5Y 5/2 and 4/2). It has mottles that have hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 8. The upper part of the B horizon is loam, sandy clay loam, or clay loam. Thin lenses or layers of sandy loam that does not have the structure typical of the B horizon occur in some places. Thin, continuous or patchy, grayish-brown (10YR 5/2) or gray (10YR 5/1, N 5/0) clay films are on ped surfaces. Depth to the clayey IIB3 horizon ranges from 20 to 40 inches. The C horizon is till or lacustrine sediment that is more than 35 percent clay. Reaction ranges from medium acid to mildly alkaline throughout the profile.

Mermill soils are the poorly drained member of a drainage sequence that includes the somewhat poorly drained Haskins soils and the moderately well drained Rawson soils. Mermill soils are coarser textured throughout the profile than Lorain and Miner soils. They are less silty than Luray soils and less sandy or gravelly than Olmsted soils. They formed in mineral material, whereas Carlisle soils formed in organic material.

Mermill loam (Mo).—This nearly level soil is in large, shallow depressions on the lake plain. Included in mapping were areas of soils that have a surface layer of silt loam or fine sandy loam. Crusting is likely in areas where the surface layer and upper part of the subsoil are silty. Also included were areas of Haskins and Lorain soils.

Wetness is the main limitation in farming. The soil responds well to fertilization. It is well suited to subsurface drainage. If adequately drained, it is well suited to general farm crops. Wetness and the slow permeability are limitations for many nonfarm uses. Capability unit IIw–4; woodland suitability group 2w2.

Miner Series

The Miner series consists of very poorly drained, dark-colored (fig. 10), nearly level soils in depressions and drainageways throughout the county. These soils formed in moderately fine textured and fine textured glacial till.

In a representative profile in a cultivated area the surface layer is very dark gray silty clay loam about 9 inches thick. The subsoil extends to a depth of 32 inches and is mottled, gray and dark-gray silty clay. The subsoil extends to a depth of 32 inches and is mottled, gray and dark-gray silty clay. The substratum is gray silty clay loam glacial till that extends to a depth of 60 inches.

Permeability is slow, and the available water capacity is high. The organic-matter content is moderate to high. The root zone is deep and is commonly slightly acid or neutral. Wetness is the main limitation. The water table is perched, and water is likely to pond during periods of heavy rainfall.

Most areas of Miner soils are used for farming. The commonly grown crops are corn, small grain, and soybeans.

***Figure 10.*—A field used for grain. The darker colored, lower lying area in the middle of the field is Miner silty clay loam; the lighter colored area is Mahoning silt loam.**

Representative profile of Miner silty clay loam, approximately 250 feet east of Jaycox Road, 300 feet south of Mills Road, in North Ridgeville:

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

B1gt—9 to 12 inches, gray (10YR 6/1) silty clay; many, coarse, distinct, yellowish-brown (10YR 5/8 and 5/4) mottles; moderate, medium and coarse, subangular and angular blocky structure; firm; many roots; thin, discontinuous, dark-gray (10YR 4/1) clay films; medium acid; clear, wavy boundary.

B21tg—12 to 18 inches, gray (N 5/0) silty clay; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, prismatic structure parting to weak, coarse, subangular blocky; firm; common roots; gray (10YR 5/1) clay coatings on ped surfaces; less than 1 percent pebbles; medium acid; gradual, wavy boundary.

B22tg—18 to 25 inches, dark-gray (N 4/0) silty clay; many, medium, distinct, yellowish-brown (10YR 5/6 and 5/8) mottles; weak, coarse, prismatic structure parting to moderate, medium, subangular and angular blocky; firm; few roots; gray (10YR 5/1) clay films on ped surfaces; less than 1 percent pebbles; slightly acid; gradual, wavy boundary.

B3tg—25 to 32 inches, dark-gray (N 4/0) silty clay; many, medium, distinct, yellowish-brown (10YR 5/6 and 5/4) mottles; weak, coarse, subangular blocky structure; firm; few roots; dark-gray (10YR 4/1) clay coatings on ped surfaces; less than 1 percent pebbles; neutral; gradual, wavy boundary.

C—32 to 60 inches, gray (N 5/0) silty clay loam glacial till; many, distinct, coarse, yellowish-brown (10YR 5/4 and 5/6) mottles; massive; firm; few roots; 5 percent pebbles; mildly alkaline, calcareous.

The Ap horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. The B2 horizon is dominantly gray and has chroma of 2 or less. It has higher chroma mottles in hue of 10YR, 7.5YR, and 2.5Y and value of 4 and 5. Mottles that have chroma of 4 to 8 are in ped interiors. Clay films that are 10YR in hue, 4 or 5 in value, and less than 2 in chroma are on most ped surfaces. Reaction ranges from medium acid to neutral in the B horizon. The C horizon is gray (N 5/0, N 4/0, or 10YR 5/1) and has mottles of yellowish brown (10YR 5/4, 5/6, or 5/8). It is silty clay loam, clay loam, or silty clay.

Miner soils are the very poorly drained member of a drainage sequence that includes the poorly drained Trumbull soils, the somewhat poorly drained Mahoning soils, and the moderately well drained Ellsworth soils. They are finer textured than Luray soils. They contain less sand and gravel throughout the profile than Olmsted soils. They do not have the loamy upper horizons that are typical of

Mermill soils. They formed in mineral material, whereas Carlisle soils formed in organic matter. Miner soils have poorer drainage and are less acid than the nearby Hornell soils.

Miner silty clay loam (Mr).—This nearly level soil is in large flat areas of the lake plain and in sluggish drainageways and potholes on the till plain. This soil has the profile described as representative of the series.

Included with this soil in mapping were spots of Trumbull, Mahoning, Lorain, and Luray soils. In the northern part of the county were included areas of soils that are somewhat darker and have a thicker surface layer than is typical for Miner soil. In the southern part of the county were areas of Miner soils that have more included Trumbull soils, mostly in small pockets and in narrow strips along drainageways; areas of soils in which the carbonates are deeper than is typical for Miner soil; and areas of soils in which the surface layer is silt loam. Also included, on the east side of State Route 83 and north of Chester Road along the railroad tracks, was a depressional area of Miner soils that have a mucky surface layer 4 to 20 inches deep over mineral material. This area is covered with swampgrass, cattails, and a few water-tolerant trees. The area is ponded, and internal drainage is slow.

If this Miner soil is plowed when it is wet, it becomes very sticky, and when it dries it becomes very hard. Locally, this soil is referred to as "Blue Clay." Adequate drainage outlets are difficult to locate in some areas. If this soil is artificially drained and well managed, it is well suited to the general crops commonly grown in the county. Many of the wet areas are not properly drained and are wooded. These areas have good potential for production of timber.

Wetness is a severe limitation in farming. Wetness, the slow permeability, and the high shrink-swell potential are limitations for most nonfarm uses. Capability unit IIIw–4; woodland suitability group 2w1.

Miner silty clay loam, shale substratum (Ms).—This nearly level soil is in the northern part of the county. It has a profile similar to the one described as representative of the series, but it is underlain by shale bedrock at a depth of 40 to 60 inches. In some places small humps or smears of sandy material 3 to 12 inches thick are over the shale bedrock. Slopes are nearly level to concave.

Included with this soil in mapping were spots of soils where shale bedrock is as shallow as 30 inches or as deep as 72 inches. Also included were a few spots of muck and a few spots of Lorain, Luray, and Allis soils.

This soil is very sticky when wet and has a severe wetness limitation. In many of the broad flat areas adequate drainage outlets are difficult to locate. In the past much of the acreage of this soil was used for grapes. However, it is now idle, is reverting to woodland, or is in nonfarm uses. Wetness is a severe limitation in farming. Wetness and the slow permeability are limitations for many nonfarm uses. Capability unit IIIw–4; woodland suitability group 2w1.

Mitiwanga Series

The Mitiwanga series consists of somewhat poorly drained, nearly level to gently sloping soils on sandstone highs. These soils formed in 20 to 40 inches of loamy material over sandstone bedrock.

In a representative profile the surface layer is dark grayish-brown silt loam about 7 inches thick. The subsurface layer, about 3 inches thick, is yellowish-brown silt loam. The subsoil extends to a depth of 35 inches and is yellowish-brown, dark-brown, and light brownish-gray silt loam, loam, and clay loam. Sandstone bedrock is at a depth of 35 inches.

Permeability is moderate, and the available water capacity is medium. The organic-matter content is moderate. The root zone is moderately deep and is commonly very strongly acid or strongly acid. The moderate depth to bedrock and wetness are the main limitations. The soils need drainage for optimum crop production, and in places outlets are difficult to obtain because of the limited depth to bedrock.

Mitiwanga soils are used for orchards and for the general crops grown in the county, such as corn, small grain, and soybeans.

Representative profile of Mitiwanga silt loam, 0 to 2 percent slopes, approximately 660 feet east of the intersection of Garfield and Baumhart Road, 330 feet north of Garfield Road, in a wooded section, Henrietta Township:

A1—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine and medium, granular structure; friable; many roots; very strongly acid; clear, wavy boundary.

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

B1—10 to 15 inches, yellowish-brown (10YR 5/6) silt loam; few, fine, distinct, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; friable; ped coatings of light brownish gray (10YR 6/2); common roots; very strongly acid; clear, smooth boundary.

IIB21t—15 to 23 inches, yellowish-brown (10YR 5/6) loam; common, medium, distinct, pale-brown (10YR 6/3) and strong-brown (7.5YR 5/6) mottles; moderate, medium, subangular blocky structure; friable; ped coatings of light brownish gray (10YR 6/2); thin patchy clay films in pores; few, fine, black (10YR 2/1) stains; few roots; 2 percent pebbles; very strongly acid; clear, wavy boundary.

IIB22t—23 to 29 inches, dark-brown (7.5YR 4/4) clay loam; common, medium, distinct, light brownish-gray (10YR 6/2) ped coatings and few, medium, faint, brown (7.5YR 5/4) mottles; moderate, coarse, subangular blocky structure; firm; thin patchy clay films on ped surfaces and continuous thick clay films bridging sand grains; few, fine, black (10YR 2/1) stains; few roots; 10 percent coarse fragments; strongly acid; clear, irregular boundary.

IIB3t—29 to 35 inches, light brownish-gray (10YR 6/2) and dark-brown (7.5YR 4/4) clay loam; massive; firm; grayish-brown (10YR 5/2), patchy, medium clay coatings on surfaces of rock fragments; few roots in rock fractures; 75 percent coarse fragments; strongly acid; gradual, irregular boundary.

IIIR—35 inches +, Berea Sandstone bedrock.

Depth to sandstone bedrock ranges from 20 to 40 inches. Reaction is medium acid to very strongly acid in the upper part of the solum and medium acid to strongly acid in the lower part of the solum and in the C horizon. The content of coarse fragments ranges from 0 to 25 percent in the A horizon and the upper part of the B horizon. The Ap horizon is dark grayish brown or grayish brown and has hue of 10YR or 2.5Y. Mottles are present immediately below the A horizon. The A horizon is loam and silt loam. The B horizon has ped exteriors dominated by chroma of 2 or less and value of 4 to 6. The matrix of ped interiors is hue in

10YR or 2.5Y, 4 to 5 in value, and 3 to 6 in chroma. The B horizon is silt loam, light silty clay loam, loam, and clay loam. It has weak and moderate, fine to coarse, subangular and angular blocky structure. The C horizon is loam, light clay loam, or channery material and masses of sandier material. Shattered or fractured rock is above the bedrock in some places.

Mitiwanga soils are near Conotton, Weikert, and Dekalb soils. They have less stone fragments throughout the profile than those soils. They are coarser textured than Allis and Lockport soils and they are underlain by sandstone, whereas Allis and Lockport soils are underlain by shale.

Mitiwanga silt loam, 0 to 2 percent slopes (MtA).—This soil is on the flat and rounded tops and at the base of sandstone highs in the northern and northwestern parts of the county. Most areas range from 10 to 50 acres in size. This soil has the profile described as representative of the series.

Included with this soil in mapping were areas of soils that have a surface layer of loam and a few spots that have a cobbly surface layer. Also included were spots of soils in which bedrock is slightly shallower or slightly deeper than is typical in Mitiwanga soils, a few areas in which the lower part of the subsoil is very strongly acid, and a few spots of Mahoning, Fitchville, and Fulton soils.

Poor drainage and the shallowness over bedrock are the major limitations. Cultivation is difficult in places because of coarse fragments and the shallowness over bedrock. Wet spots commonly occur where the bedrock is near the surface. Wetness and bedrock at a depth of 20 to 40 inches are limitations for many nonfarm uses. Capability unit IIIw–2; woodland suitability group 3w1.

Mitiwanga silt loam, 2 to 6 percent slopes (MtB).—This soil is commonly on the rounded tops and at the base of sandstone highs in the northern and northwestern parts of the county.

Included with this soil in mapping were areas of soils in which the surface layer is loam and a few spots in which it is cobbly. Also included were spots of soils in which bedrock is slightly shallower or slightly deeper than is typical in Mitiwanga soils, a few areas in which the lower part of the subsoil is very strongly acid, and a few spots of moderately eroded or severely eroded soils.

Wetness is a severe limitation in farming. Wetness and bedrock at a depth of 20 to 40 inches are limitations for many nonfarm uses. Capability unit IIIw–2; woodland suitability group 3w1.

Mitiwanga channery loam, 1 to 4 percent slopes (MvB).—This soil has a profile similar to the one described as representative of the series, but the surface layer is channery loam.

Included with this soil in mapping were spots of soils in which the surface layer is as much as 50 percent channers and spots in which the bedrock is slightly shallower or slightly deeper than is typical in Mitiwanga soils.

Wetness is a severe limitation in farming. The channers hinder cultivation. Wetness and bedrock at a depth of 20 to 40 inches are limitations for many nonfarm uses. Capability unit IIIw–2; woodland suitability group 3w1.

Mitiwanga-Urban land complex, gently sloping (MxB).—This complex is about 50 to 70 percent Mitiwanga silt loam or Mitiwanga channery loam and 25 to 40 percent Mitiwanga soil material that has been altered as a result of grading and filling. The original Mitiwanga soil has been altered to the extent that it is difficult to identify. Included with this complex in mapping were areas where slopes are nearly level.

The surface layer in altered areas of this complex commonly has low organic-matter content, low fertility, and poor tilth. Many sandstone fragments are throughout the profile. The available water capacity is too low to support lawns and shrubs. The included nearly level soils have a perched water table during winter and spring. The shallow depth to bedrock is a limitation in constructing basements and installing utility pipelines. Erosion is a hazard in gently sloping areas that are bare of vegetation. Capability unit and woodland suitability group not assigned.

Olmsted Series

The Olmsted series consists of the very poorly drained, nearly level soils in low-lying depressions adjacent to the beach ridges and drainageways, mainly on the lake plain in the northern part of the county. These soils formed in loamy material. They are underlain by stratified sand and gravel.

In a representative profile in a cultivated area the surface layer is very dark gray fine sandy loam about 9 inches thick. The subsoil extends to a depth of about 36 inches and is mottled, gray sandy loam and sandy clay loam. The substratum is mottled, gray and dark grayish-brown loamy fine sand that extends to a depth of 60 inches.

Permeability is moderately rapid, and the available water capacity is medium. The organic-matter content is high. The root zone is deep and is mainly slightly acid or medium acid.

Drained areas of Olmstead soils are well suited to the general farm crops grown in the county, such as corn, small grain, and soybeans.

Representative profile of Olmsted fine sandy loam, 150 feet south of Riegelsberger Road and three-eighths of a mile east of State Route 83, in the city of Avon:

Ap—0 to 9 inches, very dark gray (10YR 3/1) fine sandy loam, same color rubbed; moderate, medium, granular structure; friable; neutral; abrupt, wavy boundary.

B1g—9 to 20 inches, gray (10YR 5/1) sandy loam; few, fine, distinct, yellowish-brown (10YR 5/4) and dark-brown (7.5YR 4/4) mottles; weak, medium, subangular blocky structure; friable; medium acid; abrupt, wavy boundary.

B2tg—20 to 36 inches, (10YR 5/1) sandy clay loam; many, medium and large, distinct, yellowish-brown (10YR 5/4), dark yellowish-brown (10YR 4/4), and strong-brown (7.5YR 5/6) mottles; moderate, medium, subangular blocky structure; friable; thin very patchy clay films and bridges between sand grains; few small pebbles in lower part of horizon; medium acid; diffuse, smooth boundary.

C1—36 to 42 inches, gray (5Y 5/1) loamy fine sand; common, large, distinct, olive-brown (2.5Y 4/4) mottles; massive; friable; slightly acid.

C2—42 to 60 inches, dark grayish-brown (10YR 4/2) loamy fine sand; many, fine, distinct, yellowish-brown (10YR 5/6) mottles; massive; friable; slightly acid.

The Ap horizon is very dark gray (10YR 3/1), very dark brown (10YR 2/2), or very dark grayish brown (10YR 3/2). The Btg horizon is mainly sandy clay loam or sandy loam that contains various amounts of gravel. Mottles are immediately below the plow layer and are yellowish brown (10YR 5/4 or 5/6), dark yellowish brown (10YR 4/4), dark brown (7.5YR 4/4), or strong brown (7.5YR 5/6). The matrix of the mottled Btg horizon typically has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of mainly 1 or 2. In most places the B horizon has moderate subangular blocky structure, but in places the structure is weak. Reaction ranges from medium acid to neutral in the Btg horizon. Gravel in the Btg horizon generally increases, in many places gradually, as depth increases.

Olmsted soils are the poorly drained member of a drainage sequence that includes the well drained Chili soils, the moderately well drained Bogart soils, and the somewhat poorly drained Jimtown soils. Olmsted soils formed in loamy material, whereas Luray soils formed in silty material and Miner and Lorain soils formed in silty clay material. They are underlain by sand and gravel, whereas Mermill soils are underlain by loamy glacial till.

Olmsted fine sandy loam (Om).—This soil is in depressions and drainageways in the lake plain. It has the profile described as representative of the series. Included in mapping were small areas of soils that have a surface layer of silty clay loam, silt loam, or loam. Also included were spots of Mermill soils.

Wetness is a moderate limitation in farming. Many areas receive runoff from surrounding soils. Wetness is a severe limitation for many nonfarm uses. Capability unit IIw–4; woodland suitability group 2w1.

Olmsted loam, sandstone substratum (On).—This soil is in depressional pockets in the northern one-third of the county. It has a profile similar to the one described as representative of the series, but it is underlain by bedrock at a depth of 40 to 60 inches and the surface layer is loam.

Included with this soil in mapping were a few areas of soils in which bedrock is slightly shallower than a depth of 40 inches and a few areas in which the surface layer is silt loam, silty clay loam, or channery loam.

Poor drainage and the underlying bedrock are the main limitations. The soil needs drainage, but subsurface drains are difficult to install because of the underlying rock. Drained areas of this soil are well suited to general crops. Wetness is a limitation for many nonfarm uses. Capability unit IIw–4; woodland suitability group 2w1.

Orrville Series

The Orrville series consists of somewhat poorly drained, nearly level soils along the small streams and meandering channels of the major streams of the county. These soils formed in medium-textured and moderately fine textured recent alluvium.

In a representative profile in a cultivated area the surface layer is dark-brown silt loam about 8 inches thick. The subsoil extends to a depth of 36 inches and is mottled brown and light brownish-gray silty clay loam and clay loam. Between depths of 36 and 42 inches the substratum is mottled light-gray gravelly loam. Below this, and extending to a depth of about 60 inches, it is mottled, grayish-brown silty clay.

Permeability is moderate, and the available water capacity is medium. The root zone is deep and is mainly medium acid or strongly acid. Flooding and wetness are the main limitations. The soils generally are flooded each spring and are slow to dry out.

Orrville soils are used mainly for pasture or nonfarm purposes.

Representative profile of Orrville silt loam, approximately one-half mile south of the intersection of Indian Hollow and Foster Roads, 100 feet west of Indian Hollow Road, in Penfield Township:

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

B1—8 to 16 inches, brown (10YR 5/3) silty clay loam; common, medium, distinct, light brownish-gray (2.5Y 6/2) mottles and few, fine, distinct, yellowish-brown (10YR 5/6, 5/8) and dark brown (7.5YR 4/4) mottles; moderate, medium and fine, subangular blocky structure; friable; few roots; less than 1 percent pebbles; very strongly acid; clear, smooth boundary.

B21—16 to 25 inches, light brownish-gray (2.5Y 6/2) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6 and 5/8) mottles; moderate, medium and fine, subangular blocky structure; friable; few roots; numerous concretions; medium acid; abrupt, smooth boundary.

B22—25 to 36 inches, light brownish-gray (2.5Y 6/2) clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) and dark-brown (7.5YR 4/4) mottles; moderate, medium and coarse, subangular blocky structure; friable; few, patchy, gray (N 6/0) coatings on ped surfaces; medium acid; abrupt, smooth boundary.

C1—36 to 42 inches, light-gray (10YR 6/1) gravelly loam; common, medium, distinct, yellowish-brown (10YR 5/6) and dark-brown (7.5YR 4/4) mottles; single grained; loose; slightly acid; abrupt, smooth boundary.

C2—42 to 60 inches, grayish-brown (10YR 5/2) silty clay; common, medium, faint, light-gray (10YR 6/1) mottles and few, fine, distinct, dark-brown (7.5YR 4/4) and light yellowish-brown (2.5Y 6/4) mottles; massive; firm; slightly acid.

The Ap horizon has hue of 10YR or 2.5Y, value of 4, and chroma of 2 or 3. Below the A horizon the base color commonly has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. Mottles are present below a depth of 6 to 15 inches. The B horizon is silty clay loam and clay loam. In some places its texture is relatively uniform, but in others stratification is evident in thin layers of sand, silt loam, and loam. This horizon has weak or moderate, subangular blocky structure. Reaction ranges from slightly acid to very strongly acid in the B horizon. Reaction is relatively uniform in some places, but in other places reaction becomes less acid as depth increases. Below a depth of 40 inches, there are strata of different textures, including gravelly and stony layers in some places.

Orrville soils are the somewhat poorly drained member of a drainage sequence that includes the poorly drained Holly soils, the moderately well drained Lobdell soils, and the well drained Chagrin soils. Orrville soils have less development in the B horizon and are in a lower position on the landscape than Fitchville, low terrace, soils. They are less red than Senecaville soils.

Orrville silt loam (Or).—This nearly level soil is in extensive areas along the smaller streams and in wet spots on the flood plain along the larger streams. Most areas are long and narrow and are dissected by numerous drainageways.

Included with this soil in mapping were areas of soils that have a surface layer of sandy loam, loam, or silty clay loam. In Rochester and Huntington Townships were included areas of Orrville soils that are underlain by shale and siltstone bedrock at a depth of 45 to 60 inches and areas in which the stream flows directly on bedrock. Also included, in the northwestern part of the county near sandstone highs, were areas of

Orrville soils that in places are underlain by sandstone. Spots of Fitchville and Holly soils were also included.

Flooding and wetness are the main limitations. If the soil is protected from flooding and properly drained, it is well suited to general crops. Because of the size of the areas and the numerous drainageways, the soil is not used to any great extent for farming. Most of the acreage is used for pasture and recreation. Flooding and wetness are limitations for many nonfarm uses. Capability unit IIw-1; woodland suitability group 2w1.

Oshtemo Series

The Oshtemo series consists of nearly level to sloping, well-drained soils on beach ridges of old glacial lakes in the northern half of the county. These soils formed in coarse textured and moderately coarse textured material.

In a representative profile in a cultivated area the surface layer is dark-brown sandy loam about 12 inches thick. The subsoil extends to a depth of about 38 inches and is yellowish-brown gravelly sandy loam and loamy sand. The substratum is yellowish-brown and very dark grayish-brown gravelly sand, sandy loam, and fine loamy sand that extends to a depth of about 62 inches.

Permeability is moderately rapid, and the available water capacity is low. The organic-matter content is low. The root zone is deep and is commonly medium acid. Droughtiness is the main limitation.

Oshtemo soils are used mainly for truck and nursery crops.

Representative profile of Oshtemo sandy loam, 0 to 2 percent slopes, 24 yards north of State Route 10, 56 yards east of east boundary of Butternut Ridge Cemetery, in Eaton Township:

Ap—0 to 12 inches, dark-brown (10YR 4/3) sandy loam; weak, medium and coarse, granular structure; very friable; many roots; 2 percent pebbles; neutral; abrupt, irregular boundary.

B21—12 to 22 inches, yellowish-brown (10YR 5/4) gravelly sandy loam; weak, coarse, subangular blocky structure; very friable; few roots; strongly acid; diffuse, smooth boundary.

B22t—22 to 30 inches, yellowish-brown (10YR 5/4) gravelly sandy loam; weak, coarse, subangular blocky structure; friable; discontinuous 1- to 2-inch bands of dark-brown (7.5YR 4/4) material that contains enough clay to fill voids; bands are more firm than the rest of the horizon; medium acid; clear, smooth boundary.

B3—30 to 38 inches, yellowish-brown (10YR 5/4) loamy sand; single grained; loose; discontinuous bands of dark-brown (7.5YR 4/4) sandy loam, approximately 1 inch thick; clay content of bands is not so high as in the B22 horizon, and they appear to occur as coatings on the sand grains cementing them together; bands are friable; medium acid; abrupt, smooth boundary.

IIC1—38 to 46 inches, yellowish-brown (10YR 5/4) gravelly sand; single grained; loose; the sand is quartz; approximately 5 percent, by volume, sandstone and shale gravel; mildly alkaline; weakly calcareous; clear, smooth boundary.

IIC2—46 to 48 inches, very dark grayish-brown (10YR 3/2) sandy loam; massive; friable; neutral; clear, smooth boundary.

IIC3—48 to 62 inches, yellowish-brown (10YR 5/4) well-sorted fine loamy sand; neutral.

The solum ranges from less than 1 percent to 30 percent in content of gravel. The Ap horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 5/3). The Bt horizon is gravelly sandy loam, sandy loam, or gravelly loam and has thin bands of sandy clay loam. The B horizon has hue of 7.5YR and 10YR, value of 4 and 5, and chroma of 4 to 6. The lower part of the Bt horizon in places is in layers, 1/8 inch to 4 inches thick, that are separated by loamy sand that has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 3 or 4. The IIC horizon is mainly gravel and course sand.

Oshtemo soils are near Chili soils. They contain less clay and gravel than Chili soils. They contain more clay and gravel than Tyner soils. They are coarser textured than Mentor and Ellsworth soils.

Oshtemo sandy loam, 0 to 2 percent slopes (OtA).—This soil is on the long narrow tops of the higher beach ridges in the northwestern part of the county. It has the profile described as representative of the series. Included in mapping were small areas of soils in which the surface layer is loam or fine sandy loam and small areas in which it is as much as 70 percent gravel.

Droughtiness is the main limitation. A large acreage is used for building sites and roads. The soil is well suited to irrigation and to the production of truck crops. The gravelly texture is a limitation for some nonfarm uses. Capability unit IIIs-1; woodland suitability group 3s1.

Oshtemo sandy loam, 2 to 6 percent slopes (OtB).—This soil is commonly along the edge of areas of Oshtemo sandy loam, 0 to 2 percent slopes.

Included with this soil in mapping were small areas of soils in which the surface layer is loam or fine sandy loam and small areas in which it is as much as 70 percent gravel. Also included were spots of Chili, Tyner, and Haskins soils and small spots of moderately eroded soils.

Droughtiness is the main limitation. The soil responds well to irrigation and is suited to truck crops. The gravelly texture is a limitation for some nonfarm uses. Capability unit IIIs-1; woodland suitability group 3s1.

Oshtemo sandy loam, 6 to 12 percent slopes (OtC).—This soil is on the steepest slopes along the beach ridges down to the level of the lake. Included in mapping were spots of Chili and Haskins soils. Also included were small areas of soils in which the surface layer is loam and small areas in which it is as much as 70 percent gravel.

Droughtiness and erosion are severe limitations in farming. Slope and the gravelly texture are limitations for many nonfarm uses. Capability unit IIIe-1; woodland suitability group 3s1.

Quarries

Quarries (Qu) consists of areas where soil and stony rubble have been removed and sandstone bedrock has been quarried for building purposes. Some areas where the sandstone has been removed are filled with water. The adjacent areas where the spoil has been spread are stony and are hard to till. The largest area of this land type is near South Amherst, but some scattered areas are in the northern part of the county. A few gravel pits were included in mapping. Capability unit and woodland suitability group not assigned.

Rawson Series

The Rawson series consists of nearly level to sloping, moderately well drained soils on the lake plain and on terraces along major streams. These soils formed in loamy material and in the underlying finer textured glacial till or lacustrine sediment.

In a representative profile in a cultivated area the surface layer is very dark grayish-brown loam about 11 inches thick. The upper 14 inches of the subsoil is mottled, yellowish-brown sandy loam and sandy clay loam. The lower 8 inches is mottled, dark grayish-brown clay loam. The substratum is dark-gray, grayish-brown, and dark-brown clay loam that extends to a depth of 60 inches.

Permeability is moderate in the loamy material but slow in the underlying material. Available water capacity is medium. Organic-matter content is moderate. The root zone is deep and is mainly slightly acid or neutral.

Rawson soils are used for truck crops and for general farm crops.

Representative profile of Rawson loam, 0 to 2 percent slopes, 75 feet east of State Route 252, approximately 1,600 feet north of the junction of Snell Road and State Route 252, in Columbia Township:

Ap1—0 to 8 inches, very dark grayish-brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) rubbed; weak, medium, granular structure; friable; common roots; medium acid; abrupt, wavy boundary.

Ap2—8 to 11 inches, very dark grayish-brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) rubbed; moderate, medium, granular and subangular blocky structure; friable; common roots; dark grayish-brown (10YR 4/2) root channels; yellowish-brown (10YR 5/4 and 5/6) mineral stains; medium acid; abrupt, irregular boundary.

B21t—11 to 19 inches, yellowish-brown (10YR 5/4) sandy loam; common, fine and medium, distinct, very dark grayish-brown (10YR 3/2) mottles and mineral stains; weak, medium, subangular blocky structure; firm; common roots; thin, patchy, dark-brown (10YR 4/3) clay films on ped surfaces; medium acid; clear, wavy boundary.

B22t—19 to 25 inches, yellowish-brown (10YR 5/4) sandy clay loam; common, fine, distinct, dark grayish-brown (10YR 4/2) and light brownish-gray (10YR 6/2) mottles; moderate, medium and coarse, subangular blocky structure; firm; few roots; thin gray (10YR 5/1) clay films on ped surfaces; slightly acid; abrupt, wavy boundary.

IIB23t—25 to 33 inches, dark grayish-brown (10YR 4/2) clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) and grayish-brown (10YR 5/2) mottles; strong, coarse, subangular and angular blocky structure; very firm; few roots; thick, discontinuous, gray (10YR 5/1) clay films; few, coarse, black (10YR 2/1) mineral stains; neutral; abrupt, irregular boundary.

IIC1—33 to 39 inches, dark-gray (10YR 4/1) and grayish-brown (10YR 5/2) clay loam; weak, coarse, angular blocky structure; very firm; mildly alkaline; clear, smooth boundary.

IIC2—39 to 60 inches, dark-brown (10YR 4/3) clay loam; massive; very firm; seams of grayish brown (10YR 5/2); mildly alkaline.

Reaction ranges from neutral to strongly acid in the A horizon, from slightly acid to strongly acid in the upper part of the B horizon, and from slightly acid to mildly alkaline in the lower part of the B horizon. The content of gravel ranges from 2 to 20 percent in the upper part of the solum. Depth to the finer textured glacial till or lacustrine sediment ranges from 24 to 40 inches.

The Ap horizon is dark grayish brown (10YR 4/2), dark brown (10YR 4/3), and brown (10YR 5/3). In some areas it is very dark grayish brown (10YR 3/2) but is dark grayish brown (10YR 4/2) when rubbed.

The matrix of the upper part of the B horizon has hue of 10YR and 7.5YR, value of 4 or 5, and chroma of 3 to 6. There are common bright mottles to a depth of 12 to 24 inches. Gray mottles that have chroma of 2 generally are within the upper 10 inches of the B horizon. The B horizon is dominantly sandy clay loam or clay loam, but in places it is heavy loam or silty clay loam or has individual horizons of sandy loam or finer texture. Ped coatings mainly have chroma of 3 or 4, but some have chroma of 2 or less. The lower part of the B horizon ranges from gray (10YR 5/1 or 6/1) to yellowish brown (10YR 5/4) and has many mottles. It has weak and strong subangular or angular blocky structure.

The fine-textured IIC horizon is mildly alkaline or neutral and is either glacial till or lacustrine sediment. It is clay loam, silty clay loam, or clay. In areas where the underlying material is lacustrine, there are some lenses of heavy silty clay loam or silt loam, but the material is dominantly fine textured.

Rawson soils in Lorain County have gray mottles closer to the surface than is defined as within the range for the series. However, this difference does not alter the usefulness or behavior of these soils.

Rawson soils are the moderately well drained member of a drainage sequence that includes the somewhat poorly drained Haskins soils and the poorly drained Mermill soils. Rawson soils are coarser textured than Ellsworth soils in the upper part of the profile. They differ from Bogart and Chili soils in having moderately fine textured material within a depth of 40 inches.

Rawson loam, 0 to 2 percent slopes (RdA).—This soil is in small areas on low knolls on the lake plain and along the streams in the county. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of soils that have a surface layer of silt loam or sandy loam and small areas of gravelly soils. Also included were spots of the more poorly drained Haskins soils and some areas of moderately eroded soils.

This soil needs random drainage in places where there are seep areas. It is well suited to most nonfarm uses. Capability unit I–1; woodland suitability group 2o1.

Rawson loam, 2 to 6 percent slopes (RdB).—This soil is on low knolls on the lake plain and along the streams in the county.

Included with this soil in mapping were small areas of soils that have a surface layer of silt loam or sandy loam and small areas of gravelly soils. Also included were spots of moderately eroded soils.

This soil in places needs random drainage, especially in the seepy areas at the base of slopes. Erosion is a moderate limitation in farming. Slope is a limitation for some nonfarm uses. Capability unit IIe–2; woodland suitability group 2o1.

Rawson loam, 6 to 12 percent slopes, moderately eroded (RdC2).—This soil is commonly on short slopes along drainageways. It has a profile similar to the one described as representative of the series, but erosion has removed about half of the original surface layer. Included in mapping were small areas of soils that have a surface layer of fine sandy loam and small spots of severely eroded soils.

This soil has a somewhat lower available water capacity than the uneroded Rawson soils. Erosion is a severe limitation in farming. Slope is a limitation for many nonfarm uses. Capability unit IIIe–2; woodland suitability group 2o1.

Sebring Series

The Sebring series consists of nearly level, poorly drained soils in broad level areas on the lake plain and in shallow depressions at the head of small upland streams. These soils formed in silty lacustrine material.

In a representative profile in a cultivated area the surface layer is dark grayish-brown silt loam about 10 inches thick. The upper 5 inches of the subsoil is mottled, gray silt loam. The lower 35 inches is mottled, grayish-brown silty clay loam. The substratum is mottled, light-gray silty clay loam that extends to a depth of 67 inches.

Permeability is moderately slow, and the available water capacity is high. The organic-matter content is moderately low. The root zone is deep and is commonly medium acid or strongly acid. The water table is high late in winter, in spring, and early in summer unless the soils are drained. The soils are soft and compressible when saturated.

Sebring soils are used mainly for farming. The commonly grown crops are corn, soybeans, small grain, hay, and pasture.

Representative profile of Sebring silt loam, on the east side of Indian Hollow Road, three-eighths of a mile north of State Route 10, in Carlisle Township:

Ap—0 to 10 inches, dark grayish-brown (2.5Y 4/2) silt loam; moderate, medium, granular structure; friable; many roots; neutral; abrupt, smooth boundary.

B1g—10 to 15 inches, gray (10YR 5/1) silt loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; ped coatings of gray (5Y 6/1); few, thin, discontinuous clay films on vertical ped surfaces; neutral; clear, smooth boundary.

B21tg—15 to 22 inches, grayish-brown (2.5Y 5/2) silty clay loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; firm; ped coatings of gray (5Y 6/1); thin clay films; strongly acid; gradual, smooth boundary.

B22tg—22 to 50 inches, grayish-brown (2.5Y 5/2) silty clay loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; firm; ped coatings of gray (5Y 6/1); thin clay films on ped surfaces; many, very dark gray (10YR 3/1) manganese concretions; medium acid; gradual, smooth boundary.

C—50 to 67 inches, light-gray (N 7/0) silty clay loam; coarse, distinct, yellowish-brown (10YR 5/6) mottles; massive; friable; stratified; few pebbles; neutral.

In cultivated areas the Ap horizon ranges from dark grayish brown (10YR 4/2 or 2.5Y 4/2) or gray (10YR 5/1) to grayish brown (10YR 5/2). The matrix of the B horizon has hue of 10YR, 2.5Y, 5Y, or N; value of 4 or 5; and chroma of 0 to 2. Mottles in the B horizon have hue of 10YR, 7.5YR, or 2.5Y; value of 4 to 5; and chroma of 5 to 8. Ped surfaces are typically gray or dark gray and generally have clay films. The B horizon is mainly silt loam to silty clay loam, but thin strata of loam or clay loam occur in this horizon in some places. It has weak to moderate, medium to coarse, subangular and angular blocky structure.

Sebring soils are the poorly drained member of a drainage sequence that includes the very poorly drained Luray soils, the somewhat poorly drained Fitchville soils, and the well-drained Mentor soils. They contain more silt than Trumbull soils. They differ from Holly soils because they did not form in alluvium and do not have thin layers of sandy material in the subsoil.

Sebring silt loam (Sb).—This nearly level soil is in areas between beach ridges, at the heads of drainageways, and in small depressions in the till plain. It has the profile described as representative of the series.

Included with this soil in mapping were spots of the better drained Fitchville soils, spots of the darker colored, very poorly drained Luray soils, small areas in which sandstone bedrock is at a depth of 30 inches, and other small areas in which mildly alkaline material is at a depth of about 36 inches. Also included on the till plain were areas of soils in which the lower part of the solum is finer textured than is typical in Sebring soils. Around the sandstone highs are included areas of soils that have sandstone fragments on the surface.

Wetness is a severe limitation in farming, and it also limits this soil for many nonfarm uses. Capability unit IIIw-3; woodland suitability group 2w1.

Sebring silt loam, sandstone substratum (Sd).—This nearly level soil is around sandstone areas, in wet pockets that have no outlets, and along some drainageways. The areas are generally very difficult to drain, and many of them stay wet most of the summer. This soil has a profile similar to the one described as representative of the series, but it is underlain by layered sandstone bedrock at a depth of 40 to 60 inches.

Included with this soil in mapping were spots of soils in which the depth to bedrock is slightly shallower or slightly deeper than is typical in Sebring soils.

Wetness is a severe limitation in farming, and most areas of this soil are not farmed. Wetness and the underlying bedrock are limitations for many nonfarm uses. Capability unit IIIw-3; woodland suitability group 2w1.

Senecaville Series

The Senecaville series consists of nearly level, somewhat poorly drained soils on flood plains in the northwestern part of the county. These soils formed in alluvium. They have reddish colors derived from the red Bedford Shale in the area.

In a representative profile the surface layer is dark reddish-gray silt loam about 5 inches thick. The subsoil extends to a depth of about 32 inches and is reddish-brown silt loam and silty clay loam. The substratum is reddish-brown silty clay loam that extends to a depth of about 60 inches.

Permeability is moderately slow, and the available water capacity is medium. The organic-matter content is low. The root zone is deep and is mainly slightly acid or medium acid. The soils are subject to flooding and have a high water table during winter and spring.

Most areas of Senecaville soils are not farmed. They are wooded or are used for recreation.

Representative profile of Senecaville silt loam, approximately 1,148 feet west of Pyle-South Amherst Road, 330 feet south of Crownhill Cemetery, on the flood plain of Beaver Creek, in the city of Amherst:

A1—0 to 5 inches, dark reddish-gray (5YR 4/2) silt loam; moderate, medium, granular structure; friable; medium acid; clear, smooth boundary.

B1—5 to 10 inches, reddish-brown (5YR 4/3) silt loam; moderate, coarse, granular structure; friable; medium acid; clear, smooth boundary.

B2—10 to 20 inches, reddish-brown (5YR 4/4) silt loam: common, medium, distinct, pinkish-gray (7.5YR 6/2) and yellowish-brown (10YR 5/6) mottles; moderate, fine, subangular blocky structure; friable; thin lenses, as much as 1 inch thick, of reddish-brown (5YR 5/3) fine sandy loam; slightly acid; clear, smooth boundary.

B3—20 to 32 inches, reddish-brown (5YR 4/3) silty clay loam; weak, fine, subangular blocky structure; slightly acid; clear, smooth boundary.
C—32 to 60 inches, reddish-brown (5YR 4/3) silty clay loam; massive; firm; few grains of pinkish-gray (7.5YR 6/2); medium acid.

The Ap horizon is dark brown (7.5YR 4/2) or dark reddish gray (5YR 4/2). The B horizon is dark reddish brown (5YR 3/3), reddish gray (5YR 5/2), or reddish brown (5YR 5/4, 4/3, or 4/4). Mottles that have chroma of 2 or less are at a depth of 10 to 24 inches. The B horizon is silt loam or silty clay loam and has lenses of sandier material. The C horizon has hue of 2.5YR to 7.5YR and value and chroma of 3 or 4. Depth to soft shale bedrock is more than 48 inches. Reaction is slightly acid to strongly acid in the B and C horizons.

Senecaville soils differ from Orrville and Lobdell soils in having red colors, which result from the Bedford Shale.

Senecaville silt loam (Se).—This soil is along Beaver Creek and the Vermillion River where the underlying Bedford Shale has made the soil reddish. Included in mapping were spots of soils that are somewhat better drained and spots of Orrville soils. Also included were small areas of soils that have a surface layer of loam.

Flooding is the main limitation. In small areas where this soil is on a bench above the flood plain and receives a large amount of water from the adjacent steep slopes and escarpments, drainage is a severe limitation. If flooding is controlled and if drainage is adequate, the soil is suited to general farm crops. Flooding and wetness are limitations for many nonfarm uses. Capability unit IIw–1; woodland suitability group 1o1.

Shinrock Series

The Shinrock series consists of moderately well drained, nearly level to gently sloping soils in areas adjacent to the Lake Erie escarpment. These soils formed in lacustrine material.

In a representative profile in a cultivated area the surface layer is dark grayish-brown silt loam about 9 inches thick. The subsoil extends to a depth of about 36 inches, is dark yellowish-brown and dark-brown silty clay and silty clay loam, and is mottled below a depth of 14 inches. The substratum is light olive-brown and light yellowish-brown silt loam that extends to a depth of 60 inches.

Permeability is moderately slow, and the available water capacity is medium. The organic-matter content is low. The root zone is deep and is mainly slightly acid or medium acid. Erosion is the main limitation. Seep areas need drainage.

Shinrock soils are idle or are used for general farming. The commonly grown crops are corn, small grain, soybeans, hay, and pasture.

Representative profile of Shinrock silt loam, 0 to 2 percent slopes, approximately one-half mile east of Erie County line, along the shore of Lake Erie, in Vermilion:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium and coarse, granular structure; friable; many roots; neutral; abrupt, smooth boundary.
B1—9 to 14 inches, dark yellowish-brown (10YR 4/4) silty clay; strong, fine and medium, subangular blocky structure; firm; common roots; thin patchy silt coatings; neutral; clear, smooth boundary.
B21t—14 to 22 inches, dark-brown (10YR 4/3) heavy silty clay loam; common, fine, faint, dark grayish-brown (10YR 4/2) mottles; strong, fine, subangular and angular blocky structure; firm; few roots; thin continuous clay films; strongly acid; clear, wavy boundary.
B22t—22 to 29 inches, dark yellowish-brown (10YR 4/4) silty clay; few, fine, faint, yellowish-brown (10YR 5/8) mottles; moderate, medium, subangular blocky and moderate, fine, angular blocky structure; firm; few roots; dark grayish-brown (10YR 4/2), thin, continuous clay films on angular surfaces of peds; medium acid; abrupt, wavy boundary.
B23t—29 to 36 inches, dark yellowish-brown (10YR 4/4) silty clay; common, medium, distinct, brownish-yellow (10YR 6/6) mottles; weak, fine, subangular blocky structure; friable; black (N 2/0) concretions; dark grayish-brown (10YR 4/2) ped surfaces; thin patchy clay films; neutral; abrupt, irregular boundary.
C—36 to 60 inches, light olive-brown (2.5Y 5/4) and light yellowish-brown (2.5Y 6/4) silt loam; massive; friable; mildly alkaline, calcareous.

The solum ranges from 20 to 36 inches in thickness. Depth to carbonates commonly coincides with thickness of the solum. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The B horizon has hue of 10YR, 2.5Y, or 7.5YR; value of 4 or 5; and chroma mainly of 3 or 4 but that ranges to 6. Mottles that have chroma of 2 are less than 10 inches below the top of the B2t horizon. High-chroma mottles are typically also present. In places structure is weak prismatic and parts to dominantly moderate to strong, fine, subangular and angular blocky. The C horizon is stratified with considerable variations in texture, but silt loam and silty clay loam are typical. Coarser textured strata become more numerous as depth increases. Reaction is neutral or mildly alkaline in the C horizon.

Shinrock soils are near the somewhat poorly drained Del Rey soils. They differ from Ellsworth soils because they have more stratification and formed in lacustrine material. They contain less silt than Mentor soils and less sand and gravel than Bogart soils. They do not have the underlying shale that is typical of Hornell soils, and they are less acid than those soils.

Shinrock silt loam, 0 to 2 percent slopes (SkA).—This soil is on flat areas adjacent to the Lake Erie escarpment in the northwestern part of the county. It has the profile described as representative of the series.

Included with this soil in mapping were areas of soils that have a surface layer of fine sandy loam. Also included were spots of the wetter Del Rey soils and some areas of soils that have more coarse fragments than is typical of Shinrock soils.

This soil in places has wet spots that need artificial drainage. Slight seasonal wetness is a limitation for some nonfarm uses. Capability unit IIs–1; woodland suitability group 2o1.

Shinrock silt loam, 2 to 6 percent slopes (SkB).—This gently sloping soil is adjacent to the escarpment along Lake Erie and the Vermillion River in the northwestern part of the county.

Included with this soil in mapping adjacent to Lake Erie were soils that have short slopes of as much as 12 percent. Also included were areas of soils in which the surface layer is fine sandy loam and areas in which erosion has removed as much as half of the original surface layer. Spots of Ellsworth and Del Rey soils were also included.

Erosion is the main limitation in farming. Under good management, the soil has moderate potential for productivity. Slope and slight seasonal wetness are limitations for some nonfarm uses. Capability unit IIe–2; woodland suitability group 2o1.

Stafford Series

The Stafford series consists of somewhat poorly drained, nearly level soils. These soils are in depressional to nearly level areas on the back side of old beach ridges that slope away from the short, steep, north-facing slope of the beach ridge. They formed in loamy sand.

In a representative profile in a cultivated area the surface layer is dark-brown and dark grayish-brown fine sandy loam about 11 inches thick. The subsoil extends to a depth of about 32 inches and is mottled, grayish-brown loamy fine sand. The substratum is light olive-gray loamy fine sand that extends to a depth of 60 inches.

Permeability is rapid, and the available water capacity is medium to low. The organic-matter content is moderate. The root zone is deep and is mainly strongly acid. Wetness is the main limitation, and the soils also become unstable when they are saturated with water.

Stafford soils are used mainly for specialized crops.

Representative profile of Stafford fine sandy loam, approximately 600 feet east of the junction of Overlin and Middle Ridge Roads, 250 feet south of Middle Ridge Road, in Amherst Township:

Ap1—0 to 7 inches, dark-brown (10YR 3/3) fine sandy loam; weak, medium, granular structure; friable; medium acid; abrupt, smooth boundary.

Ap2—7 to 11 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, medium, granular structure; friable; strongly acid; abrupt, smooth boundary.

B—11 to 32 inches, grayish-brown (2.5Y 5/2) loamy fine sand; few, medium, distinct, strong-brown (7.5YR 5/6) mottles, center of mottles is dark brown (10YR 3/3); single grained; very friable; strongly acid; clear, smooth boundary.

C—32 to 60 inches, light olive-gray (5Y 6/2) loamy fine sand; single grained; very friable; medium acid.

The Ap horizon ranges from dark grayish-brown (10YR 4/2) to dark-brown (10YR 3/3) fine sandy loam. The B horizon has hue of 5YR to 5Y but dominantly 10YR and 2.5Y, value of 4 or 5, and chroma of 1 or 2. It is dominantly fine sand, but texture ranges to loamy sand and loamy fine sand. It has weak, medium, granular structure or is single grained. Reaction is medium acid to extremely acid in the B horizon. The C horizon is dominantly single grained. It is light olive gray (5Y 6/2) or gray (5Y 6/1 or 5/1) and is commonly mottled with yellowish brown (10YR 5/6). Gravel is generally absent, but in places it ranges to as much as 15 percent and is mainly fine.

Stafford soils are the somewhat poorly drained member of a drainage sequence that includes the moderately well drained Elnora soils. They contain more sand and less gravel than Jimtown soils and less silt than Fitchville soils.

Stafford fine sandy loam (Sw).—This soil is in medium-sized areas on the lake plain. It is commonly adjacent to higher areas that furnish seepage water, keeping the soil wet much of the time.

Included with this soil in mapping were small areas of soils that have a surface layer of loam or loamy sand. Also included were spots of Elnora and Bogart soils and spots of poorly drained, darker colored soils in depressions.

Wetness is the main limitation. The soil is easy to till, and it is well suited to vegetable crops. Wetness is a limitation for many nonfarm uses. Capability unit IIw–3; woodland suitability group 2w2.

Tioga Series

The Tioga series consists of well-drained, nearly level soils on the flood plain along the Black River from Elyria north to Lake Erie. These soils formed in moderately coarse textured to coarse textured alluvium.

In a representative profile the surface layer is very dark grayish-brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of about 40 inches and is dark grayish-brown and dark-brown fine sandy loam. The substratum is dark-brown stratified fine sandy loam, sand, and gravel that extends to a depth of 60 inches.

Permeability is moderate, runoff is slow, and the available water capacity is medium. The organic-matter content is moderate. The root zone is deep and is mainly slightly acid. Flooding is the main limitation.

Where flooding is controlled Tioga soils are suited to general crops. Areas that are frequently flooded should be used for recreation, woodland, or permanent pasture.

Representative profile of Tioga sandy loam, near the Elyria city limits in Cascade Park off Washington Avenue, on the flood plain of the Black River, in the city of Elyria:

A1—0 to 5 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, coarse, granular structure; friable; many roots; slightly acid; clear, smooth boundary.

B1—5 to 16 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, medium, subangular blocky structure; friable; patchy very dark grayish-brown (10YR 3/2) organic coatings; common roots; slightly acid; clear, smooth boundary.

B2—16 to 40 inches, dark-brown (7.5YR 4/4) fine sandy loam; weak, fine and medium, subangular blocky structure; friable; many medium and large pores; few roots; slightly acid; gradual, wavy boundary.

C—40 to 60 inches, dark-brown (7.5YR 4/4) stratified fine sandy loam, sand, and gravel; massive; friable; slightly acid.

The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The B2 horizon is fine sandy loam or loam and has thin strata of loamy sand and sandy loam. This horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 or 4. Mottles of lower chroma are below a depth of 24 inches in some places. Rounded pebbles and small shale fragments are in the lower part of some profiles. Reaction is slightly acid to medium acid in the upper horizons and medium acid to neutral in the lower horizons.

Tioga soils are similar to Chagrin soils but contain more sand throughout the profile, which makes them more droughty than those soils. They are sandier throughout the profile than the Fitchville, low terrace, soils.

Tioga fine sandy loam (Tg).—This soil is on the flood plain of the Black River from Elyria north to Lake Erie. Areas are mainly 50 to 200 acres in size.

Included with this soil in mapping were the more poorly drained Lobdell and Orrville soils in small depressions and stream scars. Also included were areas of the Fitchville, low terrace, soils at a slightly higher elevation and small areas of soils that have slopes of as much as 5 percent.

Flooding is the main limitation in farming and is a limitation for many nonfarm uses. Where flooding is not too severe, this soil is suited to general crops. It has good potential for recreation. Capability unit IIw–1; woodland suitability group 1o1.

Tiro Series

The Tiro series consists of somewhat poorly drained, nearly level to gently sloping soils on the glacial till plain. These soils formed in medium-textured to moderately fine textured material.

In a representative profile in a cultivated area the surface layer is dark grayish-brown silt loam about 9 inches thick. The subsurface layer is mottled, light brownish-gray silt loam about 3 inches thick. The next layer is mottled, light brownish-gray silty clay loam about 3 inches thick. The subsoil extends to a depth of about 33 inches and is mottled light brownish-gray and yellowish-brown silty clay loam and clay loam. The substratum is mottled, brown clay loam and silty clay loam that extends to a depth of about 60 inches.

Permeability is slow, and the available water capacity is medium. The organic-matter content is moderate. The root zone is deep and commonly ranges from strongly acid to slightly acid. Wetness is the main limitation.

Tiro soils are used mainly for the general crops commonly grown in the county, such as corn, small grain, and soybeans.

Representative profile of a Tiro silt loam in an area of Mahoning-Tiro silt loams, 0 to 2 percent slopes, approximately 2,500 feet east of Hawley Road, 2,000 feet south of State Route 18, just west of a north-south fence, in Wellington Township:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A2—9 to 12 inches, light brownish-gray (2.5Y 6/2) heavy silt loam; many, medium, distinct, dark yellowish-brown (10YR 4/4) mottles and common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; friable; ped surfaces coated with light brownish gray (2.5Y 6/2); medium acid; clear, smooth boundary.

B&A—12 to 15 inches, light brownish-gray (2.5Y 6/2) light silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium subangular blocky structure; firm; ped surfaces coated with light brownish gray (2.5Y 6/2); very patchy thin clay films; about 2 percent pebbles; strongly acid; clear, smooth boundary.

B21t—15 to 20 inches, light brownish-gray (2.5Y 6/2) light silty clay loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; thin patchy clay films of light brownish gray (2.5Y 6/2); about 2 percent pebbles; strongly acid; clear, smooth boundary.

B22t—20 to 26 inches, yellowish-brown (10YR 5/4) silty clay loam; common, medium, distinct, gray (10YR 6/1) mottles; moderate, medium, subangular blocky structure; firm; gray (10YR 6/1) ped coatings; thin patchy clay films; about 2 percent pebbles; slightly acid; clear, smooth boundary.

IIB23t—26 to 30 inches, yellowish-brown (10YR 5/4) silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles and common, fine, distinct, gray (5Y 6/1) mottles; weak, coarse, subangular blocky structure; firm; very thin patchy clay films; 5 to 7 percent pebbles; neutral; few, fine, black (10YR 2/1) concretions; abrupt, smooth boundary.

IIIB3t—30 to 33 inches, yellowish-brown (10YR 5/4) clay loam; common, fine, distinct, strong-brown (7.5YR 5/6) and grayish-brown (10YR 5/2) mottles; weak, coarse, subangular blocky structure; firm; very patchy thin clay films; 10 percent coarse fragments; neutral; abrupt, smooth boundary.

IIIC1—33 to 41 inches, brown (10YR 5/3) clay loam; few, fine, distinct, yellowish-brown (10YR 5/6) and grayish-brown (2.5Y 5/2) mottles; weak, coarse, subangular blocky structure; firm; 12 percent coarse fragments; some light-gray (2.5Y 7/2) lime concretions; mildly alkaline; clear, smooth boundary.

IIIC2—41 to 60 inches, brown (10YR 5/3) silty clay loam; few, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, thick, platy structure; firm; 10 percent coarse fragments; few light-gray (2.5Y 7/2) lime concretions; mildly alkaline.

The silty mantle ranges from 22 to 36 inches in thickness. Reaction ranges from neutral to medium acid in the surface layer, from medium acid to strongly acid in the upper part of the B horizon, and from slightly acid to mildly alkaline in the lower part of the B horizon. Coarse fragments make up about 2 percent of the silty mantle and 3 to 12 percent of the lower part of the B horizon. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or less. The A2 horizon is intermittent in cultivated areas and ranges to as much as 4 inches in thickness. It has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or 3, and it has a few high-chroma mottles. The B horizon is mainly 10YR in hue but includes 7.5YR and 2.5Y, is 4 to 6 in value, and is 1 to 6 in chroma. Mottles are few to many and of low and high chromas. Clay films are very patchy to continuous on ped surfaces and in pores. The C horizon is heavy loam, clay loam, or silty clay loam.

Tiro soils are near the similar Fitchville and Mahoning soils. They have a thinner mantle of silty material than Fitchville soils, but they have a thicker mantle than Mahoning soils. They are finer textured in the upper horizons than Haskins soils.

Tiro soils in Lorain County are mapped only with Mahoning soils.

Trumbull Series

The Trumbull series consists of poorly drained, nearly level soils in level to slightly depressional areas at the heads of drainageways and in drainageways, on uplands. These soils formed in fine textured and moderately fine textured glacial till.

In a representative profile in a cultivated area the surface layer is dark grayish-brown silty clay loam about 8 inches thick. The upper 6 inches of the subsoil is mottled, grayish-brown silty clay loam. The lower 30 inches is mottled, gray clay. The substratum is mottled, gray silty clay loam that extends to a depth of about 60 inches.

Permeability is slow, and the available water capacity is medium. The organic-matter content is moderate. The root zone is deep and is commonly slightly acid or neutral. Wetness is the main limitation. The water table is perched, and water sometimes ponds during periods of heavy rainfall.

Trumbull soils are used mainly for general crops, such as corn, small grain, hay, and pasture.

Representative profile of Trumbull silty clay loam, 0 to 2 percent slopes, in a drainageway 500 feet south of Bronson Road, 200 feet east of State Route 511, in Camden Township:

Ap—0 to 8 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; moderate, medium, granular structure; friable; medium acid; abrupt, smooth boundary.

B1g—8 to 14 inches, grayish-brown (2.5Y 5/2) silty clay loam; few, fine, faint, brown (10YR 4/3) mottles; strong, medium, subangular blocky structure; very firm; medium acid; clear, wavy boundary.

B21tg—14 to 34 inches, gray (N 5/0) clay; few, fine, prominent, yellowish-red (5YR 4/6) mottles and common, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, prismatic structure parting to moderate, medium, angular blocky; very firm; patchy, thin, gray (10YR 5/1) clay films on ped surfaces; 2 percent coarse fragments; slightly acid; gradual, wavy boundary.

B22tg—34 to 44 inches, gray (N 5/0) clay; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, coarse, prismatic structure parting to moderate, coarse, angular blocky; firm; patchy, thin, gray (10YR 5/1) clay films on ped surfaces; 2 percent coarse fragments; neutral; gradual, wavy boundary.

C—44 to 60 inches, gray (N 5/0) silty clay loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; massive; firm; 3 percent coarse fragments; calcareous, mildly alkaline.

The A1 horizon in wooded areas ranges from 1 inch to 4 inches in thickness and is very dark brown (10YR 2/2), very dark gray (10YR 3/1), or very dark grayish brown (10YR 3/2). The A2 horizon typically is 3 to 8 inches thick and is gray (10YR 5/1 or N 5/0) or dark gray (10YR 4/1 or N 4/0). The Ap horizon is generally dark gray (10YR 4/1), gray (10YR 5/1), or dark grayish brown (10YR 4/2). The B2 horizon is gray (10YR 5/1 and 6/1 and N 5/0). It has mottles in hue of 10YR, 7.5YR, 5YR; value of 4 or 5; and chroma of 4 to 8. Reaction ranges from strongly acid to neutral. The B horizon is silty clay, silty clay loam, or clay. It has gray (10YR 5/1, N 5/0, and N 4/0) clay films. The C horizon is gray (N 5/0, 2.5Y 5/4, or 10YR 5/1) and is mottled with yellowish brown (10YR 5/6).

Trumbull soils are the poorly drained member of a drainage sequence that includes the very poorly drained Miner soils, the somewhat poorly drained Mahoning soils, and the moderately well drained Ellsworth soils. Trumbull soils are not subject to flooding and are finer textured than Holly soils. They contain less silt than the similar Sebring soils.

Trumbull silty clay loam, 0 to 2 percent slopes (TrA).—This soil is in depressions and along drainageways throughout the county. The larger areas are in the southern part of the glacial till plain.

Included with this soil in mapping were areas of soils that have a surface layer of silt loam. Also included, along some of the larger drainageways where the water overflows, are areas of Trumbull soils that have a deposit of silt on the surface.

Wetness is a very severe limitation in farming and a severe limitation for most nonfarm uses. Capability unit IVw–1; woodland suitability group 2w1.

Tyner Series

The Tyner series consists of nearly level to sloping, well-drained soils on beach ridges in the northern part of the county. These soils formed in sandy material.

In a representative profile in a cultivated area the surface layer is dark-brown loamy coarse sand about 9 inches thick. The subsoil extends to a depth of about 46 inches and is brown and yellowish-brown loamy coarse sand, loamy sand, and sand. The substratum is pale-brown sand that extends to a depth of 60 inches.

Permeability is rapid, and the available water capacity is low. The organic-matter content is low. The root zone is deep and is mainly medium acid or strongly acid. Droughtiness and soil blowing are the main limitations.

Tyner soils are idle or are used mainly for truck crops.

Representative profile of Tyner loamy sand, 1 to 6 percent slopes, 70 feet west of Quarry Road, 400 feet south of State Route 2, 2,600 feet north of North Ridge Road, in the city of Amherst:

Ap—0 to 9 inches, dark-brown (10YR 3/3) loamy coarse sand; moderate, fine and medium, granular structure; friable; very strongly acid; abrupt, smooth boundary.

B21—9 to 20 inches, brown (7.5YR 5/4) loamy coarse sand; weak, coarse, subangular blocky structure; friable; 5 percent fine pebbles; medium acid; clear, smooth boundary.

B22—20 to 30 inches, brown (7.5YR 5/4) coarse sand; single grained; friable; 10 percent fine pebbles; strongly acid; clear, wavy boundary.

B31—30 to 41 inches, yellowish-brown (10YR 5/4) coarse sand; single grained; loose; medium acid; gradual, wavy boundary.

B32—41 to 46 inches, yellowish-brown (10YR 5/4) medium sand and some spots of brown (7.5YR 4/4) loamy sand; single grained; loose; medium acid; gradual, wavy boundary.

C—46 to 60 inches, pale-brown (10YR 6/3) medium sand; single grained; loose; medium acid.

The Ap horizon is dark brown (10YR 4/3 or 3/3), very dark gray (10YR 3/1), brown (10YR 5/3), or yellowish brown (10YR 5/4). The B horizon ranges from brown (7.5YR 4/4) to yellowish brown (10YR 5/6), brown (7.5YR 4/4), or strong brown (7.5YR 5/6). In places there are small discontinuous bands of sandy loam below a depth of 40 inches. The B horizon is dominantly medium and coarse sand but is also loamy sand and loamy coarse sand, and in some places it has as much as 10 percent small pebbles. In places the C horizon is stratified with loamy sand, but it is dominantly medium and coarse sand. Reaction is slightly acid to very strongly acid throughout the profile.

Tyner soils are near the moderately well drained Elnora soils and the somewhat poorly drained Stafford soils. They contain less gravel than Oshtemo or Chili soils. They do not have the clay loam B horizon that is typical of Chili soils, and they do not have the high content of silt that is typical of Mentor soils.

Tyner loamy sand, 1 to 6 percent slopes (TyB).—This nearly level to gently sloping soil is on sandy beach ridges, generally in the northwestern part of the county. It has the profile described as representative of the series.

Included with this soil in mapping were areas of soils in which the surface layer is sandy loam or loam and a few areas in which it contains some cobbles. At the base of slopes where there is a concentration of water were included some small areas of the wet Elnora soils.

Droughtiness and soil blowing are the main limitations. The sandy texture is a limitation for some nonfarm uses. Capability unit IVs–1; woodland suitability group 3s1.

Tyner loamy sand, 6 to 12 percent slopes (TyC).—This sloping soil is on sandy beach ridges, generally in the northwestern part of the county. Included in mapping were some areas of soils in which the surface layer is sandy loam and some areas of gravelly soils. Also included were some small areas of soils that have slopes of more than 12 percent and some spots of moderately eroded soils.

This soil is very low in organic-matter content and available water capacity. Management that increases the organic-matter content is beneficial. Droughtiness and erosion are the main limitations. Slope and the sandy texture are limitations for many nonfarm uses. Capability unit IVs–1; woodland suitability group 3s1.

Upshur Series

The Upshur series consists of well-drained, gently sloping and very steep soils in the northwestern part of the county. These soils formed in fine textured and moderately fine textured material that is underlain by Bedford Shale.

In a representative profile the surface layer is dark grayish-brown silt loam about 2 inches thick. The subsurface layer is about 5 inches of yellowish-brown silt loam. The upper 5 inches of the subsoil is brown silty clay loam, and the lower 27 inches is reddish-brown silty clay. The substratum is reddish-brown, partly weathered soft shale that extends to a depth of about 60 inches.

Permeability is slow, and the available water capacity is medium. The organic-matter content is low. The root zone is moderately deep and is commonly very strongly acid or strongly acid. Erosion and slippage are the main limitations. The soils have a tendency to slide downslope where they contact the weathered shale.

Most areas of Upshur soils are wooded or are formerly cultivated fields.

Representative profile of Upshur silt loam, 25 to 70 percent slopes, in a wooded area 90 feet east of Vermilion Road, 1,155 feet south of the intersection of Vermilion and Gifford Roads, in Brownhelm Township:

A1—0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium and fine, granular structure; friable; common roots; 5 percent strong-brown (7.5YR 5/6) weathered sandstone fragments; medium acid; clear, wavy boundary.

A2—2 to 7 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium and fine, granular structure; friable; grayish-brown (10YR 5/2) and dark-gray (10YR 4/1) organic coatings on ped surfaces; few roots; 5 percent strong-brown (7.5YR 5/6) weathered sandstone fragments; very strongly acid; clear, wavy boundary.

B1—7 to 12 inches, brown (7.5YR 5/4) silty clay loam; moderate, medium and fine, subangular blocky structure; firm; brown (7.5YR 5/4) ped coatings; very patchy clay films; 3 percent strong-brown (7.5YR 5/6) weathered sandstone fragments; very few dark-gray (10YR 4/1) organic stains; very strongly acid; clear, smooth boundary.

B2t—12 to 29 inches, reddish-brown (2.5YR 4/4) silty clay; moderate, medium, subangular blocky structure; firm; very patchy clay films; very strongly acid; gradual, smooth boundary.

IIB3—29 to 39 inches, reddish-brown (2.5YR 4/4) silty clay; moderate, coarse, subangular blocky structure; firm; very patchy clay films; 8 percent pale-red (2.5YR 6/2), soft, weathered shale fragments; strongly acid; gradual, smooth boundary.

IIC—39 to 60 inches, reddish-brown (2.5YR 4/4) partly weathered soft shale; weak, thick, platy structure; firm; some fine dark-brown (10YR 4/3) pieces of remnant shale; slightly acid.

The A horizon is dark grayish brown (10YR 4/2), very dark grayish brown (10YR 3/2), and, in severely eroded areas, reddish brown (5Y 5/3, 4/3, or 4/4). The B2 and B3 horizons are mainly reddish brown (2.5YR 4/4 to 5YR 4/3); color of brown (7.5YR 5/4) is limited to a maximum of 7 inches in the B1 horizon or the upper part of the B2 horizon. In some areas hard siltstone is just below the B horizon. Depth to weathered Bedford Shale ranges from 36 to 42 inches.

Upshur soils in Lorain County have illitic clay minerals rather than mixed clay minerals, and the weathered red shale bedrock is at a slightly shallower depth than is defined as within the series. However, these differences do not alter the usefulness or behavior of the soils.

Upshur soils are the well-drained member of a drainage sequence that includes the somewhat poorly drained Lockport soils. They formed in red Bedford Shale, whereas Hornell soils formed in black shale; also the reaction of Hornell soils does not become less acid as depth increases as it does in Upshur soils. Upshur soils are not so silty as Mentor soils, and they do not have the glacial till in which Ellsworth soils formed.

Upshur silt loam, 2 to 8 percent slopes (UpC).—This soil is in narrow elongated areas along some of the streams associated with sandstone highs in the northwestern part of the county. Included in mapping were areas of soils that have slopes of slightly more than 8 percent and areas of soils that have a surface layer of loam.

Erosion is a severe limitation in farming. The clayey subsoil and the underlying shale bedrock are limitations for some nonfarm uses. Capability unit IIIe–2; woodland suitability group 3c1.

Upshur silt loam, 25 to 70 percent slopes (UpF).—This very steep soil is on slopes of a tributary of the Vermillion River in Brownhelm Township. It has the profile described as representative of the series.

Included with this soil in mapping were areas of soils that have a surface layer of loam and areas of moderately eroded Upshur soils that have a surface layer of silty clay loam. Also included were small areas of Mentor and Ellsworth soils.

This soil has a tendency to slump and is very unstable. Because of the very steep slopes, the soil should remain in permanent plant cover. Slope is a severe limitation for most nonfarm uses. Capability unit VIIe–1; woodland suitability group 4c1.

Weikert Series

The Weikert series consists of well-drained, nearly level to gently sloping soils on the crest of highs in the northern part of the county. These soils formed in loamy material that is 12 to 20 inches deep over sandstone bedrock.

In a representative profile in a cultivated area the surface layer is dark-brown channery fine sandy loam about 10 inches thick. The subsoil extends to a depth of about 18 inches and is yellowish-brown channery fine sandy loam. The substratum is 2 inches of light olive-brown channery sandy loam. Light brownish-gray sandstone bedrock is at a depth of 20 inches.

Permeability is rapid, and the available water capacity is low. The organic-matter content is low. The root zone is shallow and is commonly strongly acid. Shallowness to bedrock is the main limitation. The shallowness to bedrock and the content of channers make excavation for utility lines difficult and hinder tillage operations.

Most areas of Weikert soils are used for apple orchards or are formerly cultivated fields.

Representative profile of Weikert channery fine sandy loam, 1 to 6 percent slopes, one-fourth mile north of Ohio Turnpike, west of State Route 58, in Amherst Township:

Ap—0 to 10 inches, dark-brown (10YR 3/3) channery fine sandy loam; weak, fine, granular structure; friable; many roots; 30 percent coarse fragments as much as 6 inches in diameter; strongly acid; abrupt, irregular boundary.

B2—10 to 18 inches, yellowish-brown (10YR 5/6) channery fine sandy loam; weak, medium, subangular blocky structure; friable; common roots; 50 percent coarse fragments as much as 6 inches in diameter; strongly acid; clear, wavy boundary.

C—18 to 20 inches, light olive-brown (2.5Y 5/6) channery sandy loam; weak, medium, subangular blocky structure; friable; common roots; 30 percent coarse fragments as much as 6 inches in diameter; many, medium, light olive-brown (2.5Y 5/4) and yellowish-brown (10YR 5/8) weathered sandstone fragments; strongly acid; abrupt, irregular boundary.

R—20 inches +, light brownish-gray (2.5Y 6/2) sandstone that has a ⅛-inch-thick, yellowish-brown (10YR 5/8), oxidized surface.

Thickness of the solum and depth to sandstone bedrock range from 12 to 20 inches. In places each horizon contains as much as 60 percent, by volume, sandstone fragments. Reaction is medium acid to strongly acid throughout the profile. The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The B horizon has hue of 10YR, value of 5, and chroma of 4 to 6. It is channery loam or channery fine sandy loam.

Weikert soils in Lorain County have a higher content of sand in their profile than is defined as within the range for the series. However, this difference does not alter the usefulness or behavior of the soils.

Weikert soils are near Dekalb, Conotton, and Mitiwanga soils, all of which are more than 20 inches deep over bedrock. They have a coarser textured B horizon than Conotton soils, and they are better drained than Mitiwanga soils.

Weikert channery fine sandy loam, 1 to 6 percent slopes (WeB).—This soil is on small areas on the tops of hills.

Included with this soil in mapping were areas of soils that have a surface layer of silt loam and other areas that are less acid than is typical for Weikert soils. Also included were small areas of soils in which bedrock is slightly deeper than 20 inches and a few areas that have short slopes that are as much as 10 percent.

The shallowness over bedrock is the main limitation for both farm and nonfarm uses. Capability unit VIs–1; woodland suitability group 4d1.

Formation and Classification of the Soils

This section lists the factors and processes of soil formation and describes the effects they have had on the formation of soils in Lorain County. It also explains the current system of soil classification and places the soil series in the categories of that classification system. The soil series in this county, including a profile representative of each series, are described in the section "Descriptions of the Soils."

Published laboratory characterization data are available for the Bogart, Ellsworth, Fitchville, Jimtown, Lorain, Mahoning, and Sebring soils in the Soil Survey of Mahoning County, Ohio (*11*). Published data for the Fulton and Mahoning soils are in the Soil Survey of Erie County, Ohio (*10*); and data for the Carlisle, Chili, Dekalb, Fitchville, and Luray soils are in the Soil Survey of Stark County, Ohio (*12*).

Unpublished data for most of the other series in Lorain County are on file at the Agronomy Department, Ohio Agricultural Research and Development Center, Columbus Ohio; the Ohio Department of Natural Resources, Division of Lands and Soil, Columbus, Ohio; and the Soil Conservation Service State Office, Columbus, Ohio.

Factors of Soil Formation

Soils are formed as the result of complex interactions among soil-forming factors (*7*). How soils formed and thus acquired their characteristics at any place depends on the physical and mineral composition of the parent material; the relief, or lay of the land; the climate under which the soil material has accumulated and existed; plant and animal life in and on the soil; and the length of time during which the forces of soil formation have acted upon the parent material.

Climate and plants and animals are active in soil formation. Plants, animals, and micro-organisms, influenced by climate, act upon parent material and gradually change it into a natural body that has genetically related horizons. The effects of climate and vegetation during soil formation are modified by the parent material and by the relief, which influences drainage. Parent material and relief determine the kind of soil profile that is formed and, in some cases, dominate the other factors of soil formation. Time is required for active factors to transform parent material into a soil. The weathering, leaching, and translocation of soil particles; the formation of soil structure; and other soil-forming processes take time.

Parent material

Parent material, from which a soil forms, is the unconsolidated mass that results from the weathering of rocks. Some kinds of parent material are derived from bedrock, some have been transported by glaciers, and some have been transported by wind or water. Parent material largely determines the chemical nature and mineral composition of the soil.

Parent materials in Lorain County are glacial till, glacial outwash, lacustrine sediment, recent stream alluvium, and organic material. Soils that formed in glacial till are the most extensive and have a wide range of characteristics. Mahoning, Ellsworth, and Miner soils are examples. Soils that formed in glacial outwash are generally loamy and are underlain by stratified sand and gravel. Examples are Jimtown, Bogart, and Chili soils.

Some soils in the county formed in lacustrine, or slack water, deposits of silty or clayey material. Examples are Fitchville, Luray, and Lorain soils. Soils on flood plains formed in recent alluvium. They are commonly medium textured and have little or no soil profile development. Examples are Chagrin, Orrville, and Lobdell soils. Soils that formed in organic material are called peat or muck. Examples in Lorain County are Carlisle soils.

Climate

Lorain County has a humid, temperate continental climate. Soils in the county formed under the influence of this type of climate. Important climatic factors include precipitation, temperature, and the evapotranspiration ratio. These factors are closely related to biotic communities and, on a regional basis, determine the kind of soils that form. The climate in Lorain County is fairly uniform, and soil differences are determined more by local differences in vegetation, parent material, relief, drainage, and the age of soil material.

Climate, among its other influences, regulates the rate of weathering and decomposition of minerals and influences the removal of materials by leaching. Soluble bases are removed when they are released by decomposition of the mineral material. Clay and sesquioxides are translocated by water percolating downward from the surface to the lower horizons, because the bases are continually leached downward. Mahoning and Ellsworth soils, as well as others, show evidence of clay movement from the A to the B horizon.

Trumbull and Miner soils, because of their position on the landscape, formed under a wetter microclimate than most soils of the county. This resulted in saturation for extended lengths of time and in gleying, which is caused by the reduction and leaching of iron.

A further description of climate is in the section "General Nature of the County."

Relief

Relief influences soil formation by its effect on the movement of water, and on erosion, temperature, and plant cover. Runoff, ponding, depth to water table, internal drainage, accumulation and removal of organic matter, and other phenomena are affected by relief, either directly or indirectly.

Relief can account for the development of different soils from the same kind of parent material. For this reason relief is commonly a dominant factor in differentiating many soil series. Generally, a given set of soil characteristics is related to slope and internal drainage. This is illustrated in comparing the Trumbull, Mahoning, and Ellsworth soils, all of which formed in Wisconsin glacial till.

Rain that runs off sloping soils collects in depressions or is removed through the drainage system. Therefore, from an equal amount of rainfall, sloping soils receive less water and depressional soils receive more water than flat, nearly level soils. Thus it is found that complex, gently sloping soils generally show the greatest degree of development, because they are neither saturated nor droughty. Soil formation on steep slopes tends to be inhibited by the reduction of water entering the soil because of the influence of slope on runoff.

Living organisms

All living organisms are important to soil formation. These include plants, animals, bacteria, and fungi. Plants are generally responsible for the amount of organic matter, the color of the surface layer, and the amount of nutrients in a soil. Such animals as earthworms, cicadas, and burrowing animals help keep the soil open and porous. Bacteria and fungi decompose the vegetation, releasing nutrients for plant food. Even though vegetation is a major factor, man has greatly influenced the properties of the surface layer where he has cleared the trees and plowed the land. He has added fertilizer, mixed some of the horizons, and moved the soil material from place to place.

The original vegetation in Lorain County was mainly deciduous swamp forest. The trees common on the somewhat poorly drained to poorly drained soils were black ash, white ash, American elm, shagbark hickory, basswood, swamp oak, white oak, bur oak, pin oak, sycamore, silver maple, and cottonwood. On the better drained, sloping soils and along streams, the common trees were sugar maple, beeches, white oak, and red oak.

A few soils in the county formed in swampy areas under grasses and sedges. The more extensive areas of swampy soils are in the northern part of the county.

Time

The length of time that parent material has been exposed to other factors of soil formation is important in soil development. Generally, the longer the time that climate and plant and animal life have acted upon the parent material, the more distinct are the horizons in the profile. The distinctness of the horizon indicates the relative maturity of the soil.

The soils of Lorain County formed since the last glaciation, which was about 10,000 to 15,000 years ago. In the areas of soils that are steep, geologic erosion has kept pace with soil formation; thus, the horizons are thin and the depth to parent material in places is only a few inches. In areas of soils that are rolling or flat, the horizons are much thicker than in steep soils and the depth to parent material generally is more than 24 inches. An example is Mahoning soils.

Soils that formed in recent alluvium, such as Orrville, Lobdell, and Chagrin soils, have no strongly differentiated horizons. These soils are the youngest in the county. The amount of time necessary for other factors of soil formation to significantly influence them has not elapsed.

Processes of Soil Formation

Basic chemical and physical processes, such as oxidation, reduction, hydration, hydrolysis, solution, eluviation (leaching), and illuviation (accumulation) bring about additions to, losses from, and transfers and transformations within soils (*8*). These processes, influenced by the interrelationships of the soil-forming factors, are responsible for the changing of the parent material by steps and stages, none of which is distinct, into a youthful soil and, finally, into a mature soil, which is a soil that is dynamically in equilibrium with its environment.

Additions to soils are made by the addition of organic matter, the deposition of sediment, or the accumulation of nutrients and colloidal material from such sources as organic matter, ground water, lime, and fertilizer. Most likely, all virgin soils in the county except perhaps recent soils on flood plains had a surface layer of organic accumulation. However, cultivation has since destroyed this layer or severe erosion has removed all evidence of it from the soil profile. Some nutrients move in a cycle from soil to plants and then back to the soil as byproducts of the decomposition of organic matter. This is true for all soils in the county except where this process is modified as a result of the harvesting of crops. Such alluvial soils as the Chagrin, Lobdell, and Tioga soils periodically receive deposits of sediment from floodwater.

Soil losses commonly are the result of erosion, leaching of soluble salts, eluvation of colloids by percolating water, and nutrient losses caused by the harvesting of crops. Leaching of carbonates accounts for the most significant soil nutrient losses in Lorain County. Carbonates have been removed to a depth of 2 to 4 feet or more in most of the upland soils, such as Mahoning and Ellsworth soils. The tremendous change effected by leaching is apparent from the fact that, although the parent material of these soils at one time was 10 to 20 percent calcium carbonate, these soils are now acid in reaction. Other minerals present in soils often break down through a complicated series of processes and eventually are lost through leaching, but at a slower rate than carbonates.

The decomposition of iron-bearing minerals often produces free iron oxides, which account for the fairly bright brownish colors in the Chili and Conotton soils. The recurrent or seasonal water table in Sebring, Luray, and other soils causes reduction in iron oxides and a subsequent loss by leaching. This phenomenon is principally responsible for the gray colors in the subsoil of these soils. The mottling observed in Mahoning and Trumbull soils is caused by local accumulations of iron compounds (or other materials in other soils) or by localized oxidation of iron compounds. It is an indication of poor drainage.

Classification of the 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.

The narrow categories of classification, such as those in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965 (*9*). Because this system is under continual study, readers interested in developments of the current system should search the latest literature available.

The current system of classification has six categories. Beginning with the broadest, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that soils of similar genesis, or mode of origin, are grouped. In table 9 the soil series of Lorain County are placed in four categories of the current system. Classes of the current system are briefly defined in the following paragraphs.

ORDER: Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are the Entisols and Histosols, which occur in many different climates. Each order is named with a word of three or four syllables, ending in *sol* (Ent-i-sol).

SUBORDER: Each order is divided into suborders, based mainly on those soil characteristics that seem to produce classes that have the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to differentiate among suborders are mainly those that reflect either the presence or absence of waterlogging, or soil differences that result from climate or vegetation. The names of suborders have two syllables, the last of which indicates the order. An example is *Aquent* (*Aqu*, meaning water or wet; and *ent*, from Entisol).

GREAT GROUP: Soil suborders are divided into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus has accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark-colored surface horizons. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark-red and dark-brown colors associated with basic rocks, and the like. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is *Haplaquents* (*Hapl*, meaning simple horizons; *aqu*, for wetness or water; and *ent*, from Entisols.)

SUBGROUP: Great groups are divided into subgroups, one that represents the central (typic) segment of the group and others, called intergrades, that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives in front of the name of the great group. An example is *Typic Haplaquents* (a typical Haplaquent).

FAMILY: Soil families are established within a subgroup mainly on the basis of properties important to the growth of plants or on the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, mineralogy, and so on, that are used as family differentiae. An example is the fine-silty, mixed, mesic family of Fluvaquentic Eutrochrepts.

SERIES: The series has the narrowest range of characteristics of the categories in the classification system. It is defined in the section "How This Survey Was Made." A detailed description of each soil series in the county is in the section "Descriptions of the Soils."

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 only in ways too small to be of consequence in interpretating their usefulness or behavior. Soil scientists designate such soils taxadjuncts to the series for which they are named. In Lorain County soils named in the Carlisle, Hornell, Lockport, Luray, Rawson, Upshur, and Weikert series are taxadjuncts to those series.

TABLE 9.—*Classification of the soil series*

Series	Family	Subgroup	Order
Allis	Fine, illitic, acid, mesic	Aeric Haplaquepts	Inceptisols.
Bogart	Fine-loamy, mixed, mesic	Aquic Hapludalfs	Alfisols.
Carlisle [1]	Euic, mesic	Typic Medisaprists	Histosols.
Chagrin	Fine-loamy, mixed, mesic	Dystric Fluventic Eutrochrepts	Inceptisols.
Chili	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Conotton	Loamy-skeletal, mixed, mesic	Typic Hapludalfs	Alfisols.
Dekalb	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols.
Del Rey	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Ellsworth	Fine, illitic, mesic	Aquic Hapludalfs	Alfisols.
Elnora	Mixed, mesic	Aquic Udipsamments	Entisols.
Fitchville	Fine-silty, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Fulton	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Haskins	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Holly	Fine-loamy, mixed, nonacid, mesic	Typic Fluvaquents	Entisols.
Hornell [1]	Fine, illitic, acid, mesic	Aeric Haplaquepts	Inceptisols.
Jimtown	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Lobdell	Fine-loamy, mixed, mesic	Fluvaquentic Eutrochrepts	Inceptisols.
Lockport [1]	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Lorain	Fine, illitic, mesic	Mollic Ochraqualfs	Alfisols.
Luray [1]	Fine-silty, mixed, mesic	Typic Argiaquolls	Mollisols.
Mahoning	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Mentor	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Mermill	Fine-loamy, mixed, mesic	Mollic Ochraqualfs	Alfisols.
Miner	Fine, illitic, mesic	Mollic Ochraqualfs	Alfisols.
Mitiwanga	Fine-loamy, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Olmsted	Fine-loamy, mixed, mesic	Mollic Ochraqualfs	Alfisols.
Orrville	Fine-loamy, mixed, nonacid, mesic	Aeric Fluvaquents	Entisols.
Oshtemo	Coarse-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Rawson [1]	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Sebring	Fine-silty, mixed, mesic	Typic Ochraqualfs	Alfisols.
Senecaville	Fine-silty, mixed, mesic	Fluvaquentic Eutrochrepts	Inceptisols.
Shinrock	Fine, illitic, mesic	Aquic Hapludalfs	Alfisols.
Stafford	Mixed, mesic	Typic Psammaquents	Entisols.
Tioga	Coarse-loamy, mixed, mesic	Dystric Fluventic Eutrochrepts	Inceptisols.
Tiro	Fine-silty, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Trumbull	Fine, illitic, mesic	Typic Ochraqualfs	Alfisols.
Tyner	Mixed, mesic	Typic Udipsamments	Entisols.
Upshur [1]	Fine, mixed, mesic	Typic Hapludalfs	Alfisols.
Weikert [1]	Loamy-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols.

[1] These soils are taxadjuncts to the series for which they are named. The reasons are given in the descriptions of the individual series in the section "Descriptions of the Soils."

General Nature of the County

In 1969 Lorain County had 1,354 farms that totaled 161,901 acres, or about 51 percent of the total land area. The land in farms was about 58 percent of the total land area in 1964. This decrease has continued in recent years because of the increased use of land for community developments, recreational facilities, and highways. The average size of farms increased from 112 acres in 1964 to 120 acres in 1969. This increase was caused by economic conditions and the increased use of modern farm equipment.

In 1969 dairying was the leading source of farm income. Greenhouse crops, nursery stock, fruit, general farm crops, and forest products were also important.

During the past 20 years, the land in farms and the number of farms have decreased, but the average size of farms has increased. The number of farm tenants has also decreased. The overall trend on farms in the county is toward greater mechanization and increased crop yields. Part-time farming is decreasing because of the high cost of farm machinery. In the northern third of the county, urban pressures have practically eliminated general farming; however, fruit and truck farming and nurseries are prevalent, especially on the sandy and gravelly soils that are well suited to this type of farming.

Lorain County has a network of highways. The Ohio Turnpike crosses the center of the county's industrial complex and furnishes access to Chicago, Toledo, Cleveland, Youngstown, Pittsburgh, and points east. A new expressway is under construction that will connect Lorain and Elyria with Cleveland and Detroit and provide additional access to these market areas.

The county is served by four railroads and more than sixty motor freight companies.

Lake Erie provides a direct water route through the St. Lawrence Seaway to foreign markets. The port of Lorain is the headquarters of a large shipbuilder.

Physiography, Relief, and Drainage

Lorain County is on the eastern fringe of the till plain area of the Great Central Lowlands. The topography is generally flat to gently rolling. The surface slopes gently from a high elevation in the southern part of the county to a low elevation at Lake Erie. Exceptions to the nearly flat topography are the gorges of the Black River near Elyria and the Vermillion River at Mill Hollow. The underlying rocks are exposed in these gorges. The lake front in Avon Lake and Sheffield Lake is a precipitous cliff more than 50 feet high caused by an arching of the bedrock strata that brought up some of the lower and harder rocks. These rocks offered greater resistance to the lake wave action than the softer overlying beds, which are eroded to the lake level both east and west of this area.

The soils of Lorain County, particularly in the southern part, are generally clayey and formed in glacial drift. Most of the surface of Lorain County is underlain by glacial drift or till deposits. This glacial drift was deposited by the Wisconsin Glaciation, the last glaciation in Ohio, approximately 10,000 to 15,000 years ago. This glacial till, called the Hiram till, is compact, tough, and clay rich and contains some gravel, a few cobbles, and very few boulders. As the glacier retreated northward, the glaciated surface was commonly deeply buried under beds of clay, sand, and gravel. The clay, sand, and gravel were deposited by wave action in the great lake basin. Streams that drained nearby areas also brought sand and gravel and deposited them over the glacial till.

In approximately the northern third of the county is a belt of sandy soils on ridges. The ridges are remnants of beaches produced by the action of shore waves. They show the various stages of the Lake Erie Basin since the retreat of the last Wisconsin glacier. Three major ridge lines can be traced across the county. The southernmost of these was the shoreline of Lake Maumee III at 780 feet above sea level. Next was the shoreline of Lake Whittlesley at 735 feet. The third was the Lake Warren shoreline at 680 to 665 feet.

These three prominent ridge lines, which have sandy soils and good drainage, are marked by major highways running east and west across the county that date back to pioneer times. Lake Maumee III ridge is now Ohio Route 10 (Butternut Ridge); U.S. Route 20 and Ohio Route 113 (Center Ridge Road) follow Lake Whittlesley's shoreline; and Ohio Route 254 (North Ridge or Detroit Road) marks the Lake Warren shoreline. In some places these ridges are not continuous and are difficult to trace.

The bedrock of Lorain County is predominantly shale and sandstone of Devonian and Mississippian age. All of the southern half of the county is underlain by the Cuyahoga Shale. This formation consists of blue or gray shale, frequently called soapstone, and it contains thin bands of fine-grained sandstone and in places contains a few fossils. This formation has little economic value.

The Cuyahoga Shale is underlain by the Berea Sandstone, which is more distinctly marked and is economically more important. The Berea Sandstone is generally fine grained and homogeneous, and it varies in thickness and color. It enters the county from the east in Avon Township and passes southwesterly to Elyria, where it forms the falls; then it sweeps through Amherst and South Amherst in Brownhelm and Amherst Townships. This formation is void of fossils.

Below the Berea Sandstone is the Bedford Shale. The Bedford Shale is generally red and serves as a convenient guide in explorations of the bedrocks in the county. This red shale is exposed at the village of French Creek, in the gorge of the Black River at Elyria, in quarries at Amherst, in cliffs that border the Vermillion River, and in railroad cuts between Elyria and Amherst. The upper part of the Bedford Shale is deep red, and the lower part is bluish red and gray. Fossils occur in this formation.

Below the Bedford Shale is the Cleveland Shale. The Cleveland Shale is black, but where the rock is exposed to oxidation the carbon is burned out, producing a gray color. This shale is thinly bedded. It has no economic importance except as a small source of petroleum in the area of Grafton. This formation contains few if any fossils.

Climate [5]

The climate of Lorain County is characterized by large annual, daily, and day-to-day ranges in temperature. Northerly winds off Lake Erie tend to lower the daily high temperature in summer and to raise it in winter. When winds are southerly, the presence of the lake has little effect on temperature in the county. Summer in Lorain County is moderately warm and humid. On an average of 16 days temperature exceeds 89° F. Winter is reasonably cold and cloudy, but the relatively warm water of Lake Erie modifies the air temperature of on-shore winds. The average number of days each year that have subzero temperatures increases southward from Lake Erie: in the Elyria area, about 3 days each winter; in the Oberlin area, about 5 days. Monthly temperature data are in table 10.

The average annual temperature for Lorain County is approximately 1° below the average for north-central Ohio. In 8 years out of 10 the average annual temperature is between 48.9° and 51.5°. The daily range in temperature is usually greatest late in summer and early in fall and least in winter. Annual extremes in temperature normally occur soon after June 21 and December 22. In Lorain County the highest temperature during the year is equal to or greater than 91° in 9 years out of 10, 96° in 5 years out of 10, and 100° in 1 year out of 10. The lowest temperature during the year is equal to or less than 1° in 9 years out of 10, −6° in 5 years out of 10, and −14° in 1 year out of 10. Average extreme annual temperatures, as shown in table 10, differ from those in any month because the annual extremes in temperature do not occur in the same month each year. Freeze probabilities are also shown in table 11.

Precipitation in Lorain County varies widely from year to year. However, it is normally abundant and well distributed throughout the year. Fall is the driest season. Showers and thundershowers provide most of the rainfall during the growing season. The average number of days each year that have .01, .10, .50, and 1.00 inch or more of precipitation is 120, 77, 20, and 5 days, respectively. Thunderstorms occur about 40 days each year and are most frequent during the period April through August. Heavy rains of 1.7, 2.1, 2.4, 2.7, 3.0, and 3.3 inches in 24 hours can be expected to occur at least once every 2, 5, 10, 25, 50, and 100 years, respectively. There is great variation in

[5] By JERRY M. DAVIS, climatologist for Ohio, National Weather Service, U.S. Department of Commerce.

TABLE 10.—*Temperature and precipitation data*

[All data from Elyria, Ohio]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Average highest maximum	Average lowest minimum	Average monthly total	One year in 10 will have— Less than—	One year in 10 will have— More than—	Average monthly snowfall	Average number of days that have 1.0 inch or more of snow
	°F	°F	°F	°F	In	In	In	In	
January	35.4	19.3	57	−1	2.68	1.11	4.56	9.5	4
February	37.7	20.7	58	0	2.29	1.03	3.76	8.0	3
March	45.1	26.8	69	11	2.94	1.32	4.87	8.8	3
April	59.6	37.4	79	22	3.71	2.05	5.58	1.6	1
May	71.5	47.4	86	32	3.06	1.45	4.93	.1	0
June	80.9	56.3	92	41	3.15	1.46	5.13	0	0
July	84.3	60.3	94	47	2.69	1.14	4.53	0	0
August	82.6	58.6	93	45	3.57	2.01	5.33	0	0
September	77.1	52.6	92	36	2.84	1.28	4.69	0	0
October	66.3	42.2	83	27	2.54	.80	4.73	.4	0
November	51.1	32.6	71	15	2.84	1.20	4.79	4.7	2
December	38.0	22.6	61	1	2.25	1.00	3.74	9.4	4
Year	60.8	39.7	96	−6	34.56	26.21	43.56	42.5	17

TABLE 11.—*Probabilities of last freezing temperature in spring and first in fall*

[All data from Elyria, Ohio]

Probability	Dates for given probability and temperature				
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower
Spring:					
1 year in 10 later than	March 30	April 9	April 15	April 29	May 17
2 years in 10 later than	March 24	April 4	April 12	April 25	May 12
5 years in 10 later than	March 11	March 23	April 4	April 17	May 3
Fall:					
1 year in 10 earlier than	November 15	November 10	October 22	October 16	October 4
2 years in 10 earlier than	November 19	November 14	October 27	October 20	October 7
5 years in 10 earlier than	November 30	November 23	November 7	October 31	October 16

mean annual snowfall in Lorain County. The amounts increase eastward across the county. The snowfall is about 35 inches at the county line bordering on Erie and Huron Counties and slightly more than 50 inches just south of the Cleveland Airport in the vicinity of Westview. Sums of the twelve monthly 1-year-in-10 values, shown in table 10, do not equal the annual values, because all dry and wet months do not occur in the same year.

Soil moisture goes through a seasonal cycle each year that is almost independent of the amount of precipitation received. It reaches its lowest point in October and is replenished during winter and early in spring, when precipitation exceeds water lost by evaporation. Since the moisture needs of all crops reach a maximum in July and August and rainfall is almost always insufficient to meet those needs, there is a progressive drying of all soils.

When evaporation greatly exceeds precipitation for a prolonged period, a drought may occur. From 1929 to 1968, extended periods of moderate to extreme drought in north-central Ohio, as determined from the Palmer Drought Severity Index, have occurred during the growing seasons of the 1930–36 period and in the growing seasons of 1953, 1954, 1963, 1964, and 1965. The longest continuing period of moderate to extreme drought in north-central Ohio is 35 months (November 1962 to September 1965).

Generally, humidity rises and falls inversely with the daily temperature. It is lowest in summer and highest in winter. For the year, relative humidity averages about 80 percent at 1 a.m. and 7 a.m., 60 percent at 1 p.m., and 70 percent at 7 p.m. During summer afternoons the relative humidity is often between 50 and 60 percent. Cloudiness is greatest in winter and least in summer. This seasonal variation in cloudiness is most clearly illustrated by the percentage of possible sunshine, which is about 70 percent in July but less than 30 percent in December and January.

Since 1900, 10 tornadoes have been reported in Lorain County.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; but that in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Acidity. See Reaction, soil.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity. The capacity of soil to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at the wilting point of most crop plants. It is rated to a root-restricting zone or to a depth of 60 inches. It is expressed thus:

	In.		*In.*
Very low	less than 3	High	9 to 12
Low	3 to 6	Very high	more than 12
Medium	6 to 9		

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

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 when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Crust. A thin, massive or platy surface layer that forms in some soils under the beating action of raindrops.

Eluviation. The movement of material from one place to another within the soil, in either 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.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic-matter content and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Glacial outwash (geology). Cross-bedded gravel, sand, and silt deposited by melt water as it flowed from glacial ice.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gravel. Rounded or angular rock fragments that are not prominently flattened and are as much as 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 residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

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.

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.

Lacustrine deposit (geology). Material deposited in lake water and exposed by lowering of the water level or elevation of the land.

Leaching. The removal of soluble material from soils or other material by percolating water.

Loam. Soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Moraine (geology). An accumulation of earth, stone, and other debris deposited by a glacier.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical mineralogical, and biological properties of the various horizons, and their thickness and arrangement in the soil profile.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many;* size —*fine*, *medium*, and *coarse;* and contrast—*faint*, *distinct*, and *prominent*. The size measurements are these: *fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Muck. An organic soil consisting of fairly well decomposed organic material that is relatively high in mineral content, finely divided, and dark in color.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Organic matter. A general term for plant and animal material, in or on the soil, in all stages of decomposition. Readily decomposed organic matter is often distinguished from the more stable forms that are past the stage of rapid decomposition.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality of a soil horizon that enables water or air to move through it. In words, permeability is expressed thus:

	In per hr		*In per hr*
Very slow	less than 0.06	Moderately rapid	2.0 to 6.0
Slow	0.06 to .2	Rapid	6.0 to 12.0
Moderately slow	.2 to .6	Very rapid	12.0 or more
Moderate	.6 to 2.0		

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 part of the soil that is penetrated, or can be penetrated, by plant roots. In general terms, it is expressed thus:

	In
Shallow	less than 20
Moderately deep	20 to 40
Deep	40 to 60

Sand. Individual rock or mineral fragments in a soil that range in diameter 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.

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 on earthy 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 soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Surface layer. A term used in nontechnical soil descriptions for one or more layers above the subsoil.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Variant, soil. A soil having properties sufficiently different from those of other known soils to suggest establishing a new soil series, but a soil of such limited known area that creation of a new series is not believed to be justified.

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 the description of the soil series to which the mapping unit belongs. In referring to a capability unit, woodland group, or wildlife habitat, read the introduction to the section it is in for general information about its management. Other information is given in tables as follows:

Acreage and extent, table 8, page 59.
Estimated average yields, table 1, page 14.
Woodland, table 2, page 16.
Wildlife, table 3, page 20.
Engineering uses of the soils, tables 4, 5, and 6, pages 26 through 45.
Town and country planning, table 7, page 48.

Map symbol	Mapping unit	Described on page	Capability unit Symbol	Capability unit Page	Woodland suitability group Symbol
AkA	Allis loam, 0 to 2 percent slopes	57	IVw-1	11	2w1
AlA	Allis silty clay loam, 0 to 2 percent slopes	58	IVw-1	11	2w1
AmA	Allis-Urban land complex, nearly level	58	------	--	---
BsA	Bogart sandy loam, 0 to 2 percent slopes	60	IIs-1	7	2o1
BtA	Bogart loam, 0 to 2 percent slopes	60	IIs-1	7	2o1
BtB	Bogart loam, 2 to 6 percent slopes	60	IIe-1	6	2o1
Cg	Carlisle mucky silt loam	61	IIIw-5	10	5w1
Ch	Chagrin silt loam	61	IIw-1	7	1o1
ClA	Chili loam, 0 to 2 percent slopes	62	IIs-1	7	2o1
ClB	Chili loam, 2 to 6 percent slopes	62	IIe-1	6	2o1
ClD2	Chili loam, 6 to 18 percent slopes, moderately eroded	62	IIIe-1	8	2o1
CnB	Chili-Urban land complex, gently sloping	62	------	--	---
CoB	Conotton gravelly loam, 2 to 6 percent slopes	63	IIIs-1	8	3f1
CoC	Conotton gravelly loam, 6 to 12 percent slopes	63	IIIe-1	8	3f1
Cz	Cut and fill land	63	------	--	---
DkB	Dekalb very channery loam, 1 to 6 percent slopes	64	IIe-3	6	3o1
DsB	Del Rey silt loam, 1 to 4 percent slopes	64	IIw-2	7	2w1
ElB	Ellsworth silt loam, 2 to 6 percent slopes	65	IIIe-2	8	3o1
ElB2	Ellsworth silt loam, 2 to 6 percent slopes, moderately eroded	65	IIIe-2	8	3o1
ElC2	Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded	65	IVe-1	11	3o1
ElD2	Ellsworth silt loam, 12 to 18 percent slopes, moderately eroded	65	VIe-1	11	3r1
ElF2	Ellsworth silt loam, 18 to 50 percent slopes, moderately eroded	65	VIIe-1	13	3r1
EnA	Elnora loamy fine sand, 1 to 3 percent slopes	66	IIIs-1	8	3s1
FcA	Fitchville silt loam, 0 to 2 percent slopes	67	IIw-2	7	2w2
FcB	Fitchville silt loam, 2 to 6 percent slopes	67	IIw-2	7	2w2
FdA	Fitchville silt loam, low terrace, 0 to 2 percent slopes	67	IIw-2	7	2w2
FeA	Fitchville-Urban land complex, nearly level	67	------	--	---
FuA	Fulton silt loam, 0 to 2 percent slopes	68	IIIw-3	10	3w1
FuB	Fulton silt loam, 2 to 6 percent slopes	68	IIIw-3	10	3w1
FvA	Fulton silt loam, sandy substratum, 0 to 2 percent slopes	68	IIIw-3	10	3w1
HsA	Haskins loam, 0 to 2 percent slopes	69	IIw-2	7	2w2
HsB	Haskins loam, 2 to 6 percent slopes	69	IIw-2	7	2w2
HtA	Haskins-Urban land complex, nearly level	69	------	--	---
Hy	Holly silt loam	69	IIIw-1	8	2w1
HzA	Hornell silt loam, 0 to 2 percent slopes	70	IIIw-2	9	2w2
HzB	Hornell silt loam, 2 to 6 percent slopes	70	IIIw-2	9	2w2
JsA	Jimtown sandy loam, 0 to 2 percent slopes	72	IIw-3	7	2w2
JtA	Jimtown loam, 0 to 2 percent slopes	72	IIw-3	7	2w2
JtB	Jimtown loam, 2 to 6 percent slopes	72	IIw-3	7	2w2
JuA	Jimtown-Urban land complex, nearly level	72	------	--	---
Lb	Lobdell silt loam	73	IIw-1	7	1o1
LcB	Lockport silty clay loam, 1 to 4 percent slopes	73	IIIw-2	9	3w1
Ln	Lorain silty clay loam	74	IIIw-4	10	2w1
Ls	Lorain silty clay loam, sandy substratum	74	IIIw-4	10	2w1
Ly	Luray silty clay loam	75	IIw-4	8	2w1
MgA	Mahoning silt loam, 0 to 2 percent slopes	76	IIIw-3	10	2w2
MgB	Mahoning silt loam, 2 to 6 percent slopes	76	IIIw-3	10	2w2
MgB2	Mahoning silt loam, 2 to 6 percent slopes, moderately eroded	76	IIIw-3	10	2w2

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group
			Symbol	Page	Symbol
MhA	Mahoning silt loam, sandstone substratum, 0 to 2 percent slopes--	76	IIIw-3	10	2w2
MkA	Mahoning-Tiro silt loams, 0 to 2 percent slopes------------------	76	IIIw-3	10	2w2
MkB	Mahoning-Tiro silt loams, 2 to 6 percent slopes------------------	76	IIIw-3	10	2w2
MmA	Mahoning-Urban land complex, nearly level------------------------	77	------	--	---
MnB	Mentor silt loam, 2 to 6 percent slopes--------------------------	77	IIe-2	6	1o1
MnC	Mentor silt loam, 6 to 12 percent slopes-------------------------	77	IIIe-2	8	1o1
MnE	Mentor silt loam, 12 to 25 percent slopes------------------------	78	IVe-1	11	1r1
Mo	Mermill loam---	78	IIw-4	8	2w2
Mr	Miner silty clay loam--	80	IIIw-4	10	2w1
Ms	Miner silty clay loam, shale substratum--------------------------	80	IIIw-4	10	2w1
MtA	Mitiwanga silt loam, 0 to 2 percent slopes-----------------------	81	IIIw-2	9	3w1
MtB	Mitiwanga silt loam, 2 to 6 percent slopes-----------------------	81	IIIw-2	9	3w1
MvB	Mitiwanga channery loam, 1 to 4 percent slopes-------------------	81	IIIw-2	9	3w1
MxB	Mitiwanga-Urban land complex, gently sloping---------------------	81	------	--	---
Om	Olmsted fine sandy loam--	82	IIw-4	8	2w1
On	Olmsted loam, sandstone substratum-------------------------------	82	IIw-4	8	2w1
Or	Orrville silt loam---	82	IIw-1	7	2w1
OtA	Oshtemo sandy loam, 0 to 2 percent slopes------------------------	83	IIIs-1	8	3s1
OtB	Oshtemo sandy loam, 2 to 6 percent slopes------------------------	83	IIIs-1	8	3s1
OtC	Oshtemo sandy loam, 6 to 12 percent slopes-----------------------	83	IIIe-1	8	3s1
Qu	Quarries---	83	------	--	---
RdA	Rawson loam, 0 to 2 percent slopes-------------------------------	84	I-1	6	2o1
RdB	Rawson loam, 2 to 6 percent slopes-------------------------------	84	IIe-2	6	2o1
RdC2	Rawson loam, 6 to 12 percent slopes, moderately eroded----------	84	IIIe-2	8	2o1
Sb	Sebring silt loam--	85	IIIw-3	10	2w1
Sd	Sebring silt loam, sandstone substratum--------------------------	85	IIIw-3	10	2w1
Se	Senecaville silt loam--	86	IIw-1	7	1o1
SkA	Shinrock silt loam, 0 to 2 percent slopes------------------------	86	IIs-1	7	2o1
SkB	Shinrock silt loam, 2 to 6 percent slopes------------------------	86	IIe-2	6	2o1
Sw	Stafford fine sandy loam---	87	IIw-3	7	2w2
Tg	Tioga fine sandy loam--	87	IIw-1	7	1o1
TrA	Trumbull silty clay loam, 0 to 2 percent slopes------------------	89	IVw-1	11	2w1
TyB	Tyner loamy sand, 1 to 6 percent slopes--------------------------	89	IVs-1	11	3s1
TyC	Tyner loamy sand, 6 to 12 percent slopes-------------------------	89	IVs-1	11	3s1
UpC	Upshur silt loam, 2 to 8 percent slopes--------------------------	90	IIIe-2	8	3c1
UpF	Upshur silt loam, 25 to 70 percent slopes------------------------	90	VIIe-1	13	4c1
WeB	Weikert channery fine sandy loam, 1 to 6 percent slopes----------	91	VIs-1	13	4d1

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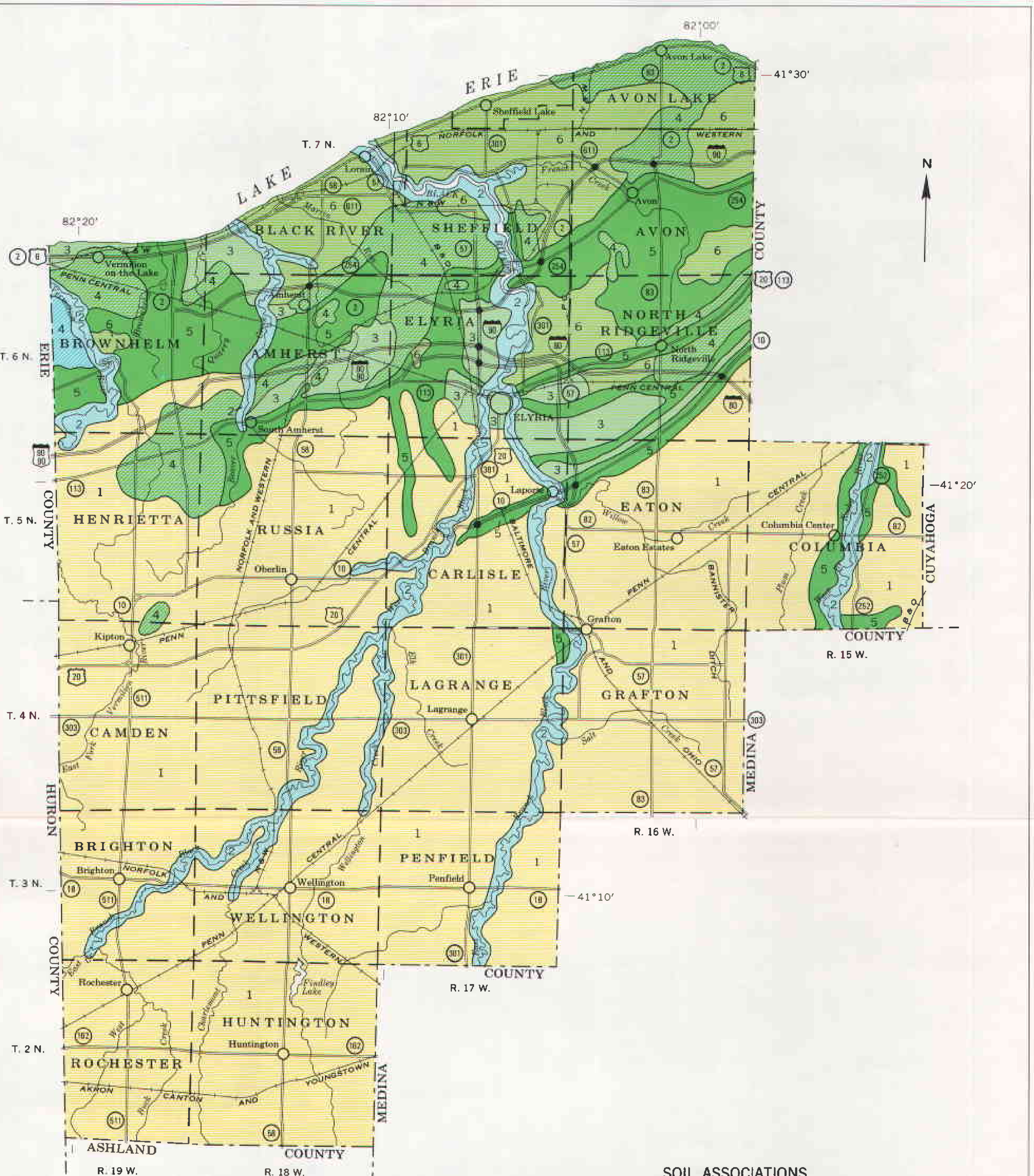


SOIL ASSOCIATIONS

1	Mahoning-Trumbull-Ellsworth association: Deep, nearly level to moderately steep, mainly somewhat poorly drained soils on the till plain
2	Orrville-Lobdell-Chagrin association: Deep, nearly level, somewhat poorly drained to well drained soils on bottom lands
3	Fitchville-Luray-Sebring association: Deep, nearly level, somewhat poorly drained to very poorly drained soils on the lake plain
4	Allis-Mitiwanga-Miner, shale substratum, association: Moderately deep and deep, nearly level to gently sloping, somewhat poorly drained to very poorly drained soils underlain by bedrock at a depth of 2 to 5 feet, on uplands
5	Haskins-Jimtown-Oshtemo association: Deep, somewhat poorly drained and well drained, nearly level to gently sloping soils on beach ridges, outwash plains, and stream terraces
6	Mahoning-Miner association: Deep, nearly level to gently sloping, somewhat poorly drained and very poorly drained soils on the till plain and the lake plain

Compiled 1972

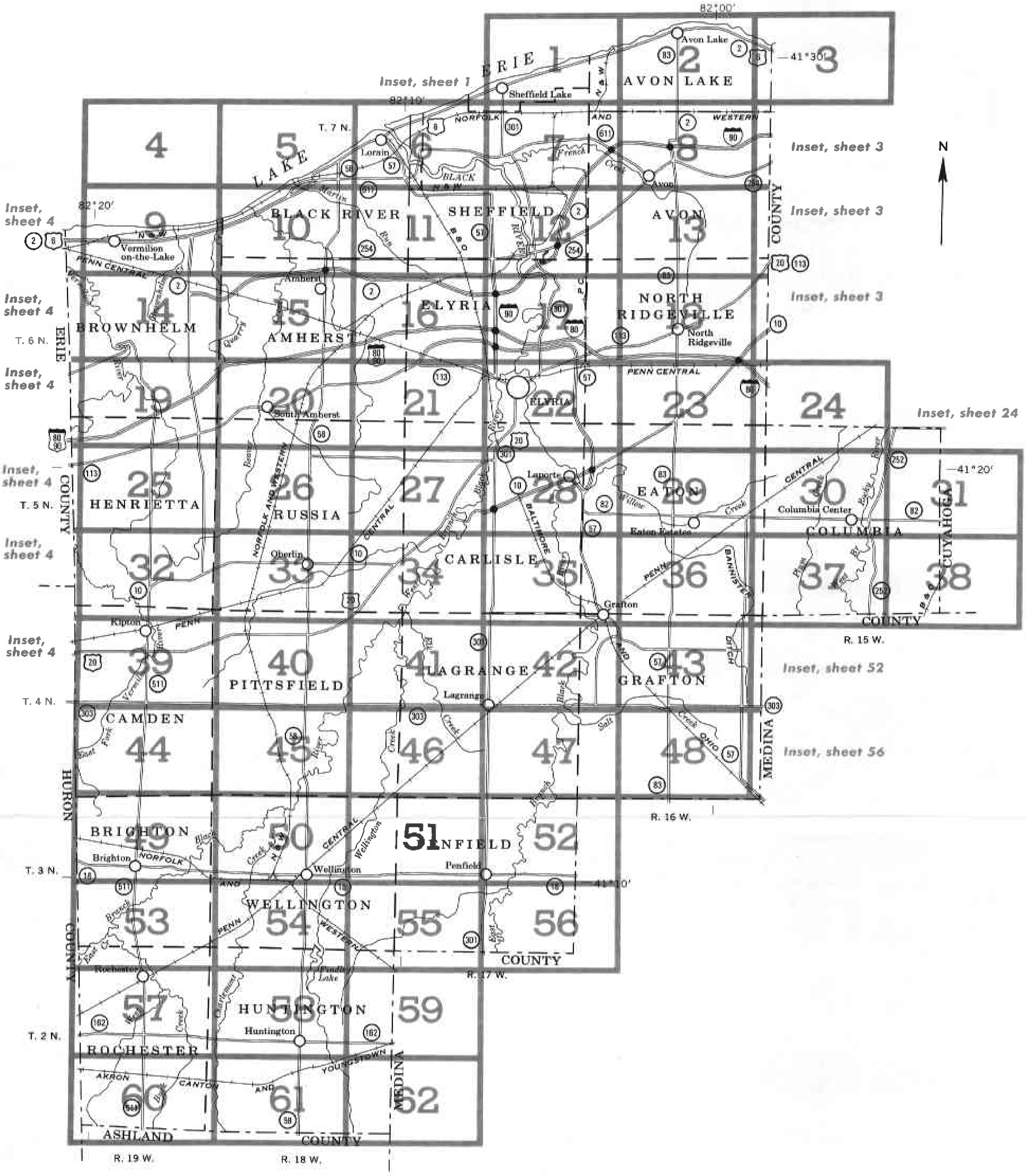
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF LANDS AND SOIL
OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER

GENERAL SOIL MAP

LORAIN COUNTY, OHIO

1 0 1 2 3 4 Miles

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

LORAIN COUNTY, OHIO

1 0 1 2 3 4 Miles

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, E, or F, shows the slope. Most symbols without a slope letter are those of nearly level soils, but some are for land types that have a considerable range of slope. A final number, 2, in the symbol shows that the soil is moderately eroded.

SYMBOL	NAME
AkA	Allis loam, 0 to 2 percent slopes
AlA	Allis silty clay loam, 0 to 2 percent slopes
AmA	Allis-Urban land complex, nearly level
BsA	Bogart sandy loam, 0 to 2 percent slopes
BtA	Bogart loam, 0 to 2 percent slopes
BtB	Bogart loam, 2 to 6 percent slopes
Cg	Carlisle mucky silt loam
Ch	Chagrin silt loam
ClA	Chili loam, 0 to 2 percent slopes
ClB	Chili loam, 2 to 6 percent slopes
ClD2	Chili loam, 6 to 18 percent slopes, moderately eroded
CnB	Chili-Urban land complex, gently sloping
CoB	Conotton gravelly loam, 2 to 6 percent slopes
CoC	Conotton gravelly loam, 6 to 12 percent slopes
Cz	Cut and fill land
DkB	Dekalb very channery loam, 1 to 6 percent slopes
DsB	Del Rey silt loam, 1 to 4 percent slopes
ElB	Ellsworth silt loam, 2 to 6 percent slopes
ElB2	Ellsworth silt loam, 2 to 6 percent slopes, moderately eroded
ElC2	Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded
ElD2	Ellsworth silt loam, 12 to 18 percent slopes, moderately eroded
ElF2	Ellsworth silt loam, 18 to 50 percent slopes, moderately eroded
EnA	Elnora loamy fine sand, 1 to 3 percent slopes
FcA	Fitchville silt loam, 0 to 2 percent slopes
FcB	Fitchville silt loam, 2 to 6 percent slopes
FdA	Fitchville silt loam, low terrace, 0 to 2 percent slopes
FeA	Fitchville-Urban land complex, nearly level

SYMBOL	NAME
FuA	Fulton silt loam, 0 to 2 percent slopes
FuB	Fulton silt loam, 2 to 6 percent slopes
FvA	Fulton silt loam, sandy substratum, 0 to 2 percent slopes
HsA	Haskins loam, 0 to 2 percent slopes
HsB	Haskins loam, 2 to 6 percent slopes
HtA	Haskins-Urban land complex, nearly level
Hy	Holly silt loam
HzA	Hornell silt loam, 0 to 2 percent slopes
HzB	Hornell silt loam, 2 to 6 percent slopes
JsA	Jimtown sandy loam, 0 to 2 percent slopes
JtA	Jimtown loam, 0 to 2 percent slopes
JtB	Jimtown loam, 2 to 6 percent slopes
JuA	Jimtown-Urban land complex, nearly level
Lb	Lobdell silt loam
LcB	Lockport silty clay loam, 1 to 4 percent slopes
Ln	Lorain silty clay loam
Ls	Lorain silty clay loam, sandy substratum
Ly	Luray silty clay loam
MgA	Mahoning silt loam, 0 to 2 percent slopes
MgB	Mahoning silt loam, 2 to 6 percent slopes
MgB2	Mahoning silt loam, 2 to 6 percent slopes, moderately eroded
MhA	Mahoning silt loam, sandstone substratum, 0 to 2 percent slopes
MkA	Mahoning-Tiro silt loams, 0 to 2 percent slopes
MkB	Mahoning-Tiro silt loams, 2 to 6 percent slopes
MmA	Mahoning-Urban land complex, nearly level
MnB	Mentor silt loam, 2 to 6 percent slopes
MnC	Mentor silt loam, 6 to 12 percent slopes
MnE	Mentor silt loam, 12 to 25 percent slopes
Mo	Mermill loam
Mr	Miner silty clay loam

SYMBOL	NAME
Ms	Miner silty clay loam, shale substratum
MtA	Mitiwanga silt loam, 0 to 2 percent slopes
MtB	Mitiwanga silt loam, 2 to 6 percent slopes
MvB	Mitiwanga channery loam, 1 to 4 percent slopes
MxB	Mitiwanga-Urban land complex, gently sloping
Om	Olmsted fine sandy loam
On	Olmsted loam, sandstone substratum
Or	Orrville silt loam
OtA	Oshtemo sandy loam, 0 to 2 percent slopes
OtB	Oshtemo sandy loam, 2 to 6 percent slopes
OtC	Oshtemo sandy loam, 6 to 12 percent slopes
Qu	Quarries
RdA	Rawson loam, 0 to 2 percent slopes
RdB	Rawson loam, 2 to 6 percent slopes
RdC2	Rawson loam, 6 to 12 percent slopes, moderately eroded
Sb	Sebring silt loam
Sd	Sebring silt loam, sandstone substratum
Se	Senecaville silt loam
SkA	Shinrock silt loam, 0 to 2 percent slopes
SkB	Shinrock silt loam, 2 to 6 percent slopes
Sw	Stafford fine sandy loam
Tg	Tioga fine sandy loam
TrA	Trumbull silty clay loam, 0 to 2 percent slopes
TyB	Tyner loamy sand, 1 to 6 percent slopes
TyC	Tyner loamy sand, 6 to 12 percent slopes
UpC	Upshur silt loam, 2 to 8 percent slopes
UpF	Upshur silt loam, 25 to 70 percent slopes
WeB	Weikert channery fine sandy loam, 1 to 6 percent slopes

LORAIN COUNTY, OHIO

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads

- Divided
- Good motor
- Poor motor
- Trail

Highway markers

- National Interstate
- U. S.
- State or county

Railroads

- Single track
- Multiple track
- Abandoned

Bridges and crossings

- Road
- Trail
- Railroad
- Ferry (FY)
- Ford (FORD)
- Grade
- R. R. over
- R. R. under

Buildings

- School
- Church

Mine and quarry

Gravel pit

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Forest fire or lookout station

Windmill

Located object

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport
- Land survey division corners

DRAINAGE

Streams, double-line

- Perennial
- Intermittent

Streams, single-line

- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Unclassified

Canals and ditches

Lakes and ponds

- Perennial (water, w)
- Intermittent (Int)

Spring

Marsh or swamp

Wet spot

Drainage end or alluvial fan

RELIEF

Escarpments

- Bedrock
- Other

Short steep slope

Prominent peak

Depressions (Large, Small)

- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

SOIL SURVEY DATA

Soil boundary and symbol (Dx)

Gravel

Stoniness

- Stony
- Very stony

Rock outcrops

Chert fragments

Clay spot

Sand spot

Gumbo or scabby spot

Made land

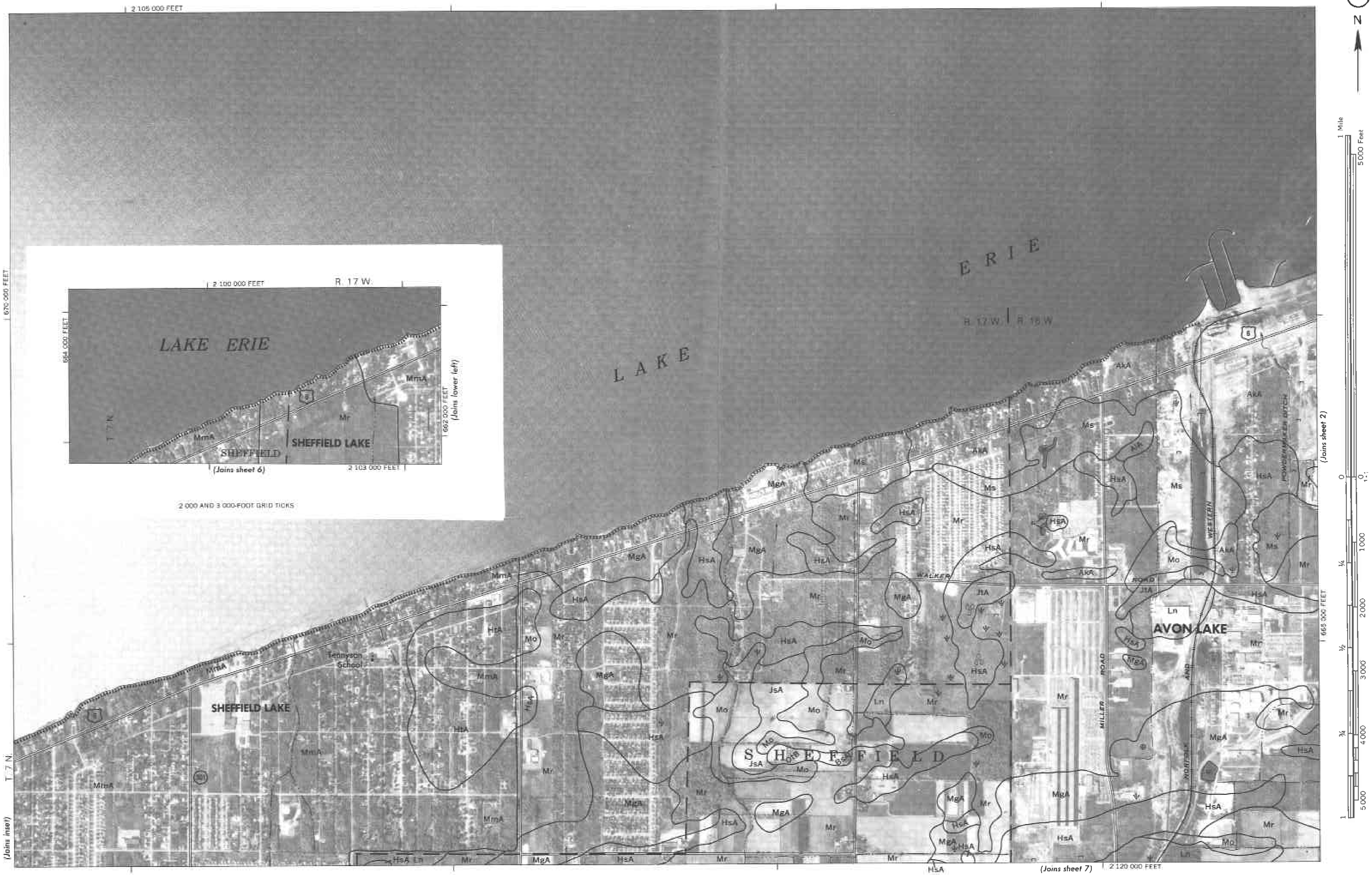
Severely eroded spot

Blowout, wind erosion

Gully

Spot of sandy loam or loam soil less than 4 acres

Spot of cut and fill land less than 4 acres



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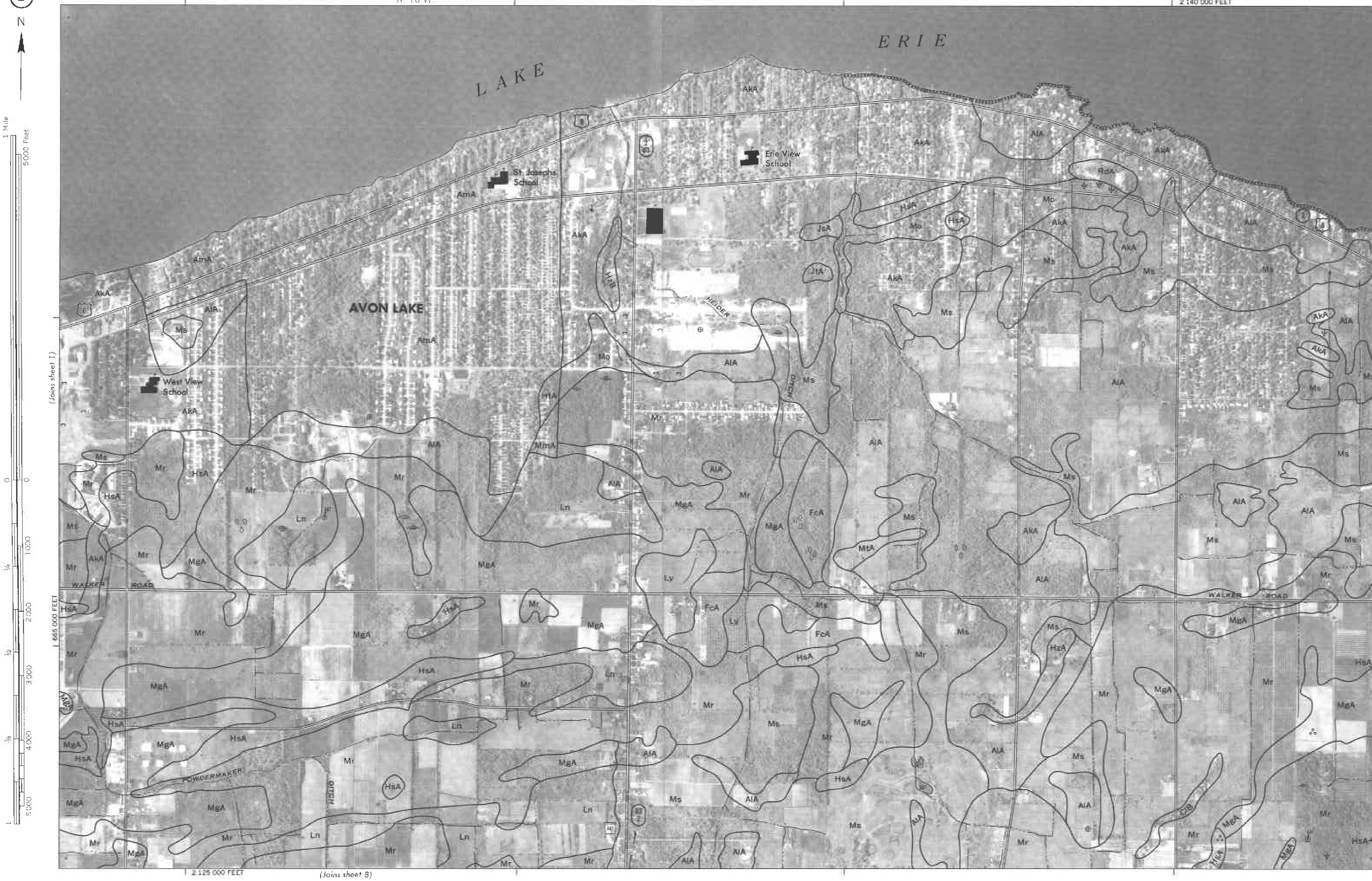
LORAIN COUNTY, OHIO — SHEET NUMBER 2



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LORAIN COUNTY, OHIO NO. 3

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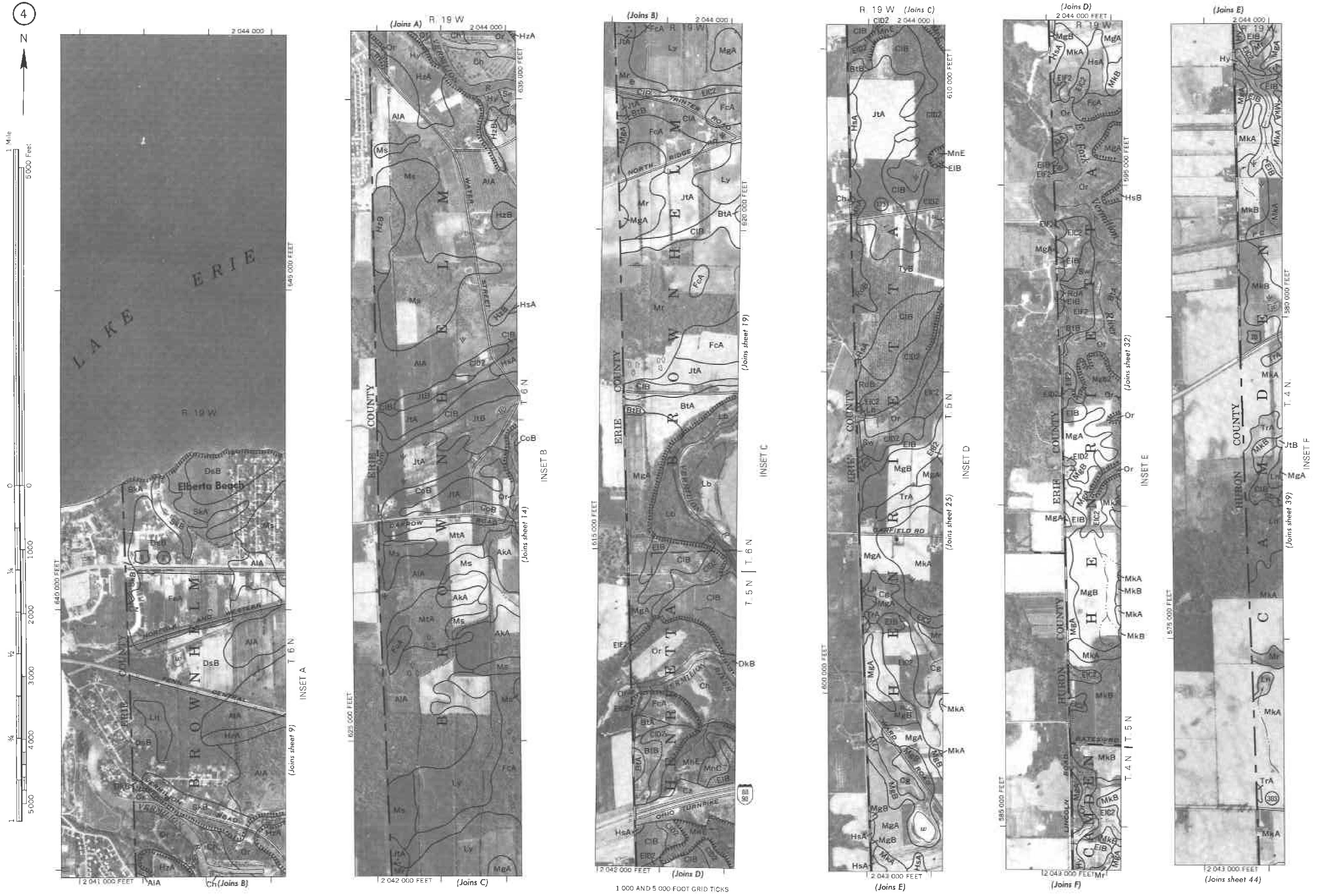
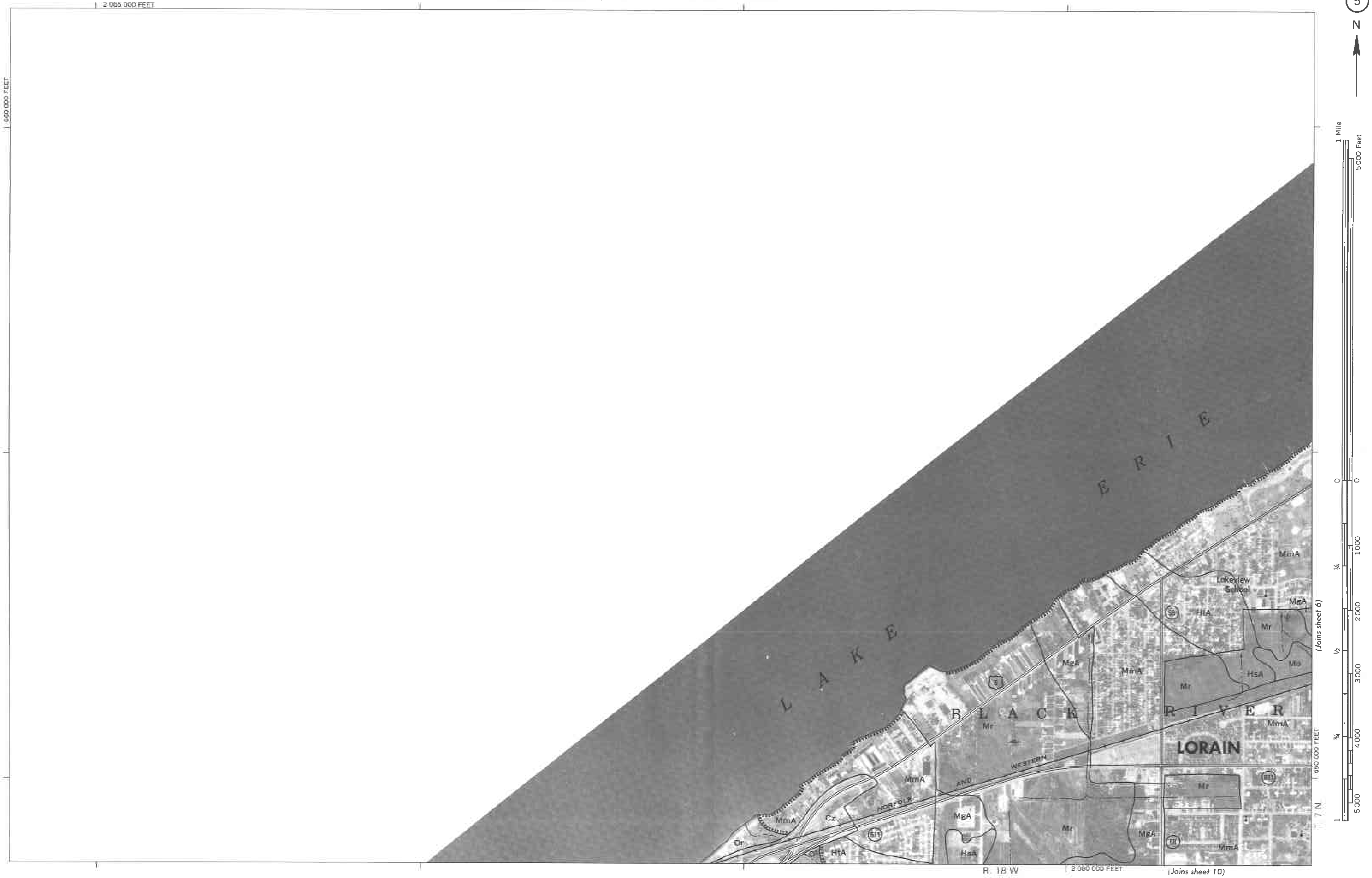


LORAIN COUNTY, OHIO — SHEET NUMBER 4

LORAIN COUNTY, OHIO — SHEET NUMBER 5



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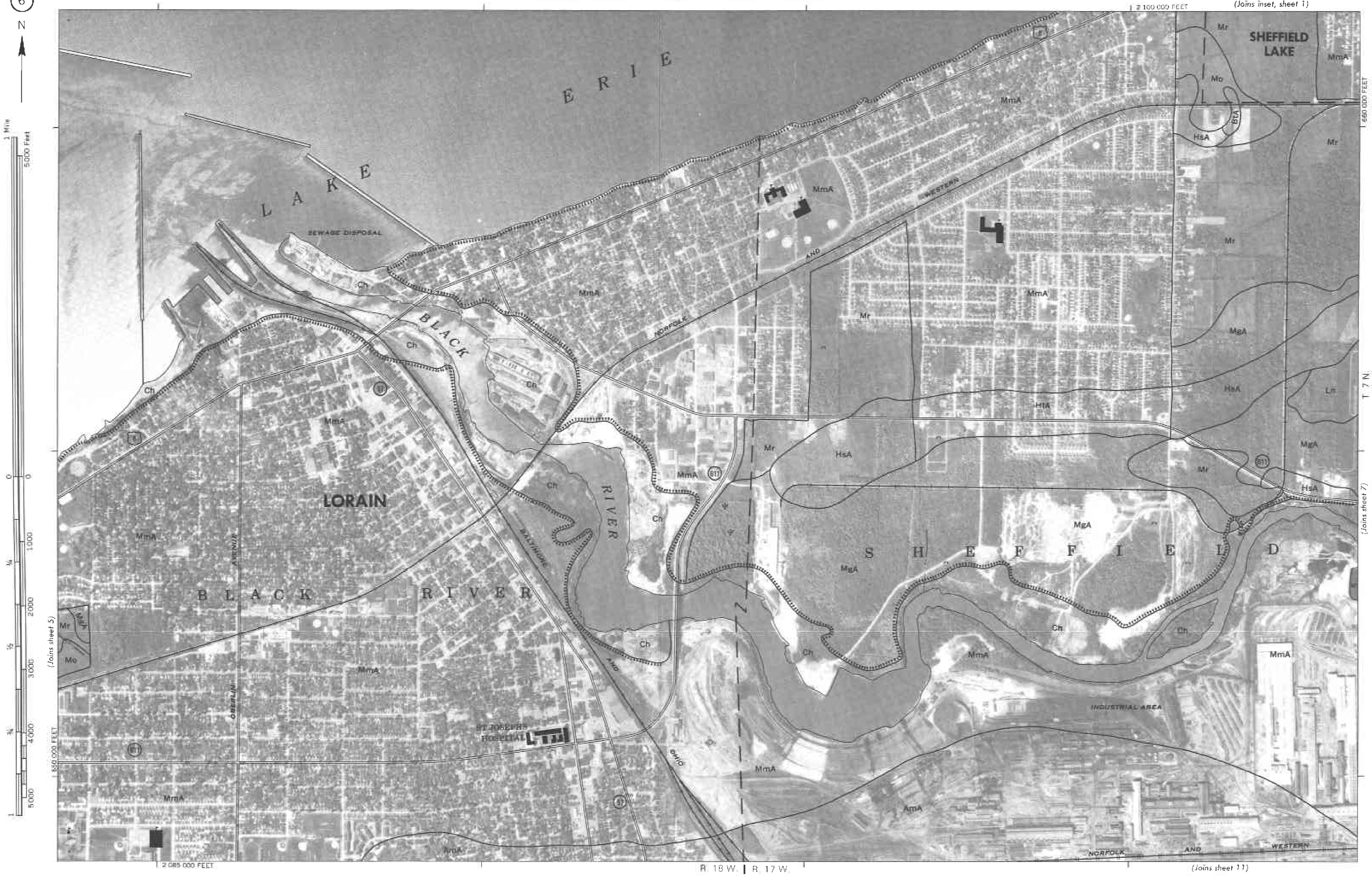

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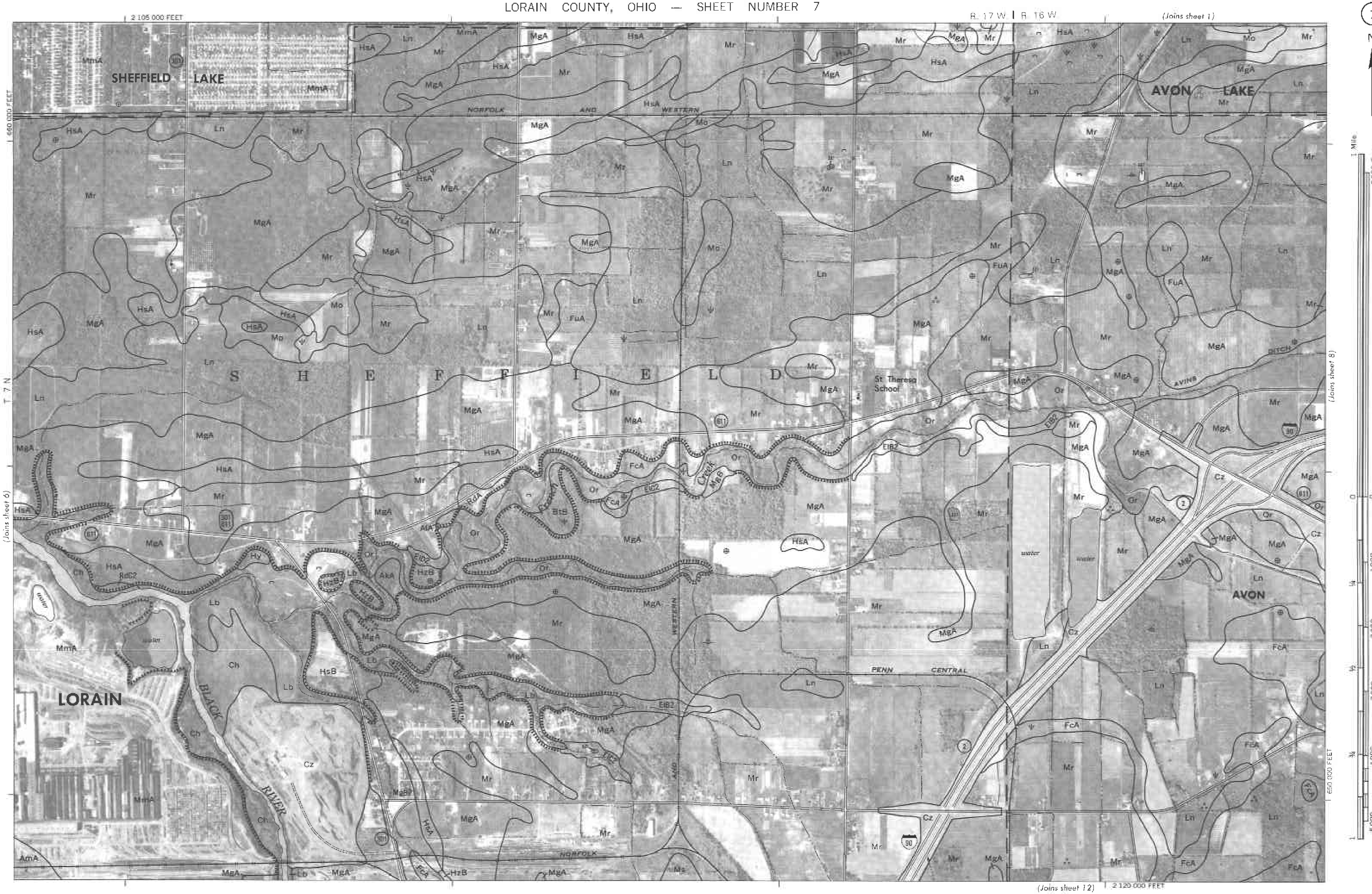

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LORAIN COUNTY, OHIO NO. 7

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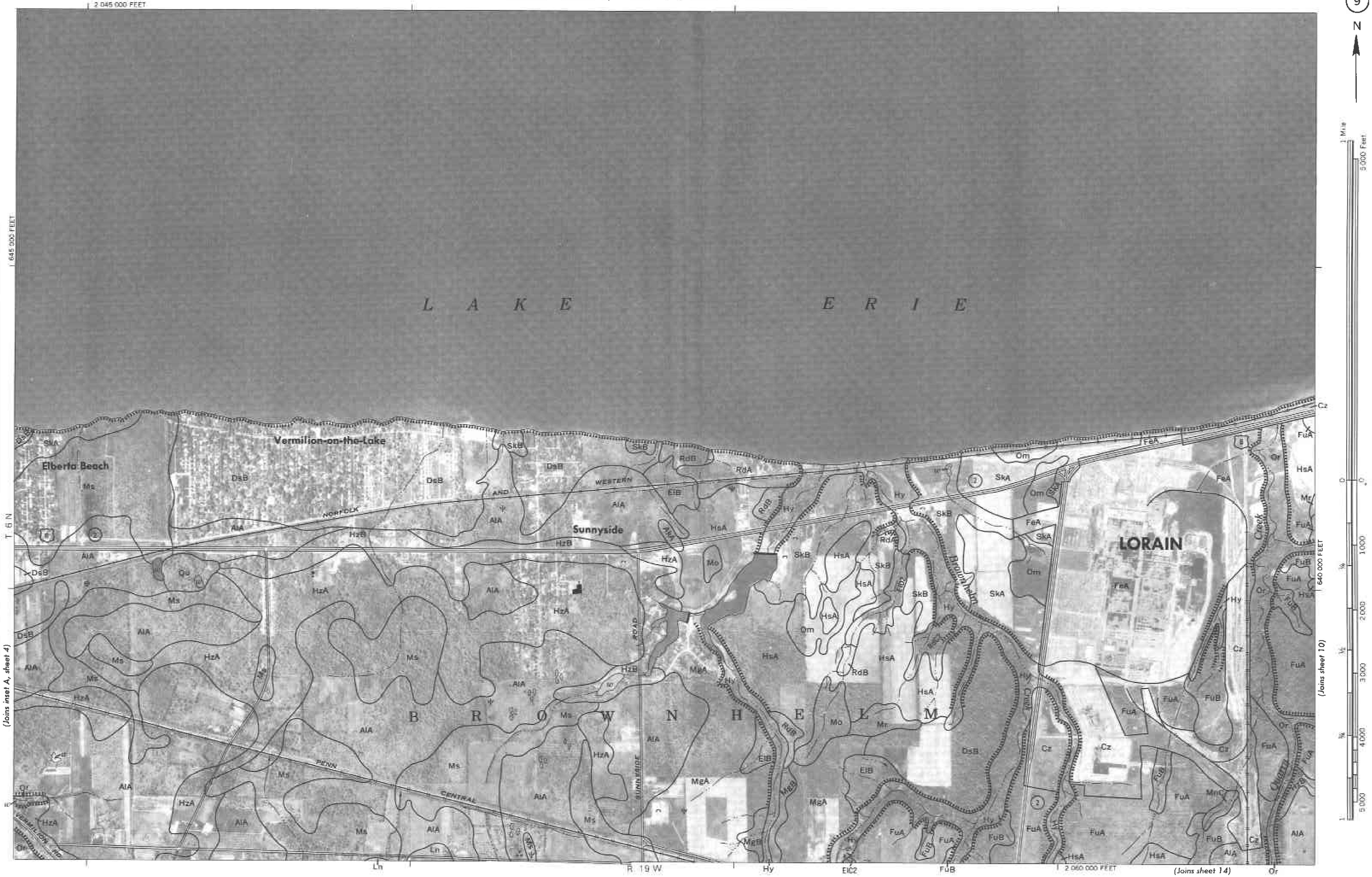

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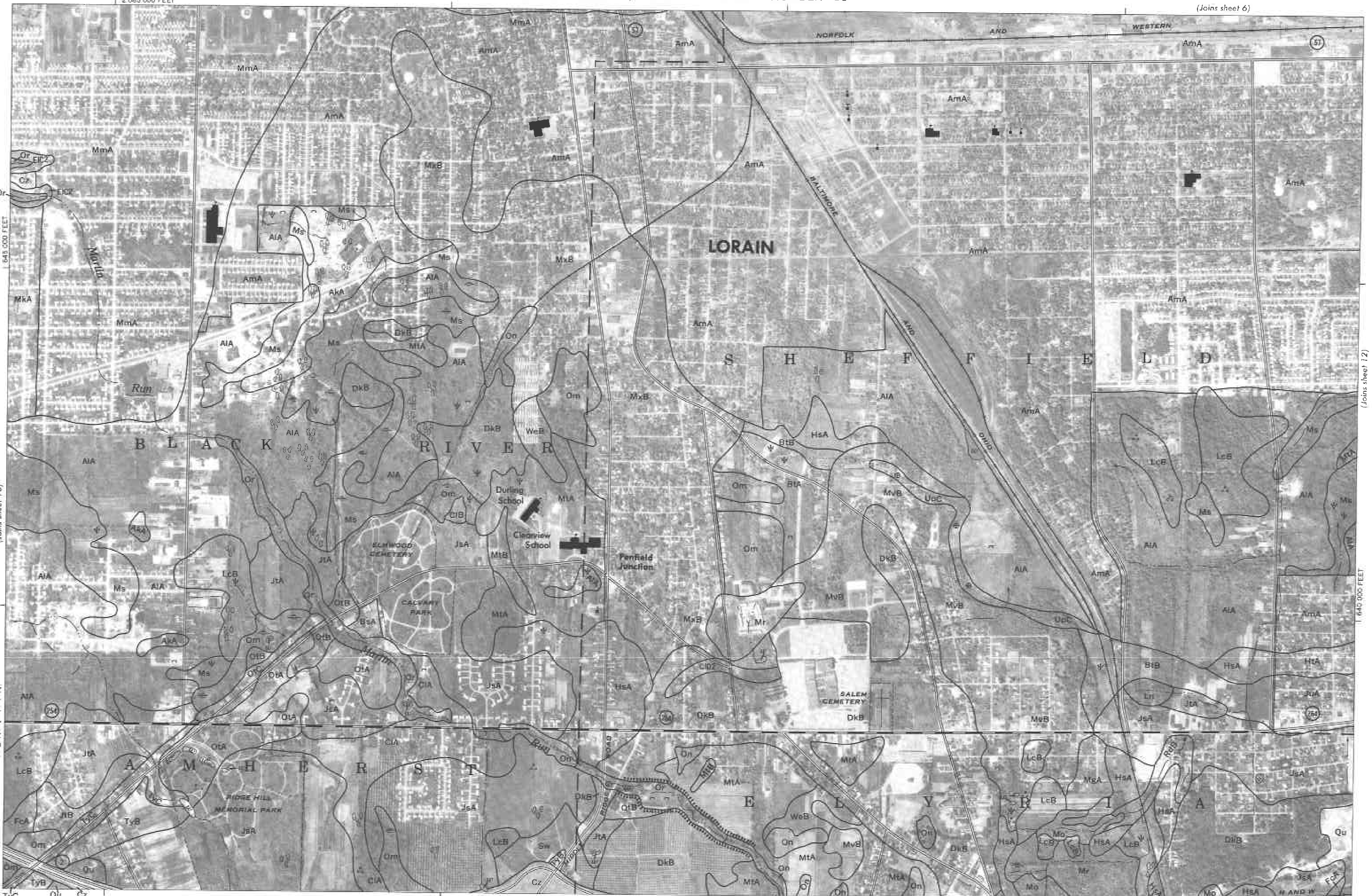

11

N

LORAIN COUNTY, OHIO NO. 11

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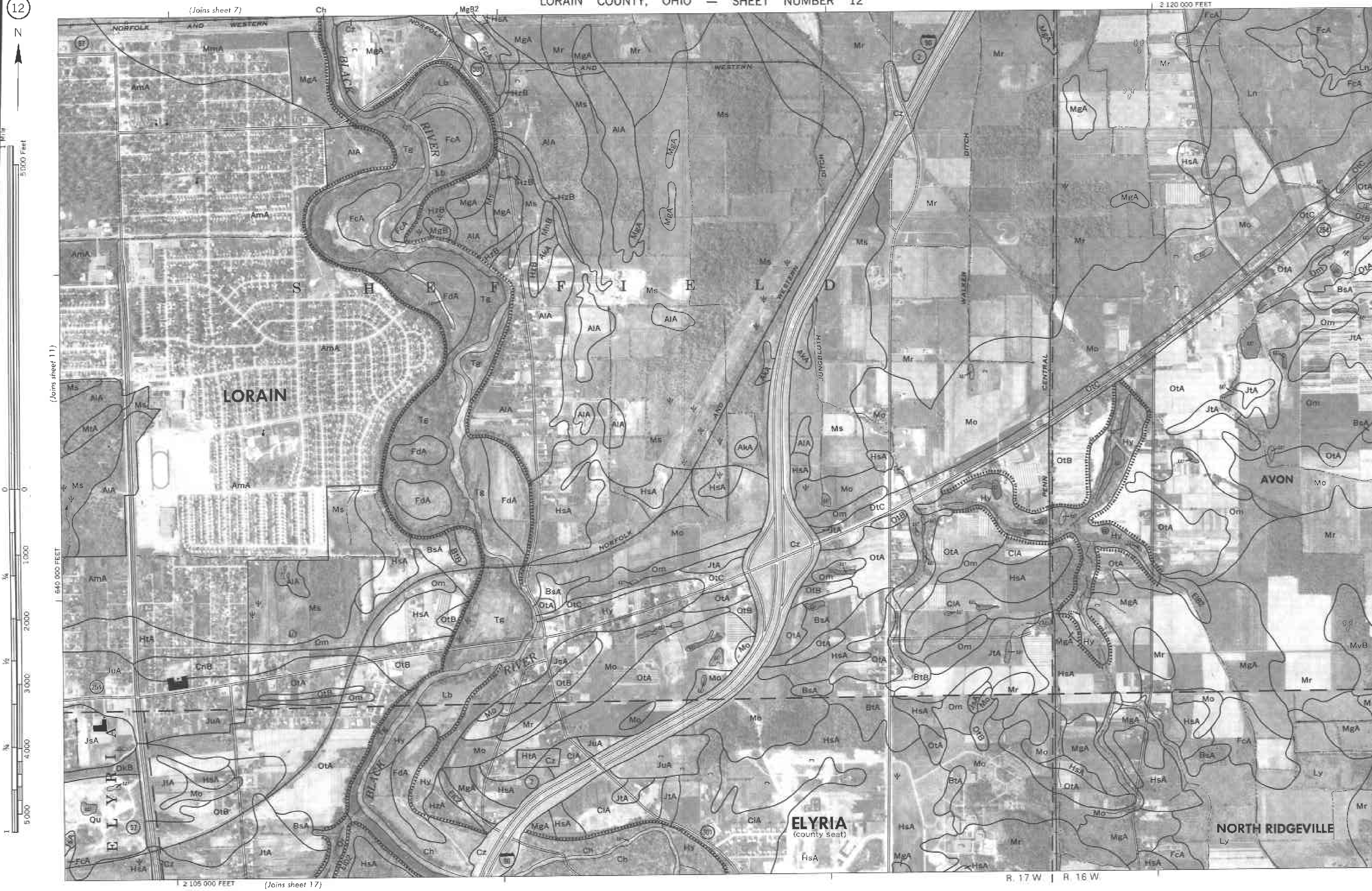

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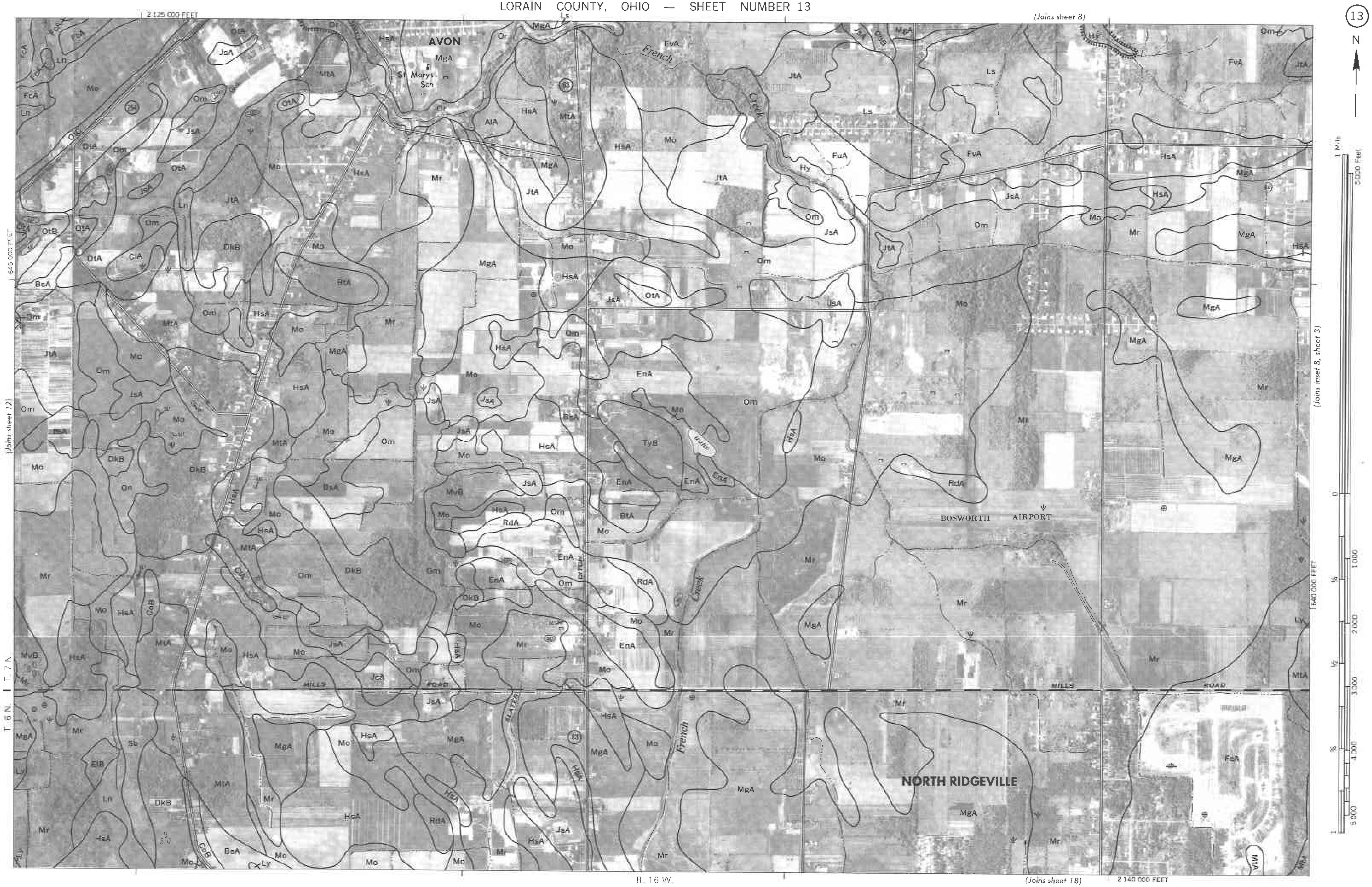

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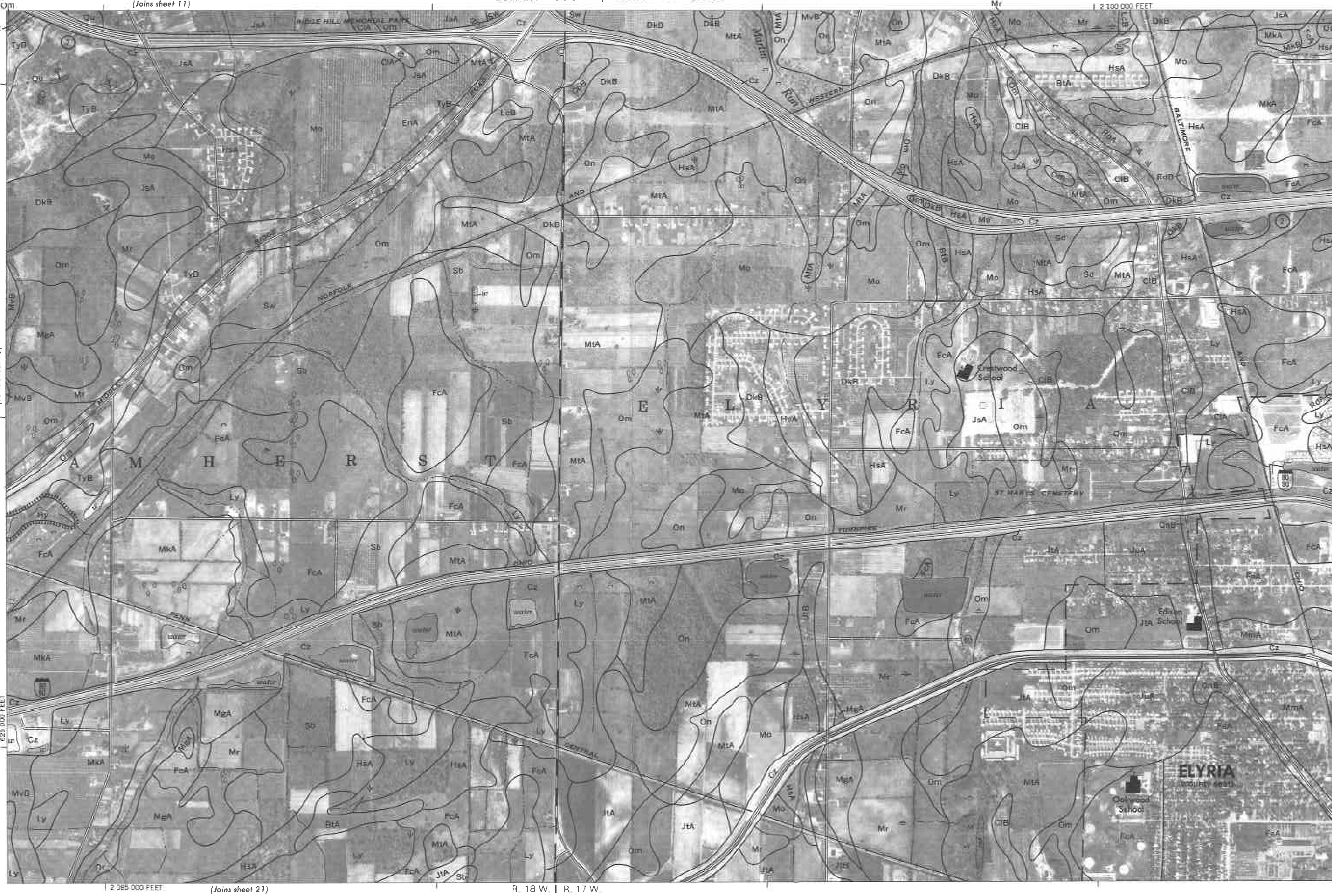

N
1 Mile
5000 Feet

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(17)

N

2 105 000 FEET

R 17 W | R 16 W

(Joins sheet 12)

635 000 FEET

LORAIN COUNTY, OHIO NO. 17

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T 6 N

(Joins sheet 16)

(Joins sheet 18)

625 000 FEET

2 120 000 FEET

(Joins sheet 22)

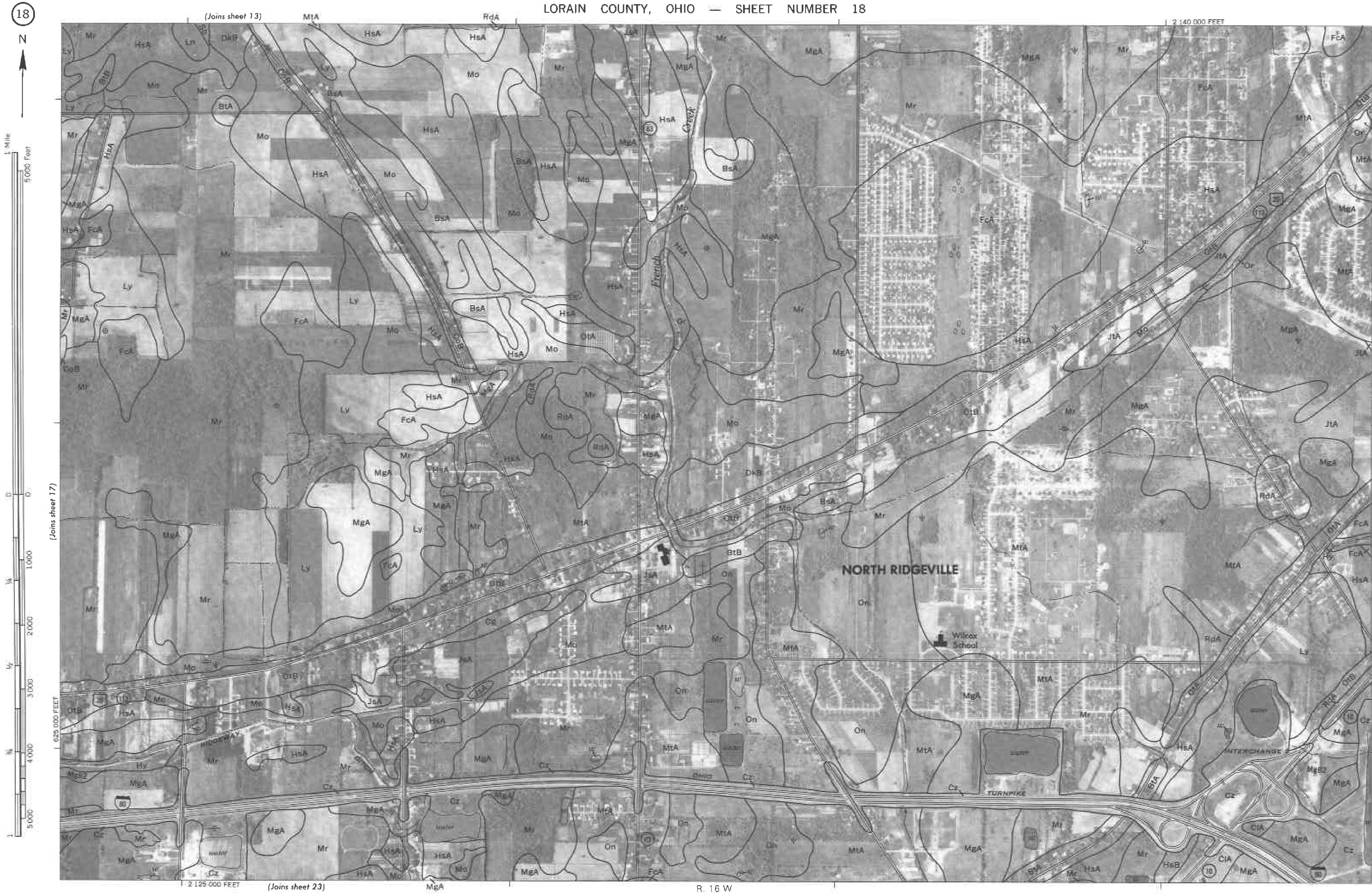
1 Mile

5000 Feet

0 — 1/4 — 1/2 — 3/4 — 1

0 — 1000 — 2000 — 3000 — 4000 — 5000

LORAIN COUNTY, OHIO — SHEET NUMBER 18



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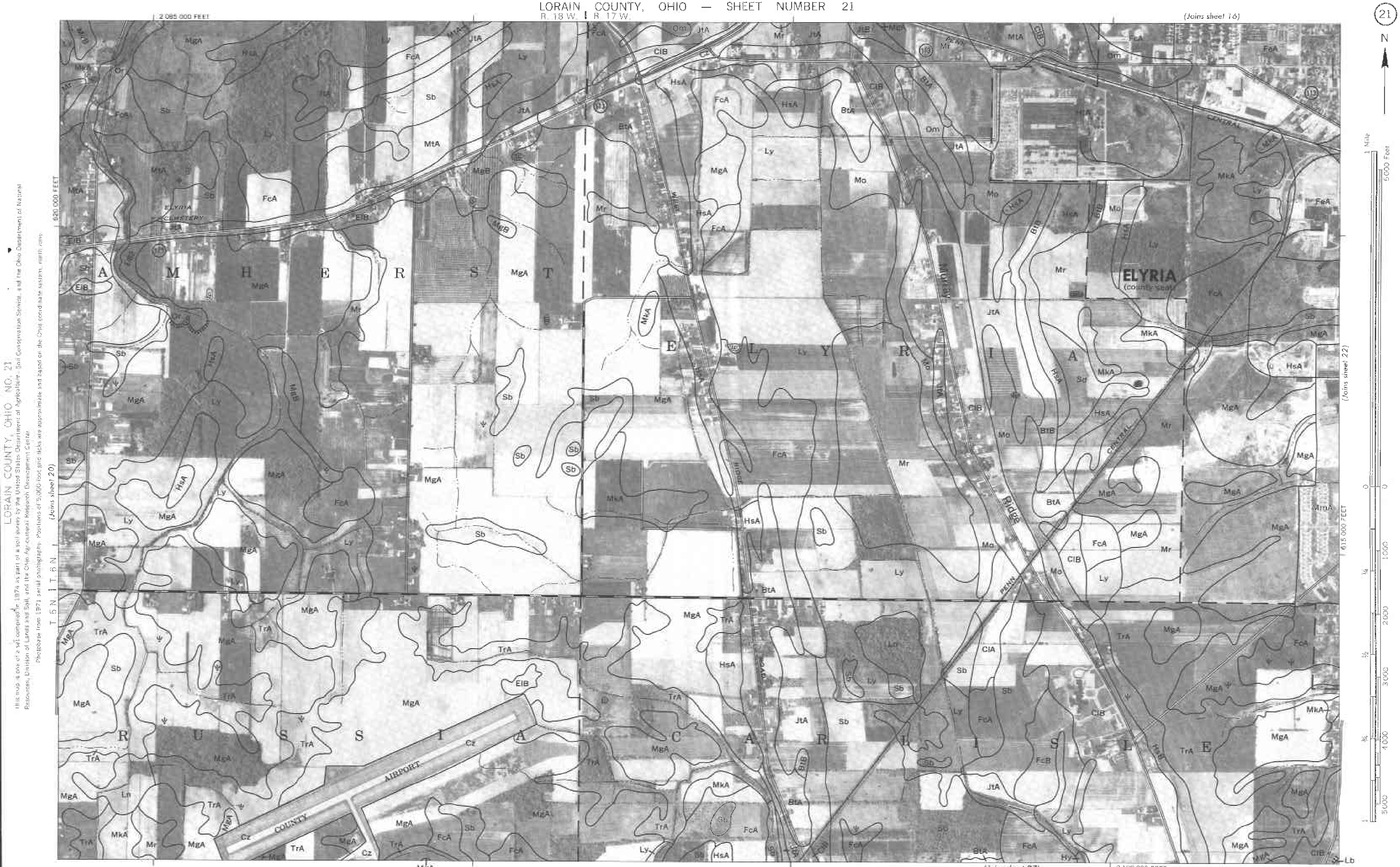
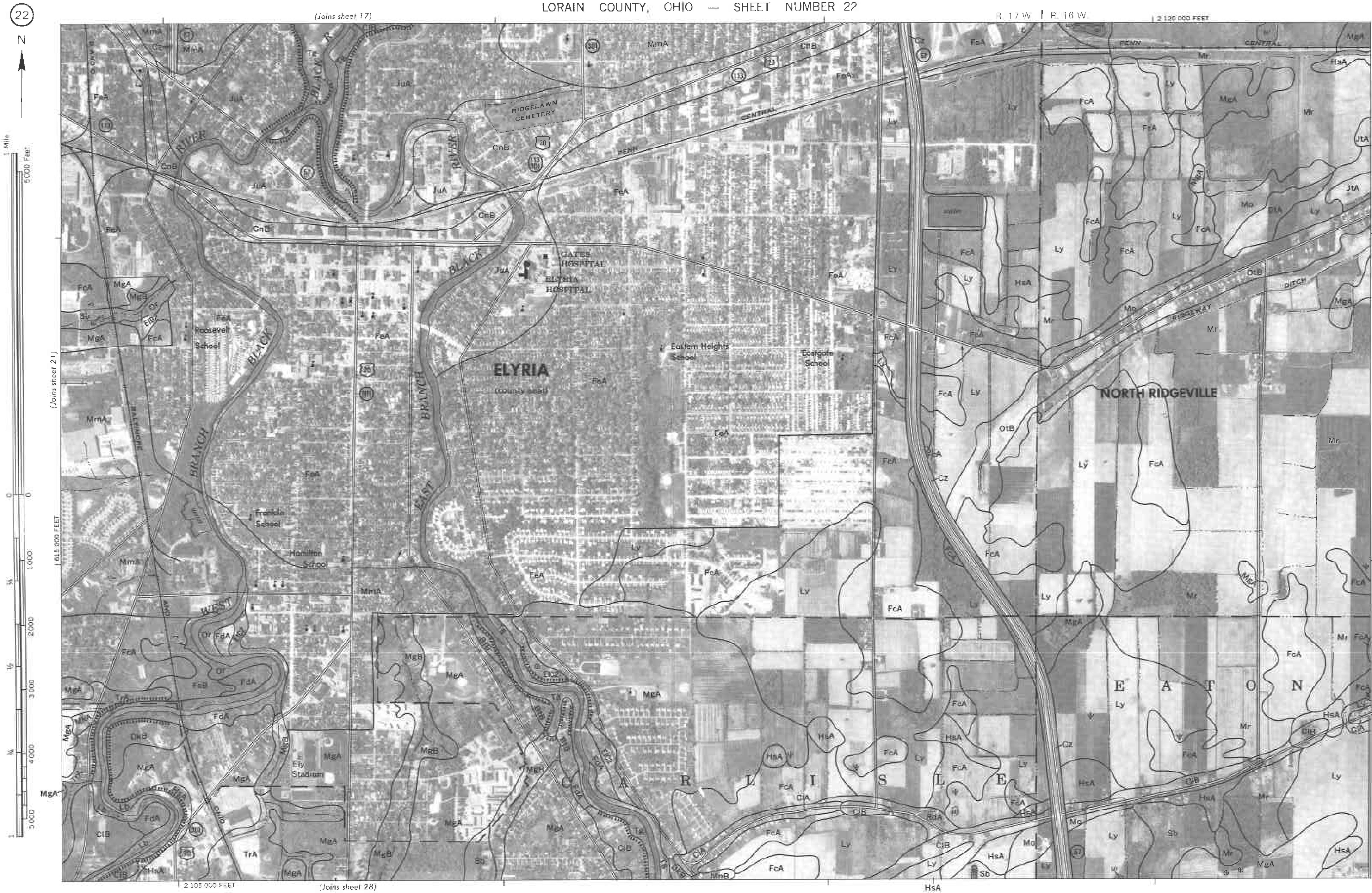
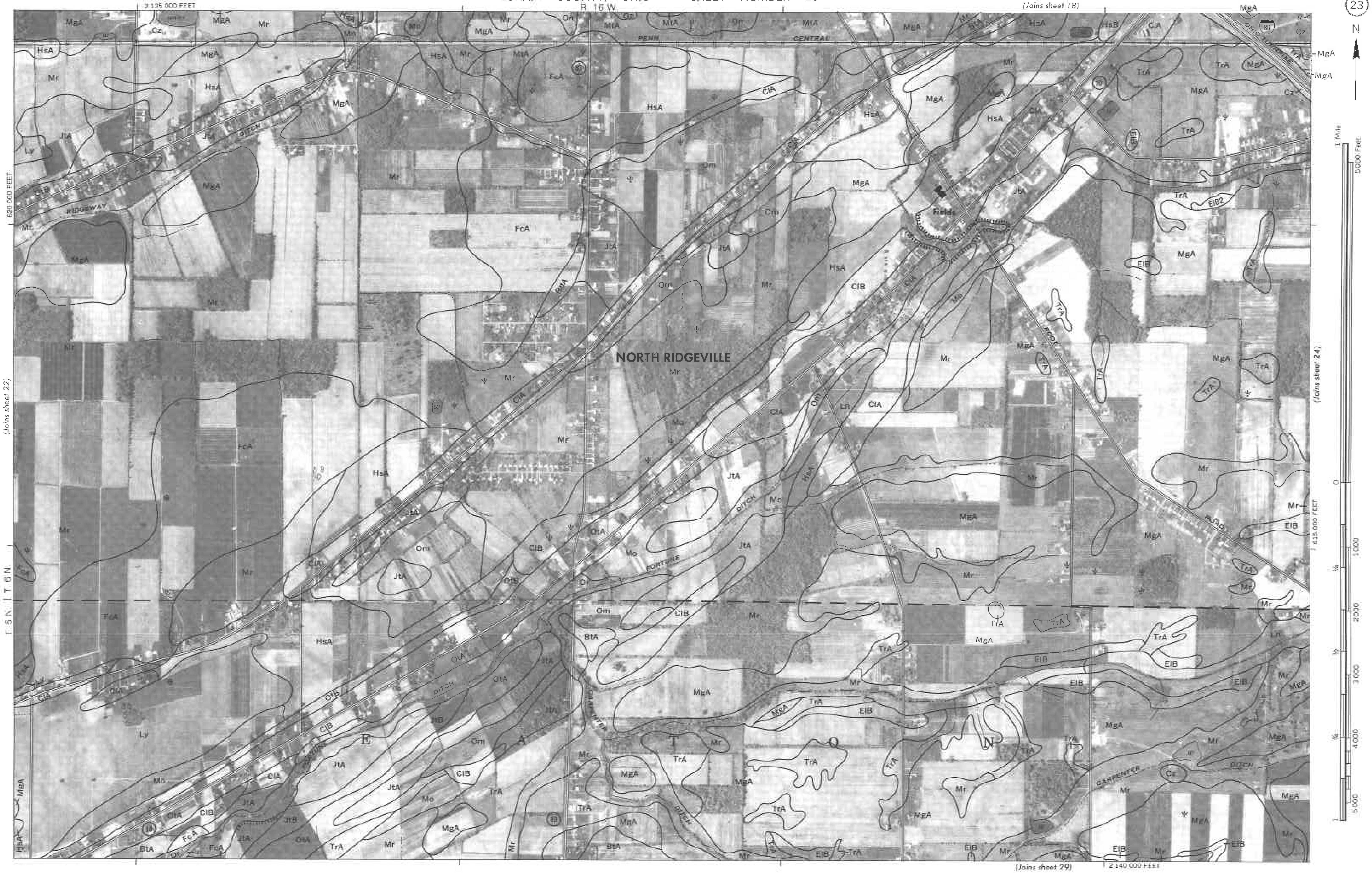

R. 18 W. | R. 17 W.
2 085 000 FEET
(Joins sheet 16)
21
N
(Joins sheet 20)
(Joins sheet 22)
(Joins sheet 27)
2 100 000 FEET
620 000 FEET
615 000 FEET
T 5 N | T 6 N
A M H E R S T
E L Y R I A
ELYRIA
(county seat)
R U S S I A
C A R L I S L E
COUNTY AIRPORT
ELYRIA CEMETERY
CENTRAL
PENN
Murray
Ridge
1 Mile
5000 Feet
LORAIN COUNTY, OHIO NO. 21
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.



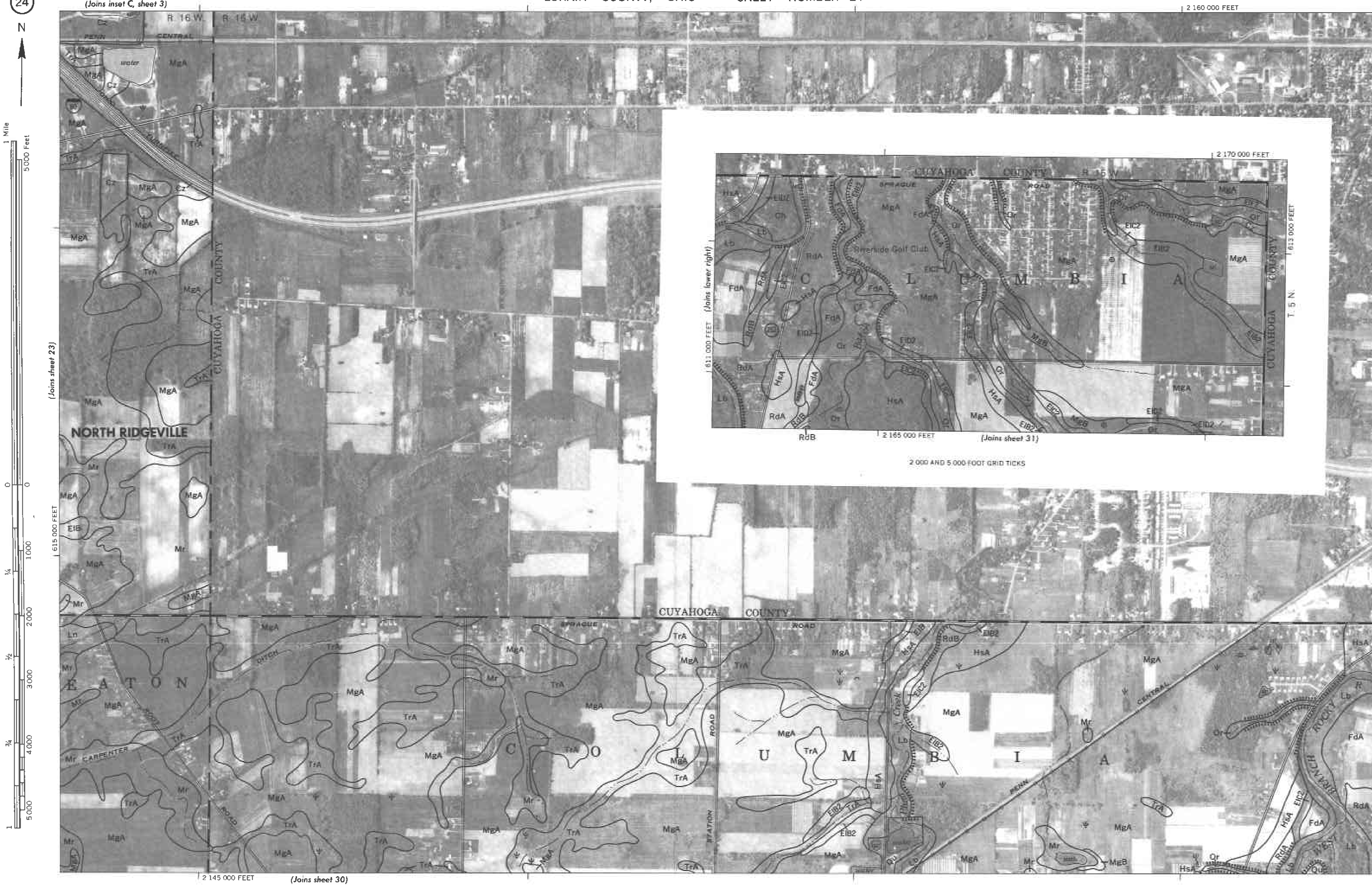
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.



LORAIN COUNTY, OHIO NO. 23

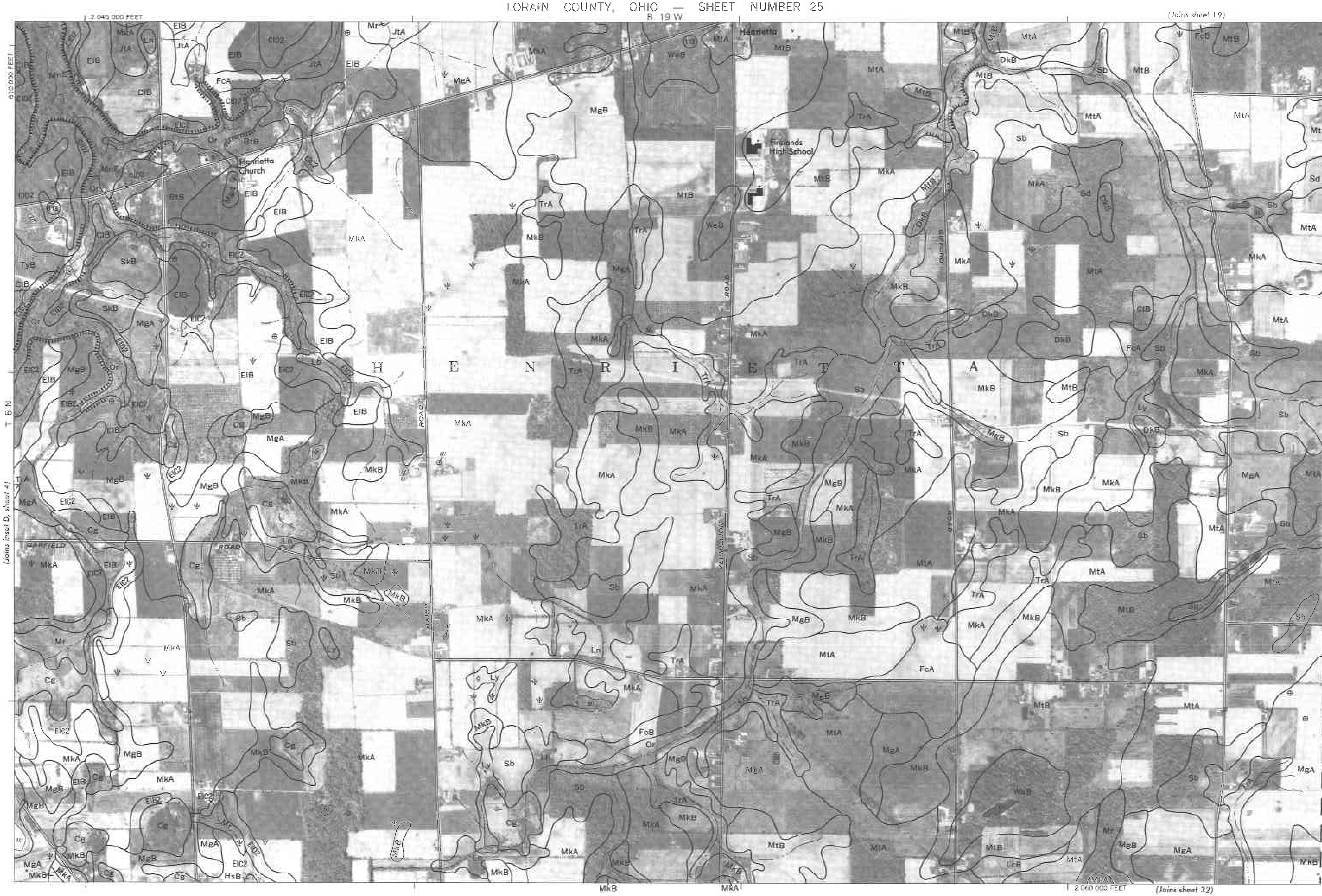
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.



Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

(Joins sheet 19)



N

1 Mile
5000 Feet
0 ¼ ½ ¾ 1
0 1000 2000 3000 4000 5000

(Joins sheet 26)

(Joins inset D, sheet 4)

(Joins sheet 32)

LORAIN COUNTY, OHIO NO. 25

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

LORAIN COUNTY, OHIO — SHEET NUMBER 26

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

LORAIN COUNTY, OHIO NO. 27

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

LORAIN COUNTY, OHIO — SHEET NUMBER 28

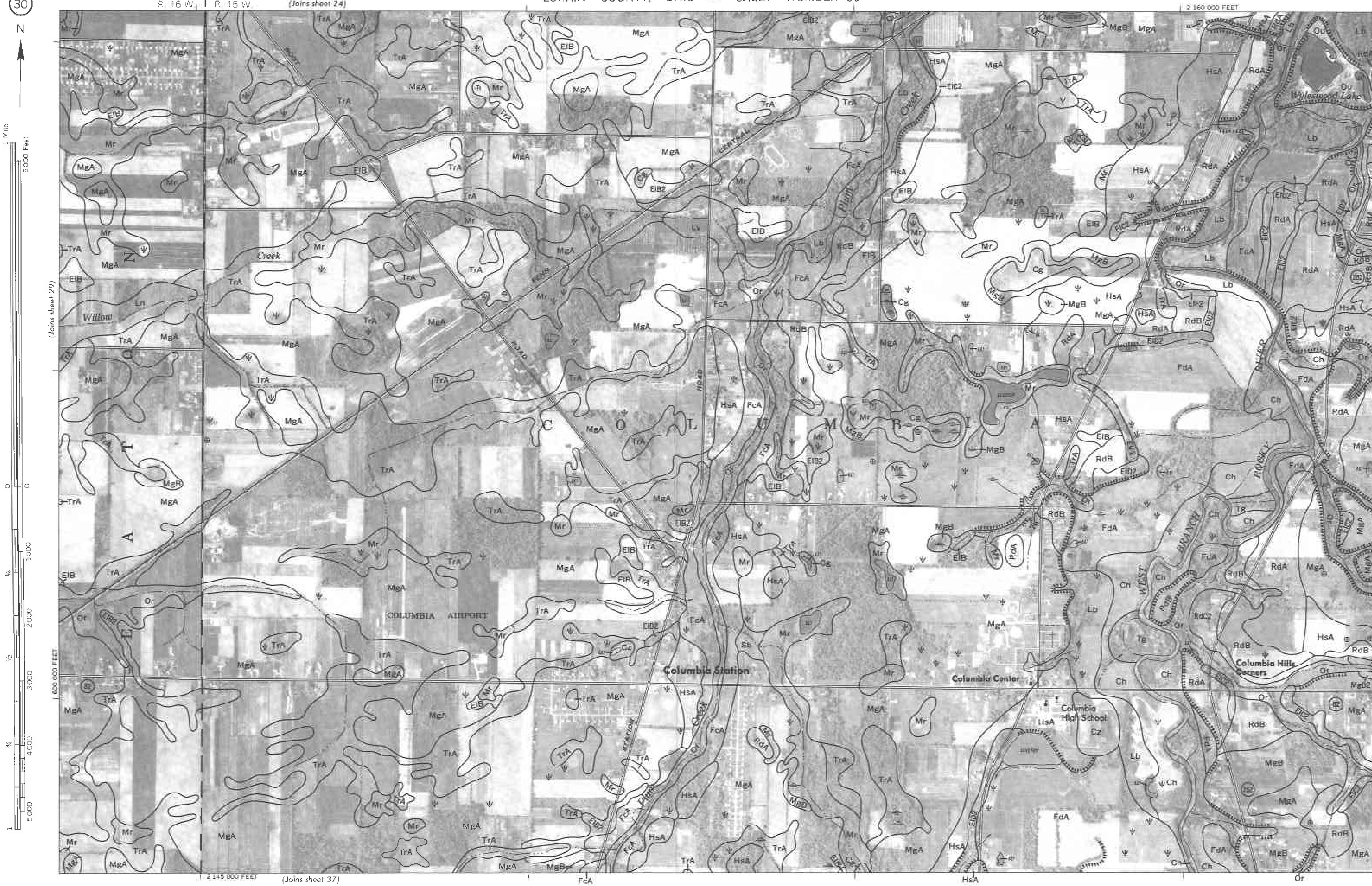
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

LORAIN COUNTY, OHIO NO. 29

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

LORAIN COUNTY, OHIO — SHEET NUMBER 30



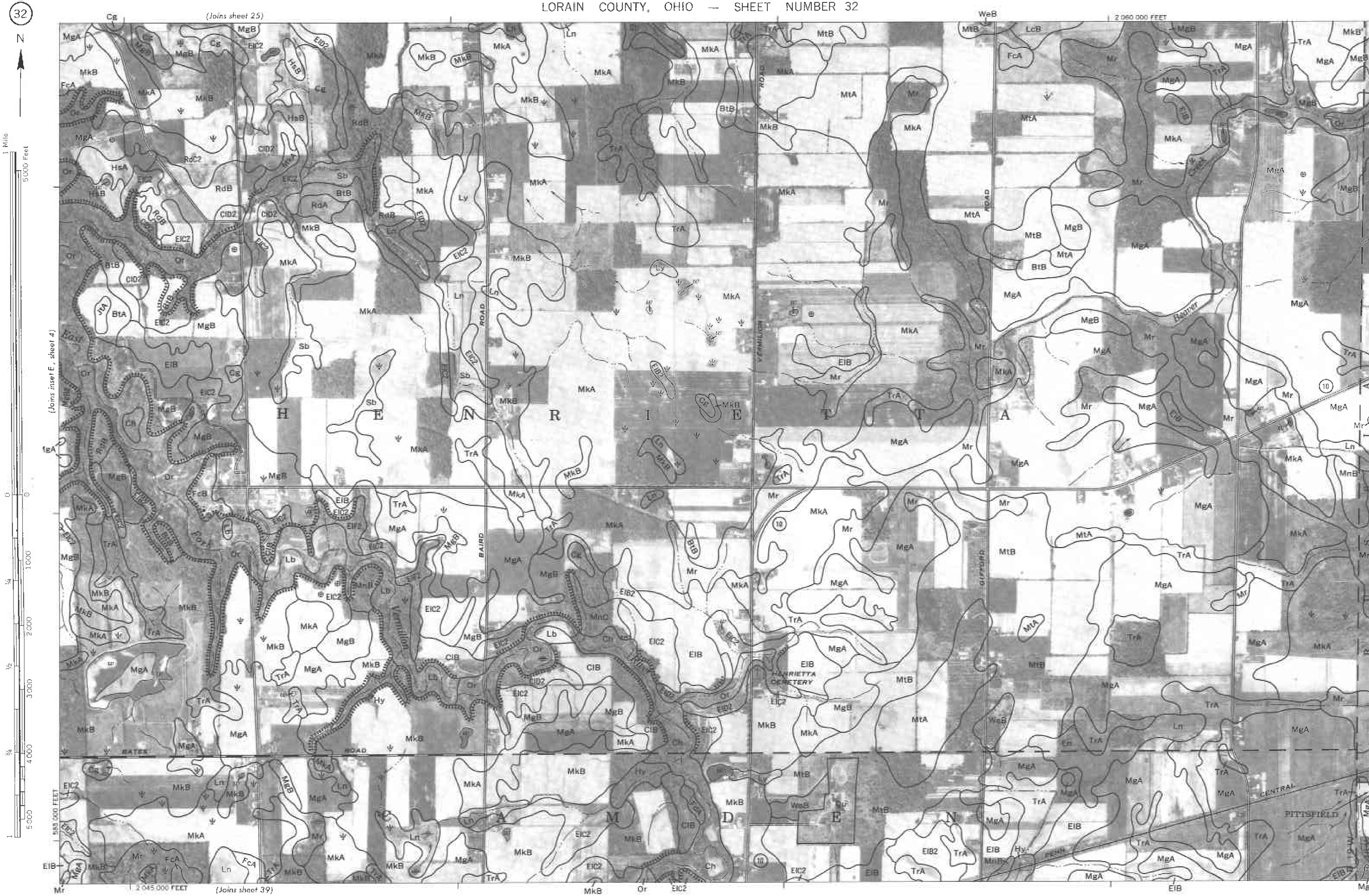
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

LORAIN COUNTY, OHIO NO. 31

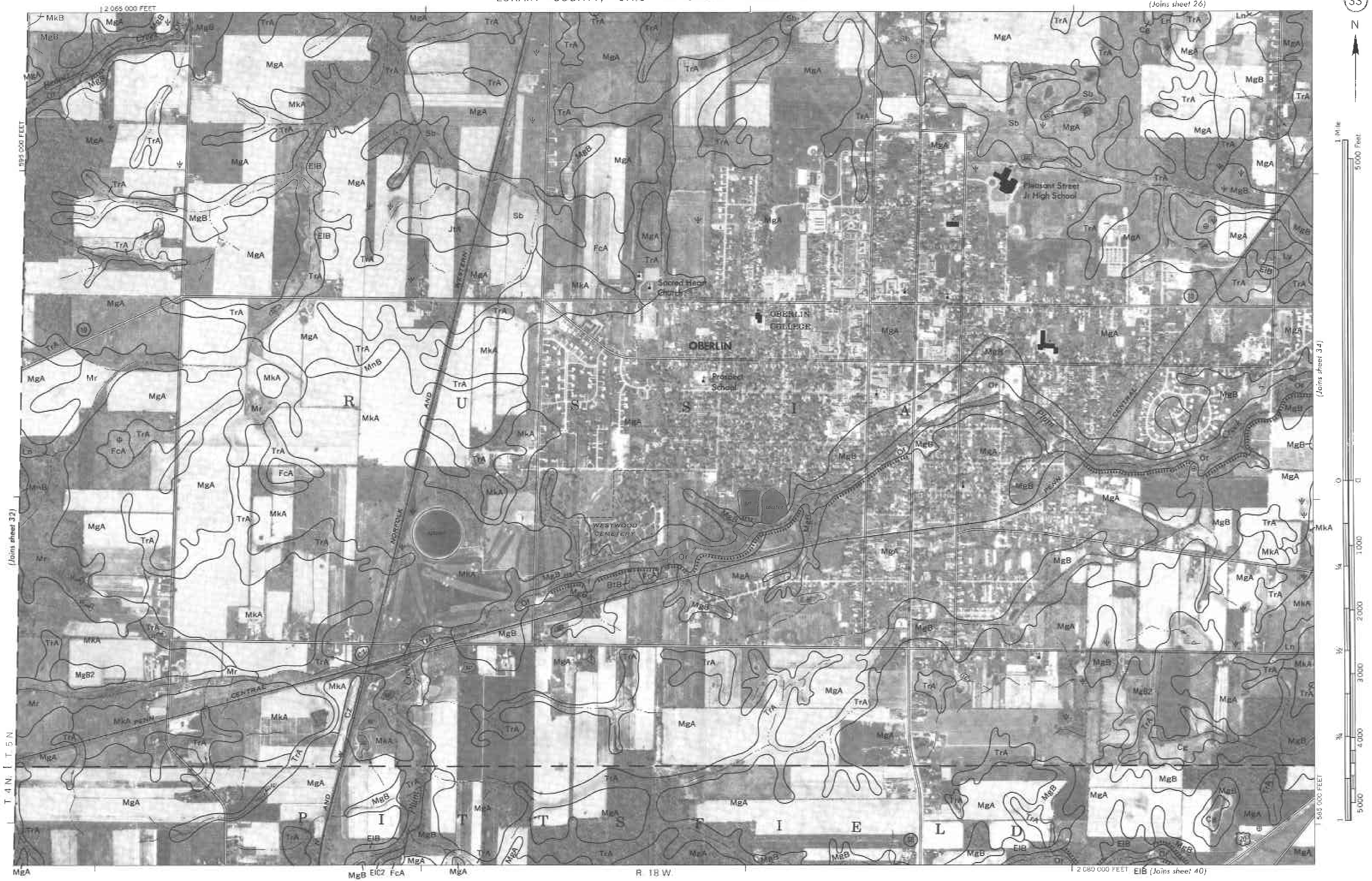
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

LORAIN COUNTY, OHIO — SHEET NUMBER 32



Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.



LORAIN COUNTY, OHIO NO. 33

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

LORAIN COUNTY, OHIO — SHEET NUMBER 34

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

LORAIN COUNTY, OHIO — SHEET NUMBER 35

LORAIN COUNTY, OHIO NO. 35

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

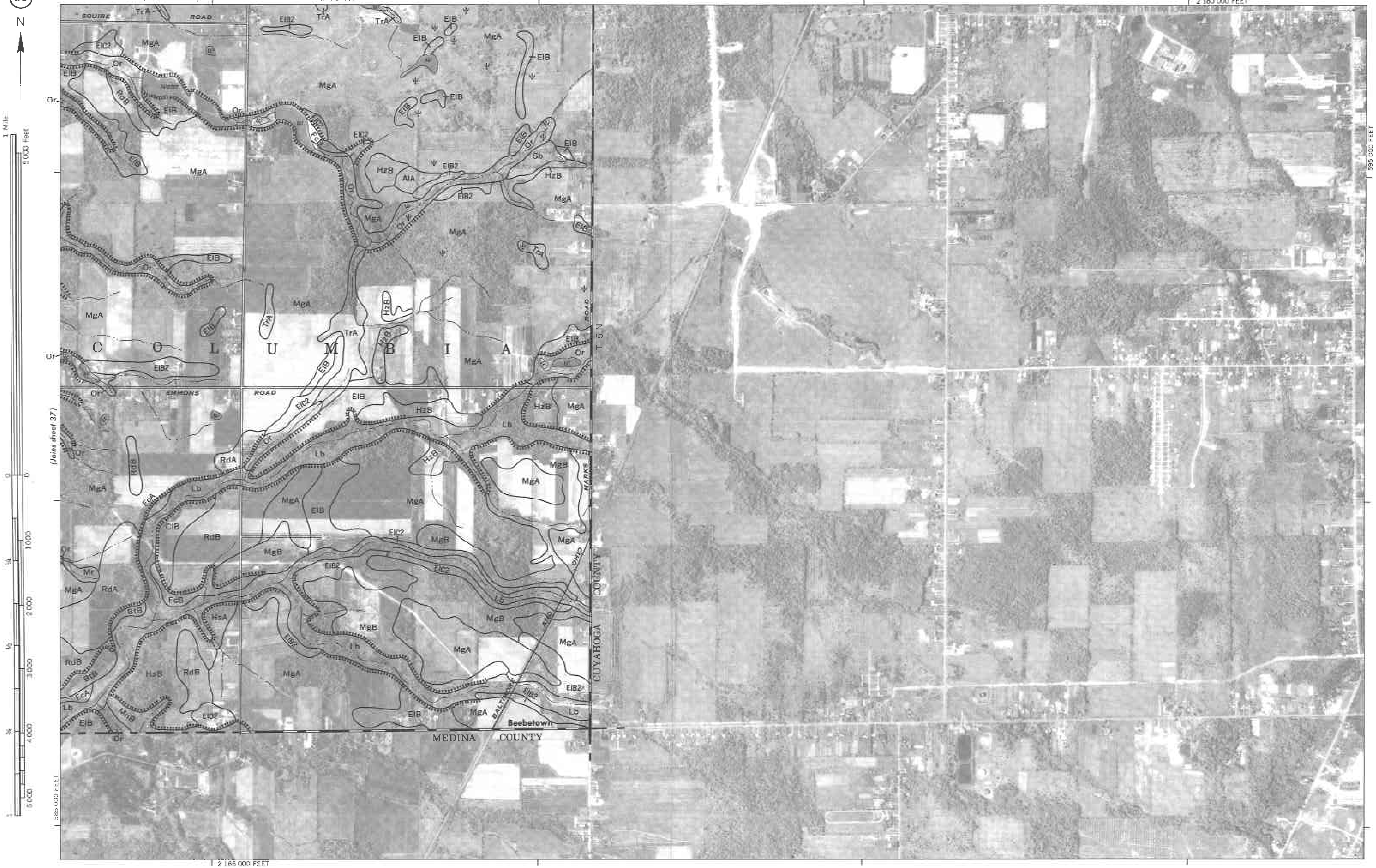
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

LORAIN COUNTY, OHIO NO. 37

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.



Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

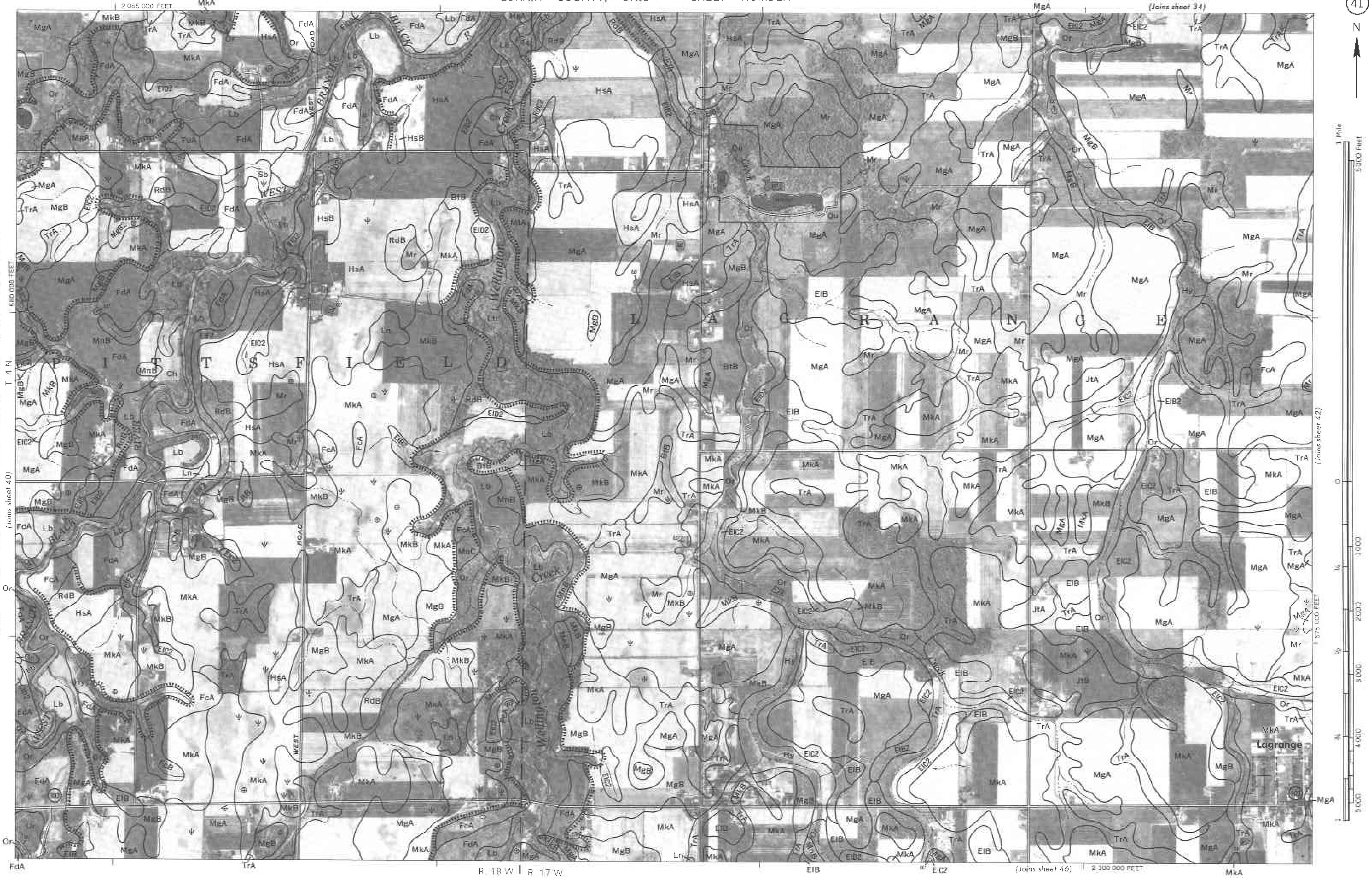
LORAIN COUNTY, OHIO NO. 39

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

LORAIN COUNTY, OHIO — SHEET NUMBER 40

Photobase from 1971 aerial photography. Positions of 5,000 foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

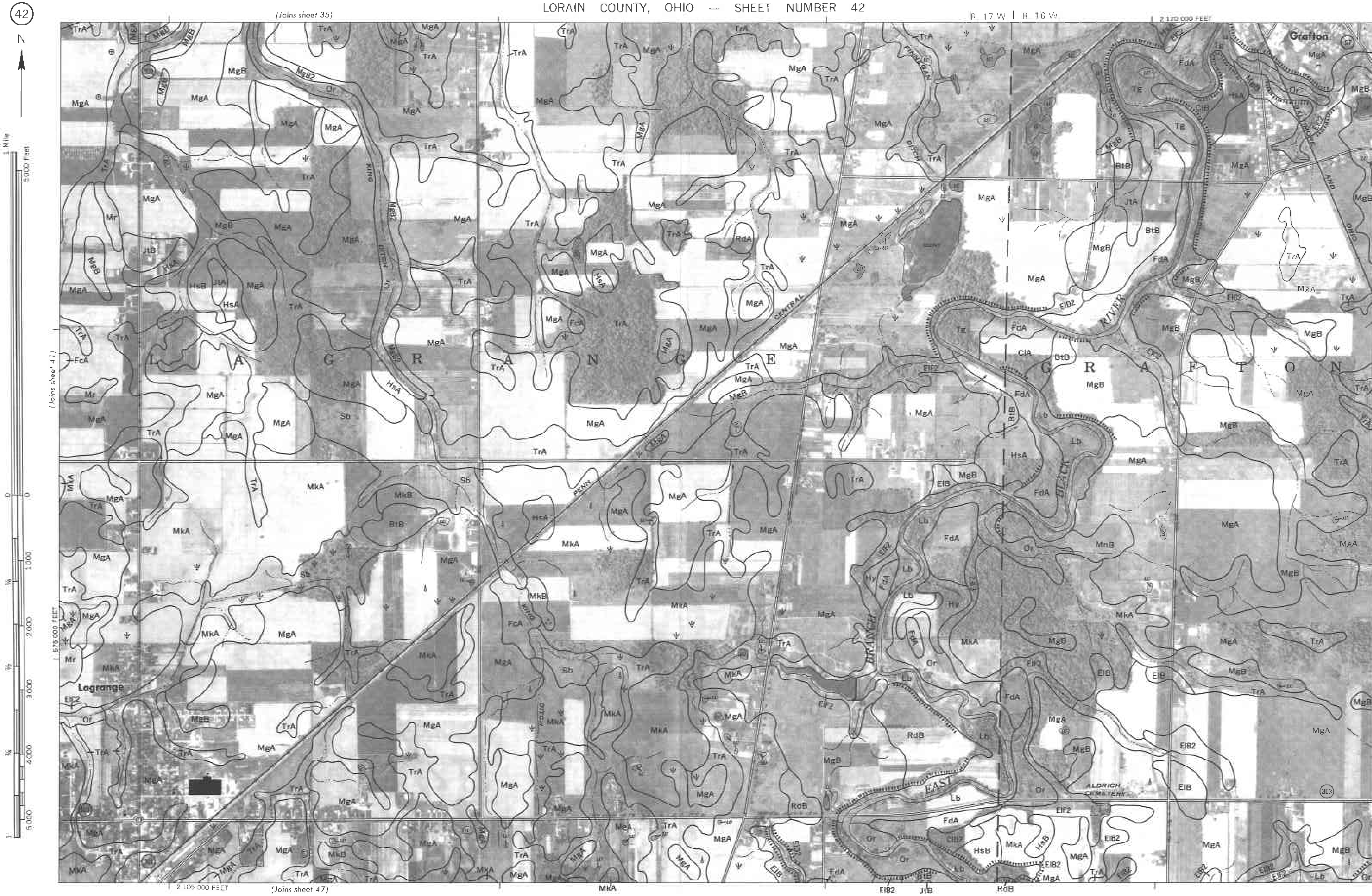


LORAIN COUNTY, OHIO NO. 41

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

LORAIN COUNTY, OHIO — SHEET NUMBER 42



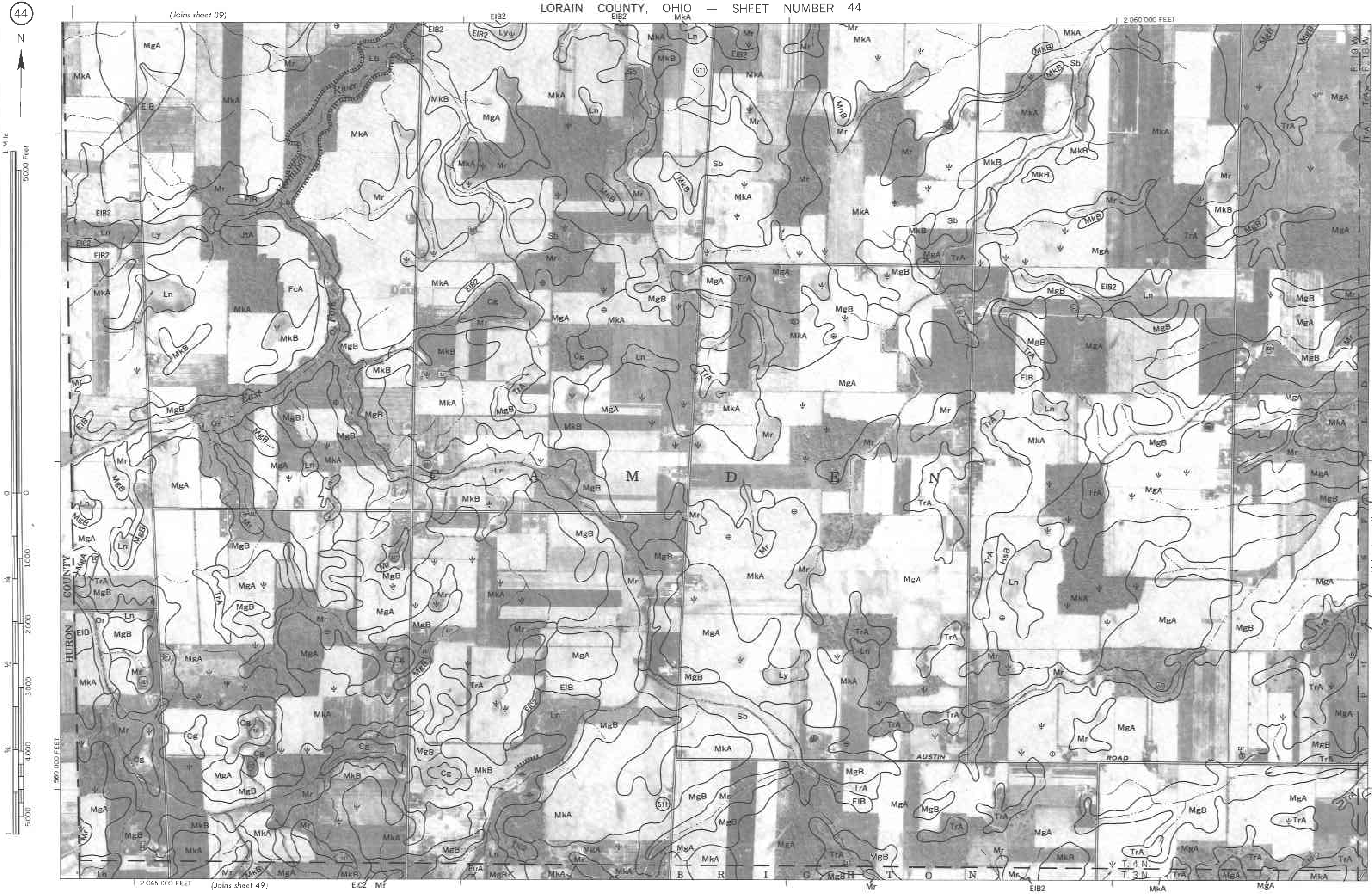
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

LORAIN COUNTY, OHIO NO. 43

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

Photobase from 1973 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.



Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center

LORAIN COUNTY, OHIO NO. 45

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

LORAIN COUNTY, OHIO — SHEET NUMBER 46

(Joins sheet 41)

R. 18 W. | R. 17 W.

2 100 000 FEET

N

(Joins sheet 45)

(Joins sheet 47)

1 Mile — 5000 Feet

0 — ¼ — ½ — ¾ — 1

0 — 1000 — 2000 — 3000 — 4000 — 5000

570 000 FEET

560 000 FEET

2 085 000 FEET

(Joins sheet 51)

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

LORAIN COUNTY, OHIO NO. 46

LORAIN COUNTY, OHIO — SHEET NUMBER 47

LORAIN COUNTY, OHIO NO. 47

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1973 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

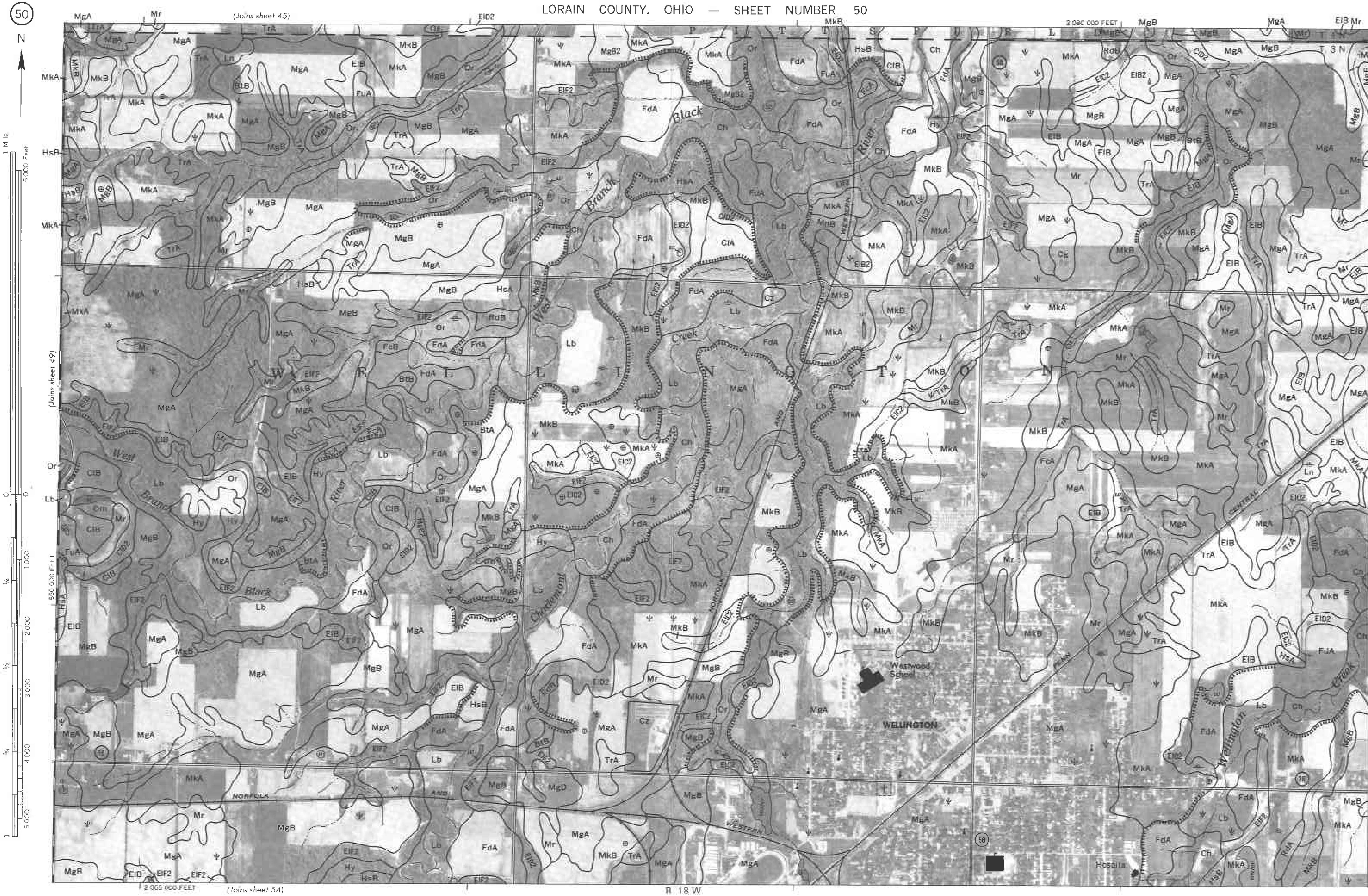
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

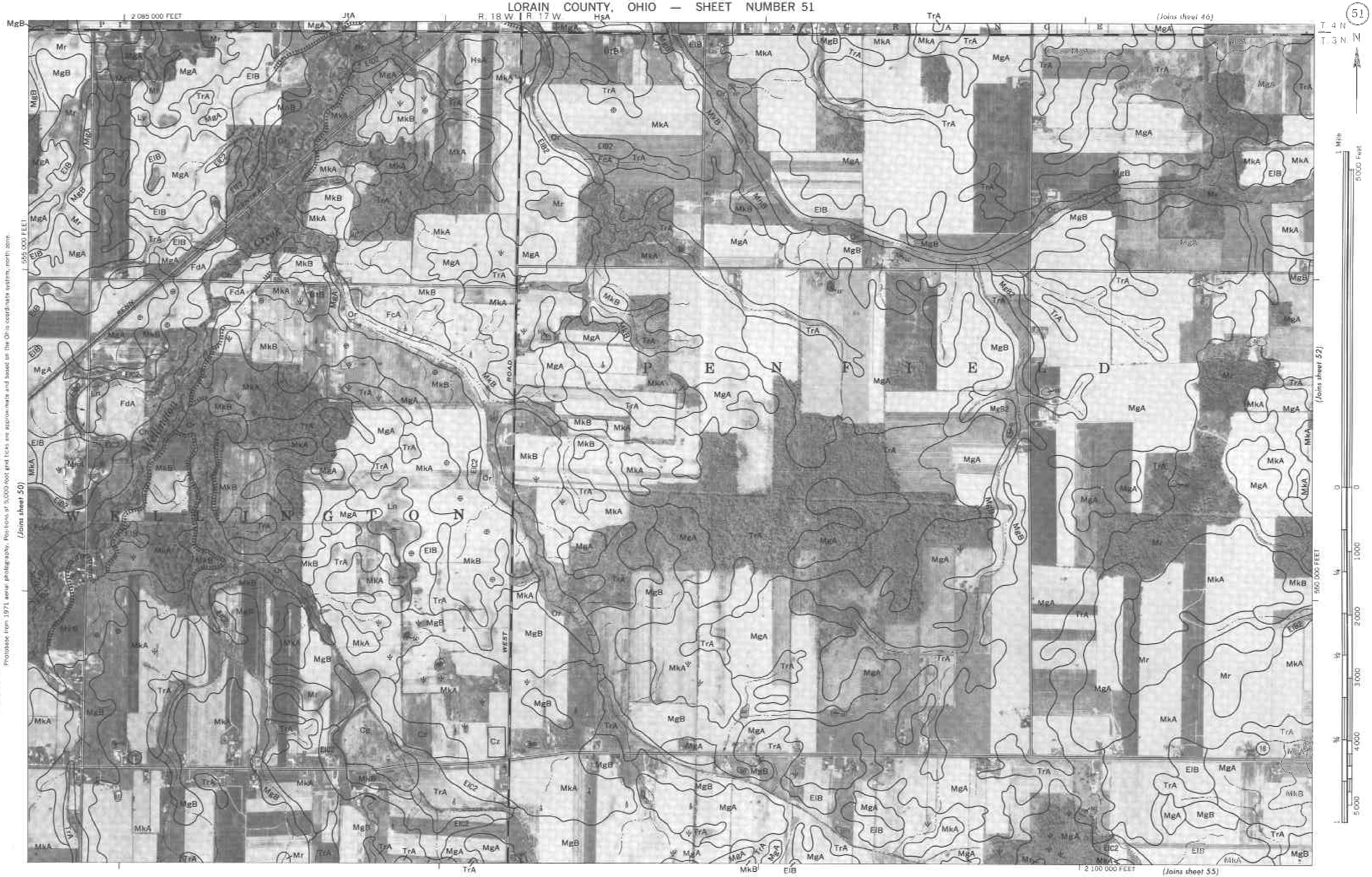
LORAIN COUNTY, OHIO NO. 49

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.



Photobase from 1973 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

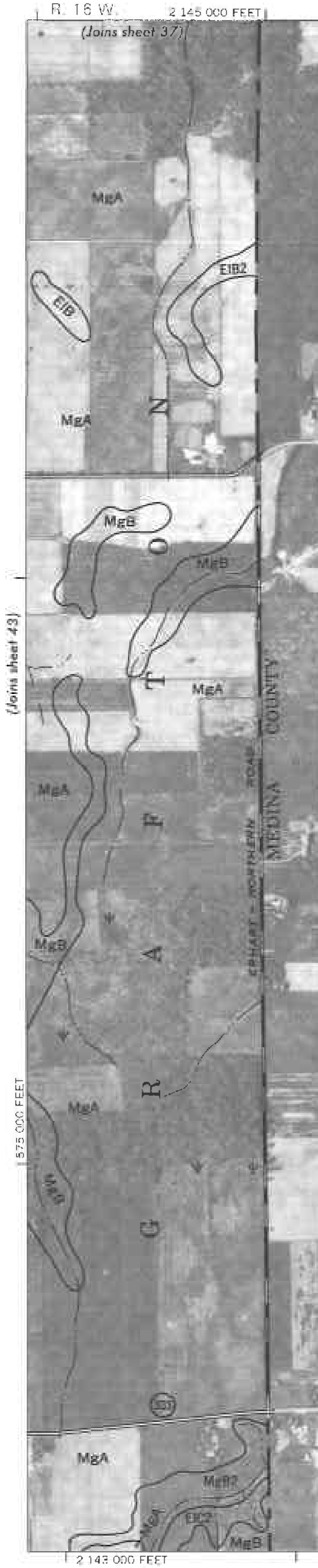


LORAIN COUNTY, OHIO NO. 51

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

LORAIN COUNTY, OHIO — SHEET NUMBER 52



(Joins inset, sheet 56)

2 000 AND 5 000-FOOT GRID TICKS

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

LORAIN COUNTY, OHIO NO. 53

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

LORAIN COUNTY, OHIO — SHEET NUMBER 54

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

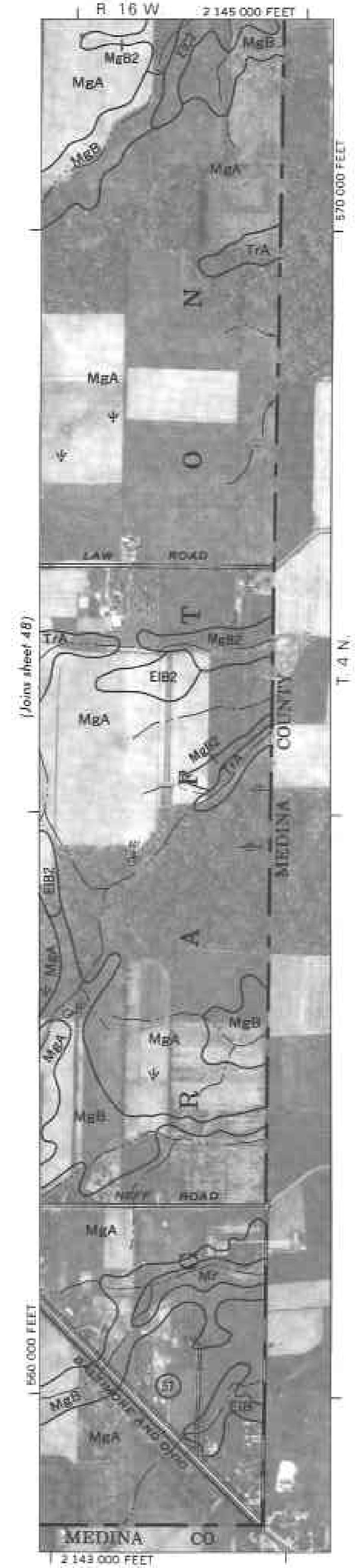
LORAIN COUNTY, OHIO — SHEET NUMBER 55

LORAIN COUNTY, OHIO NO. 55

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

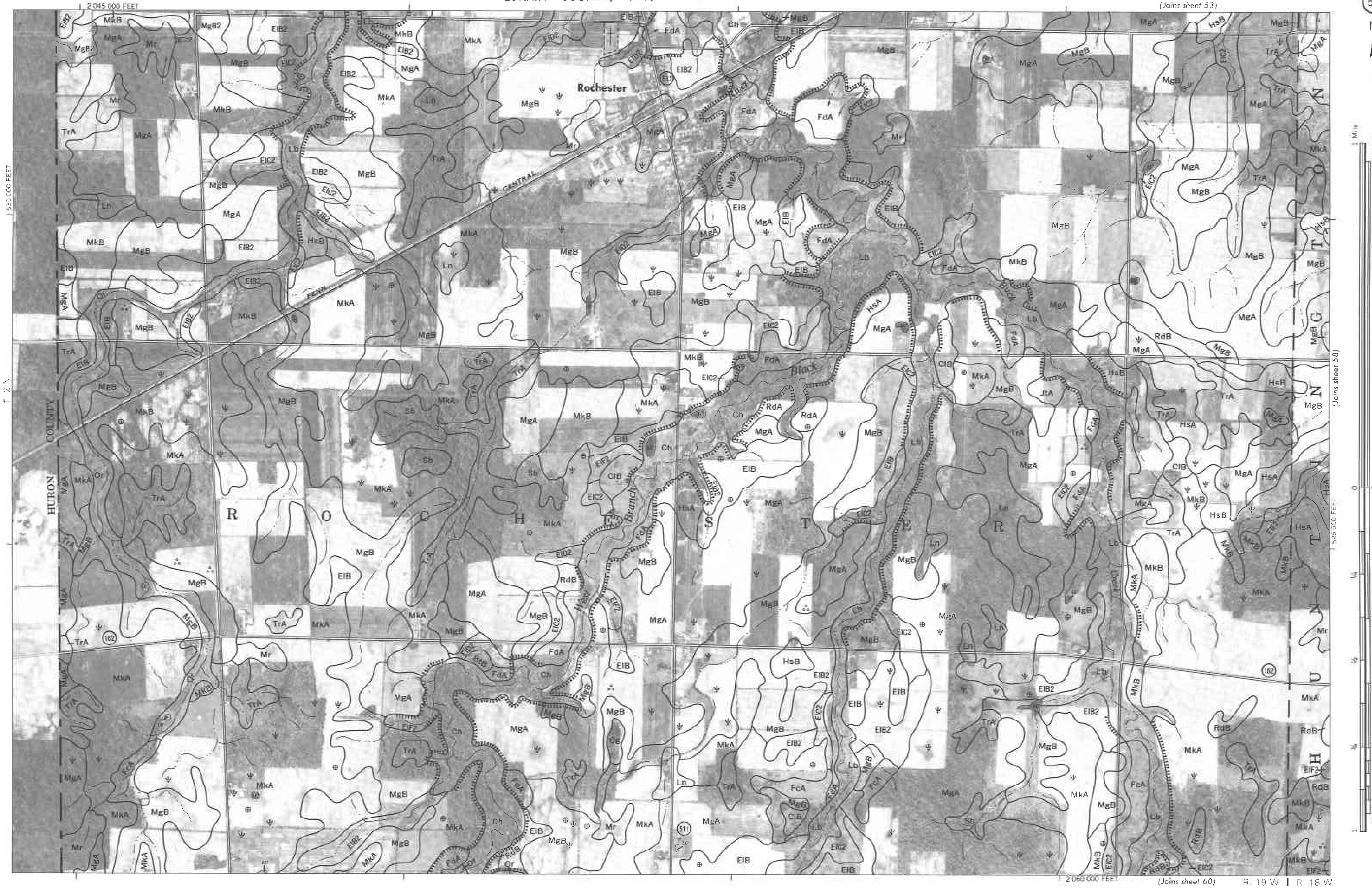
LORAIN COUNTY, OHIO — SHEET NUMBER 56



2 000 AND 5 000-FOOT GRID TICKS

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

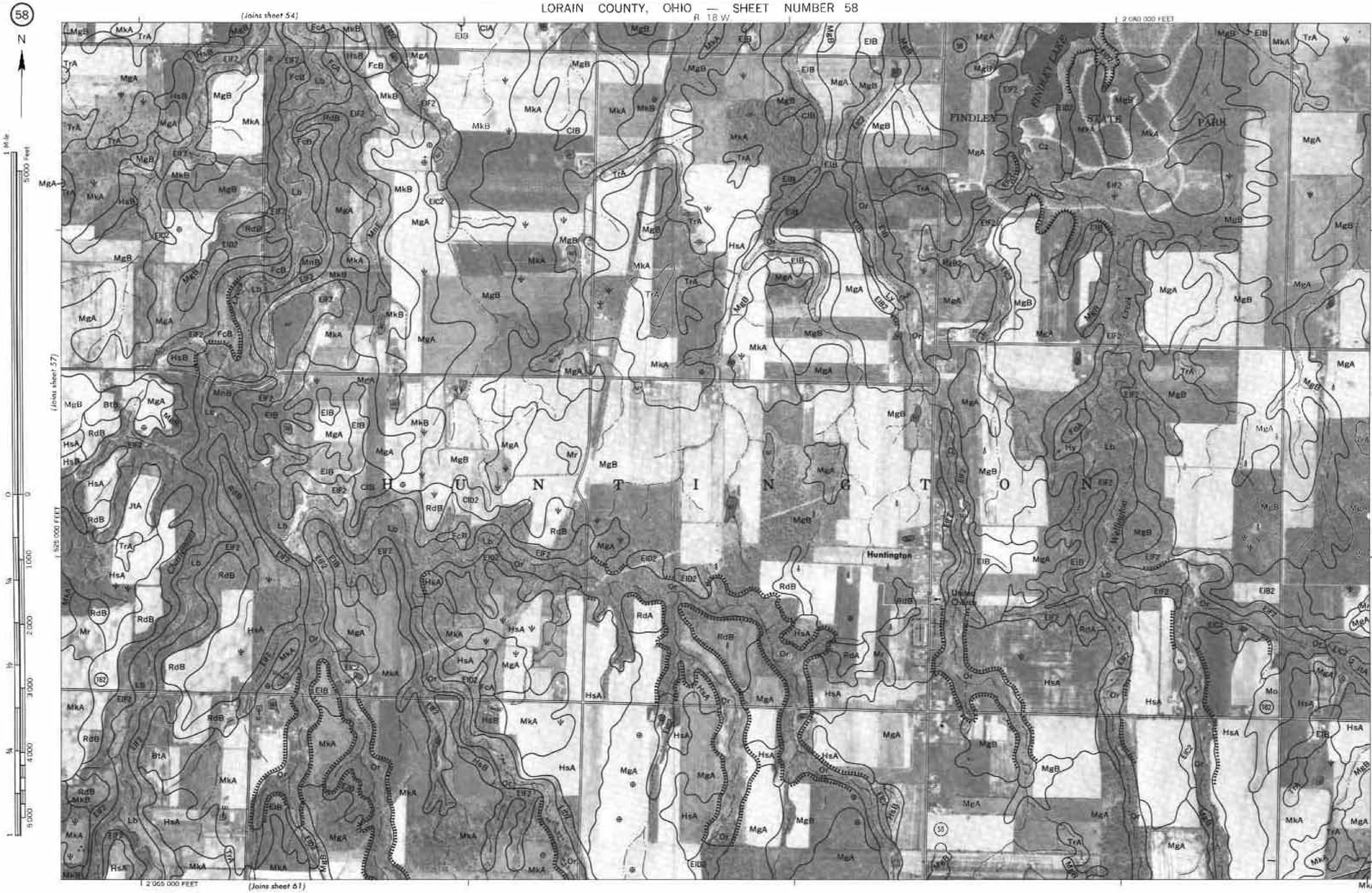


LORAIN COUNTY, OHIO NO. 57

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

LORAIN COUNTY, OHIO — SHEET NUMBER 58



Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

N

2 085 000 FEET

(Joins sheet 55)

R. 18 W.

530 000 FEET

T. 2 N.

(Joins sheet 58)

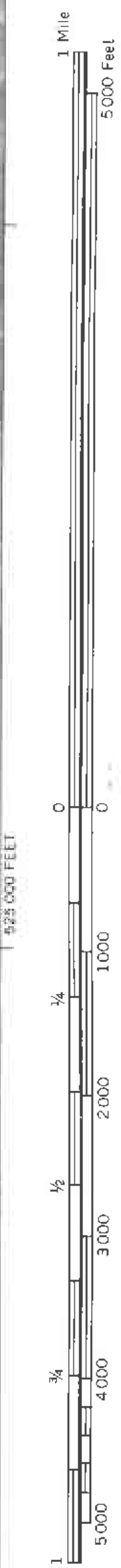
525 000 FEET

2 100 000 FEET

(Joins sheet 62)

MkA

MgA



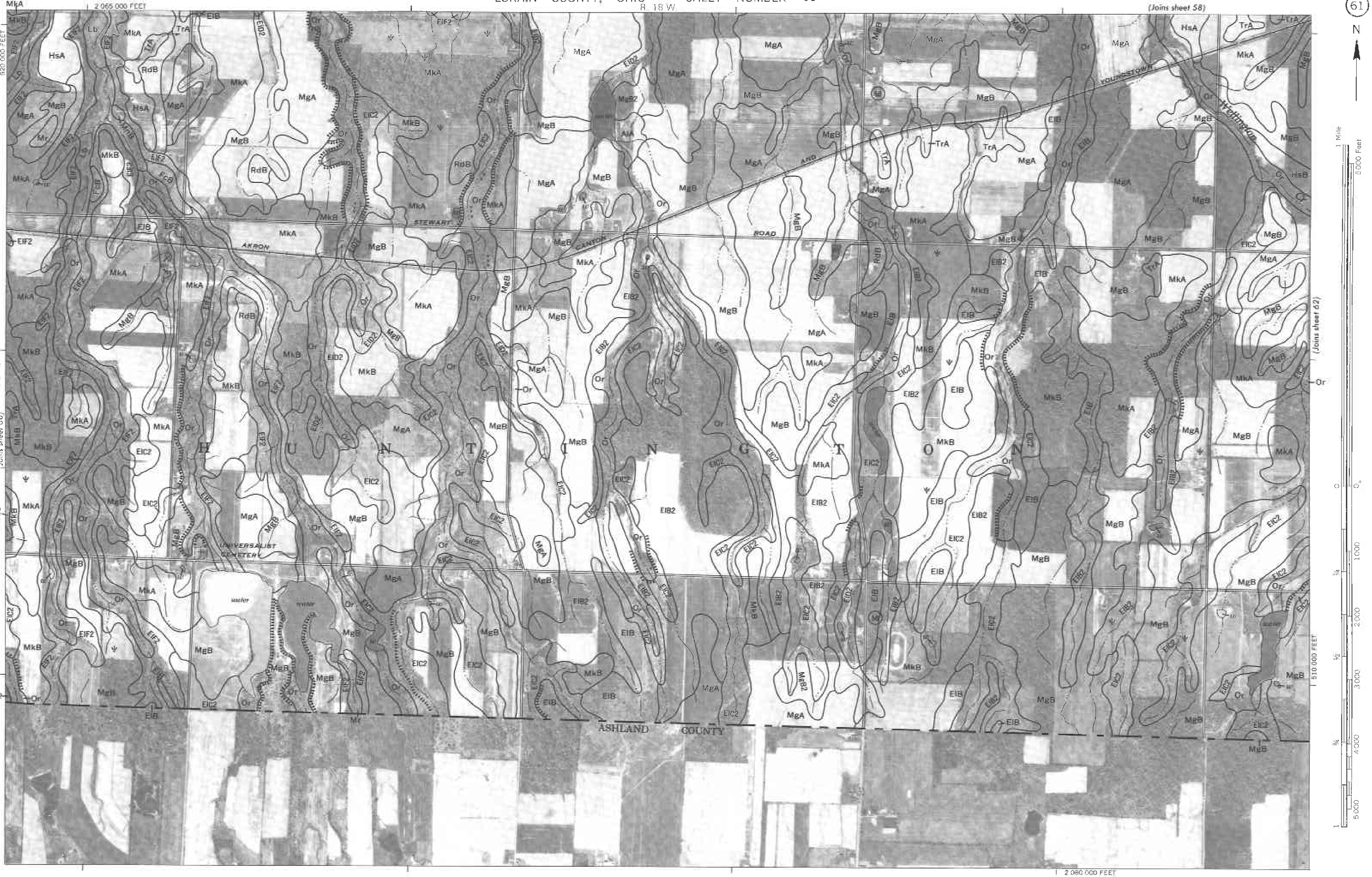
LORAIN COUNTY, OHIO NO. 59

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.

LORAIN COUNTY, OHIO — SHEET NUMBER 60

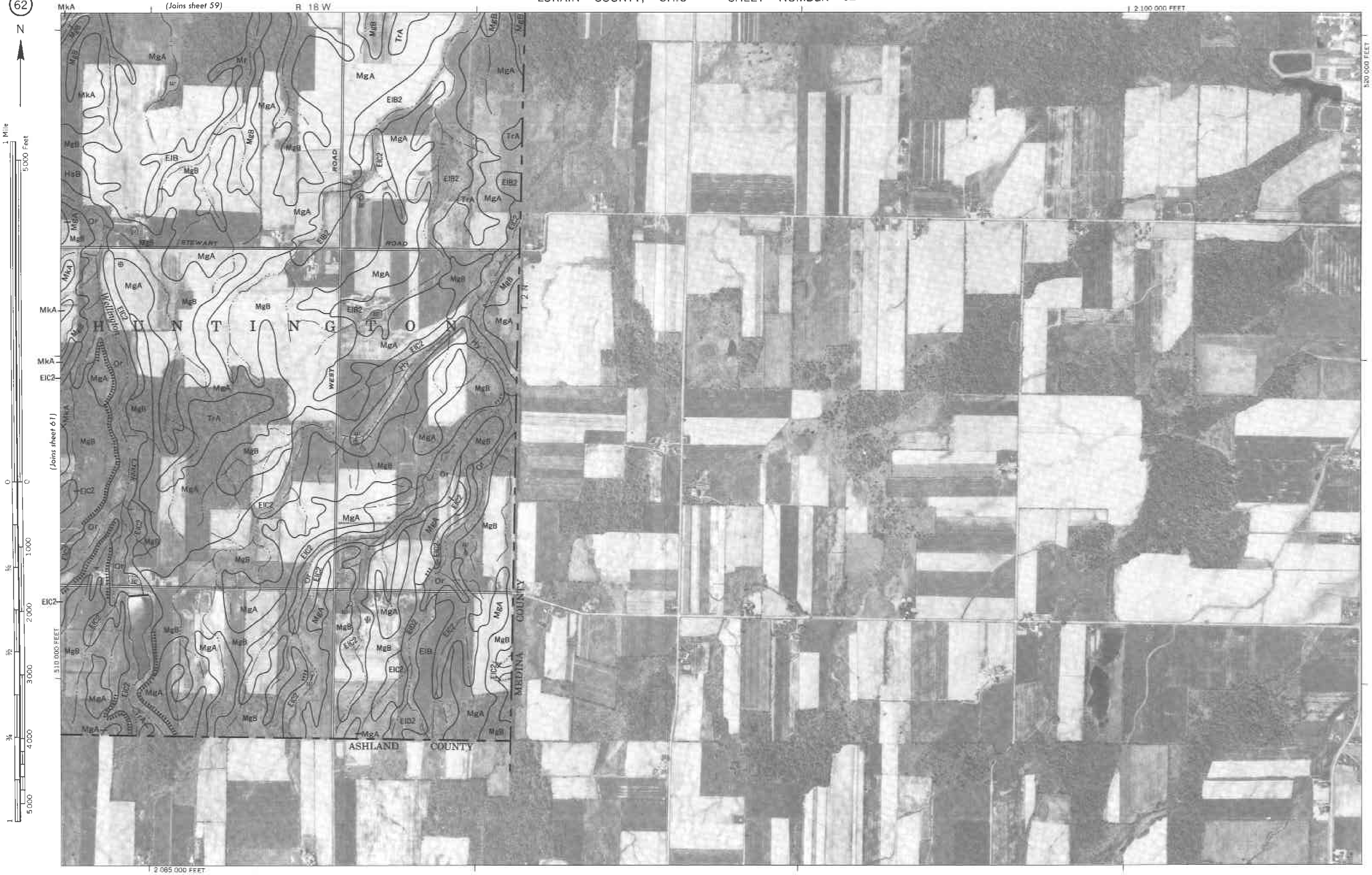
Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.



LORAIN COUNTY, OHIO NO. 61

This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center.

Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.



Photobase from 1971 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Ohio coordinate system, north zone.
This map is one of a set compiled in 1974 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research Development Center.